Public Input No. 1989-NFPA 70-2020 [Global Input]

Change measurement format from:
metric (imperial)
to
imperial (metric)

Statement of Problem and Substantiation for Public Input

This change is necessary for several reasons.

Reason 1: Consistency within the other NFPA codes. Many other NFPA including but not limited to NFPA 72 and other publications have measurements listed as imperial (metric) format. There is no reason for NEC to serve as the guinea pig, and be different.

NFPA 1 Fire Code
NFPA 2 Hydrogen Technologies Code
NFPA 3 Standard for Commissioning of Fire Protection and Life Safety Systems
NFPA 4 Standard for Integrated Fire Protection and Life Safety System Testing
NFPA 10 Standard for Portable Fire Extinguishers
NFPA 11 Standard for Low-, Medium-, and High-Expansion Foam
NFPA 11A Standard for Medium- and High-Expansion Foam Systems
NFPA 11C Standard for Mobile Foam Apparatus
NFPA 12 Standard on Carbon Dioxide Extinguishing Systems
NFPA 12A Standard on Halon 1301 Fire Extinguishing Systems
NFPA 13 Standard for the Installation of Sprinkler Systems
NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes
NFPA 13E Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems
NFPA 13R Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies
NFPA 14 Standard for the Installation of Standpipe and Hose Systems
NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection
NFPA 16 Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 17 Standard for Dry Chemical Extinguishing Systems
NFPA 17A Standard for Wet Chemical Extinguishing Systems
NFPA 18 Standard on Wetting Agents
NFPA 18A Standard on Water Additives for Fire Control and Vapor Mitigation
NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 22 Standard for Water Tanks for Private Fire Protection
NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
NFPA 30 Flammable and Combustible Liquids Code
NFPA 30A Code for Motor Fuel Dispensing Facilities and Repair Garages
NFPA 30B Code for the Manufacture and Storage of Aerosol Products
NFPA 31 Standard for the Installation of Oil-Burning Equipment
NFPA 32 Standard for Drycleaning Facilities
NFPA 33 Standard for Spray Application Using Flammable or Combustible Materials
NFPA 34 Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids
NFPA 35 Standard for the Manufacture of Organic Coatings
NFPA 36 Standard for Solvent Extraction Plants
NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

NFPA 40 Standard for the Storage and Handling of Cellulose Nitrate Film
NFPA 42 Code for the Storage of Pyroxylin Plastic
NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals
NFPA 46 Recommended Safe Practice for Storage of Forest Products
NFPA 50 Standard for Bulk Oxygen Systems at Consumer Sites
NFPA 50A Standard for Gaseous Hydrogen Systems at Consumer Sites
NFPA 50B Standard for Liquefied Hydrogen Systems at Consumer Sites
NFPA 51 Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes
NFPA 51A Standard for Acetylene Cylinder Charging Plants
NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 52 Vehicular Natural Gas Fuel Systems Code
NFPA 53 Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres
NFPA 54 National Fuel Gas Code
NFPA 55 Compressed Gases and Cryogenic Fluids Code
NFPA 56 Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems
NFPA 57 Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code
NFPA 58 Liquefied Petroleum Gas Code
NFPA 59 Utility LP-Gas Plant Code
NFPA 59A Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)
NFPA 61 Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
NFPA 67 Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems
NFPA 68 Standard on Explosion Protection by Deflagration Venting
NFPA 69 Standard on Explosion Prevention Systems
NFPA 72® National Fire Alarm and Signaling Code®
NFPA 73 Standard for Electrical Inspections for Existing Dwellings
NFPA 75 Standard for the Fire Protection of Information Technology Equipment
NFPA 76 Standard for the Fire Protection of Telecommunications Facilities
NFPA 77 Recommended Practice on Static Electricity
NFPA 78 Guide on Electrical Inspections
NFPA 79 Electrical Standard for Industrial Machinery
NFPA 80 Standard for Fire Doors and Other Opening Protectives
NFPA 80A Recommended Practice for Protection of Buildings from Exterior Fire Exposures
NFPA 82 Standard on Incinerators and Waste and Linen Handling Systems and Equipment
NFPA 85 Boiler and Combustion Systems Hazards Code
NFPA 86 Standard for Ovens and Furnaces
NFPA 86C Standard for Industrial Furnaces Using a Special Processing Atmosphere
NFPA 86D Standard for Industrial Furnaces Using Vacuum as an Atmosphere
NFPA 87 Standard for Fluid Heaters
NFPA 88A Standard for Parking Structures
NFPA 88B Standard for Repair Garages
NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems
NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems
NFPA 91 Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids
NFPA 92 Standard for Smoke Control Systems
NFPA 92A Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences
NFPA 92B Standard for Smoke Management Systems in Malls, Atria, and Large Spaces
NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 97 Standard Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances
NFPA 99 Health Care Facilities Code
NFPA 99B Standard for Hypobaric Facilities
NFPA 101® Life Safety Code®
NFPA 101A Guide on Alternative Approaches to Life Safety
NFPA 101B Code for Means of Egress for Buildings and Structures
NFPA 102 Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures
NFPA 105 Standard for Smoke Door Assemblies and Other Opening Protectives
NFPA 110 Standard for Emergency and Standby Power Systems
NFPA 111 Standard on Stored Electrical Energy Emergency and Standby Power Systems
NFPA 115 Standard for Laser Fire Protection

NFPA 120 Standard for Fire Prevention and Control in Coal Mines
NFPA 121 Standard on Fire Protection for Self-Propelled and Mobile Surface Mining Equipment
NFPA 122 Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities
NFPA 123 Standard for Fire Prevention and Control in Underground Bituminous Coal Mines
NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems
NFPA 140 Standard on Motion Picture and Television Production Studio Soundstages, Approved Production Facilities, and Production Locations
NFPA 150 Fire and Life Safety in Animal Housing Facilities Code
NFPA 160 Standard for the Use of Flame Effects Before an Audience
NFPA 170 Standard for Fire Safety and Emergency Symbols
NFPA 200 Standard for Hanging and Bracing of Fire Suppression Systems
NFPA 203 Guide on Roof Coverings and Roof Deck Constructions
NFPA 204 Standard for Smoke and Heat Venting
NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
NFPA 214 Standard on Water-Cooling Towers
NFPA 220 Standard on Types of Building Construction
NFPA 221 Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls
NFPA 225 Model Manufactured Home Installation Standard
NFPA 230 Standard for the Fire Protection of Storage
NFPA 231 Standard for General Storage
NFPA 231C Standard for Rack Storage of Materials
NFPA 231D Standard for Storage of Rubber Tires
NFPA 231E Recommended Practice for the Storage of Baled Cotton
NFPA 231F Standard for the Storage of Roll Paper
NFPA 232 Standard for the Protection of Records
NFPA 232A Guide for Fire Protection for Archives and Records Centers
NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 251 Standard Methods of Tests of Fire Resistance of Building Construction and Materials
NFPA 252 Standard Methods of Fire Tests of Door Assemblies
NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials
NFPA 256 Standard Methods of Fire Tests of Roof Coverings
NFPA 257 Standard on Fire Test for Window and Glass Block Assemblies
NFPA 258 Recommended Practice for Determining Smoke Generation of Solid Materials
NFPA 259 Standard Test Method for Potential Heat of Building Materials
NFPA 260 Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture
NFPA 261 Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes
NFPA 262 Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
NFPA 265 Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls
NFPA 266 Standard Method of Test for Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source
NFPA 267 Standard Method of Test for Fire Characteristics of Mattresses and Bedding Assemblies Exposed to Flaming Ignition Source
NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
NFPA 269 Standard Test Method for Developing Toxic Potency Data for Use in Fire Hazard Modeling
NFPA 270 Standard Test Method for Measurement of Smoke Obscuration Using a Conical Radiant Source in a Single Closed Chamber
NFPA 271 Standard Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
NFPA 272 Standard Method of Test for Heat and Visible Smoke Release Rates for Upholstered Furniture Components or Composites and Mattresses Using an Oxygen Consumption Calorimeter
NFPA 274 Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation
NFPA 275 Standard Method of Fire Tests for the Evaluation of Thermal Barriers
NFPA 276 Standard Method of Fire Test for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components
NFPA 277 Standard Methods of Tests for Evaluating Fire and Ignition Resistance of Upholstered Furniture Using a Flaming Ignition Source

NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components
NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
NFPA 287 Standard Test Methods for Measurement of Flammability of Materials in Cleanrooms Using a Fire Propagation Apparatus (FPA)
NFPA 288 Standard Methods of Fire Tests of Horizontal Fire Door Assemblies Installed in Horizontal Fire Resistance-Rated Assemblies
NFPA 289 Standard Method of Fire Test for Individual Fuel Packages
NFPA 290 Standard for Fire Testing of Passive Protection Materials for Use on LP-Gas Containers
NFPA 291 Recommended Practice for Fire Flow Testing and Marking of Hydrants
NFPA 295 Standard for Wildfire Control
NFPA 297 Guide on Principles and Practices for Communications Systems
NFPA 298 Standard on Foam Chemicals for Wildland Fire Control
NFPA 299 Standard for Protection of Life and Property from Wildfire
NFPA 301 Code for Safety to Life from Fire on Merchant Vessels
NFPA 302 Fire Protection Standard for Pleasure and Commercial Motor Craft
NFPA 303 Fire Protection Standard for Marinas and Boatyards
NFPA 306 Standard for the Control of Gas Hazards on Vessels
NFPA 307 Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves
NFPA 312 Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-Up
NFPA 318 Standard for the Protection of Semiconductor Fabrication Facilities
NFPA 326 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair
NFPA 328 Recommended Practice for the Control of Flammable and Combustible Liquids and Gases in Manholes, Sewers, and Similar Underground Structures
NFPA 329 Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases
NFPA 350 Guide for Safe Confined Space Entry and Work
NFPA 385 Standard for Tank Vehicles for Flammable and Combustible Liquids
NFPA 386 Standard for Portable Shipping Tanks for Flammable and Combustible Liquids
NFPA 395 Standard for the Storage of Flammable and Combustible Liquids at Farms and Isolated Sites
NFPA 400 Hazardous Materials Code
NFPA 401 Recommended Practice for the Prevention of Fires and Uncontrolled Chemical Reactions Associated with the Handling of Hazardous Waste
NFPA 402 Guide for Aircraft Rescue and Fire-Fighting Operations
NFPA 403 Standard for Aircraft Rescue and Fire-Fighting Services at Airports
NFPA 405 Standard for the Recurring Proficiency of Airport Fire Fighters
NFPA 407 Standard for Aircraft Fuel Servicing
NFPA 408 Standard for Aircraft Hand Portable Fire Extinguishers
NFPA 409 Standard on Aircraft Hangars
NFPA 410 Standard on Aircraft Maintenance
NFPA 412 Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment
NFPA 414 Standard for Aircraft Rescue and Fire-Fighting Vehicles
NFPA 415 Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways
NFPA 418 Standard for Heliports
NFPA 422 Guide for Aircraft Accident/Incident Response Assessment
NFPA 423 Standard for Construction and Protection of Aircraft Engine Test Facilities
NFPA 424 Guide for Airport/Community Emergency Planning
NFPA 430 Code for the Storage of Liquid and Solid Oxidizers
NFPA 432 Code for the Storage of Organic Peroxide Formulations
NFPA 434 Code for the Storage of Pesticides
NFPA 440 Guide for Aircraft Rescue and Firefighting Operations and Airport/Community Emergency Planning
NFPA 450 Guide for Emergency Medical Services and Systems
NFPA 451 Guide for Community Health Care Programs
NFPA 460 Standard for Aircraft Rescue and Firefighting Services at Airports, Recurring Proficiency of Airport Fire Fighters, and Evaluating Aircraft Rescue and Firefighting Foam Equipment
NFPA 461 Standard for Fire Protection of Spaceport Facilities
NFPA 470 Hazardous Materials Standards for Responders
NFPA 471 Recommended Practice for Responding to Hazardous Materials Incidents
NFPA 472 Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents

NFPA 473 Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents
NFPA 475 Recommended Practice for Organizing, Managing, and Sustaining a Hazardous Materials/Weapons of Mass Destruction Response Program
NFPA 480 Standard for the Storage, Handling, and Processing of Magnesium Solids and Powders
NFPA 481 Standard for the Production, Processing, Handling, and Storage of Titanium
NFPA 482 Standard for the Production, Processing, Handling, and Storage of Zirconium
NFPA 484 Standard for Combustible Metals
NFPA 485 Standard for the Storage, Handling, Processing, and Use of Lithium Metal
NFPA 490 Code for the Storage of Ammonium Nitrate
NFPA 495 Explosive Materials Code
NFPA 496 Standard for Purged and Pressurized Enclosures for Electrical Equipment
NFPA 497 Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 498 Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives
NFPA 499 Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 501 Standard on Manufactured Housing
NFPA 501A Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities
NFPA 502 Standard for Road Tunnels, Bridges, and Other Limited Access Highways
NFPA 505 Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations
NFPA 513 Standard for Motor Freight Terminals
NFPA 520 Standard on Subterranean Spaces
NFPA 550 Guide to the Fire Safety Concepts Tree
NFPA 551 Guide for the Evaluation of Fire Risk Assessments
NFPA 555 Guide on Methods for Evaluating Potential for Room Flashover
NFPA 556 Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles
NFPA 557 Standard for Determination of Fire Loads for Use in Structural Fire Protection Design
NFPA 560 Standard for the Storage, Handling, and Use of Ethylene Oxide for Sterilization and Fumigation
NFPA 600 Standard on Facility Fire Brigades
NFPA 601 Standard for Security Services in Fire Loss Prevention
NFPA 610 Guide for Emergency and Safety Operations at Motorsports Venues
NFPA 650 Standard for Pneumatic Conveying Systems for Handling Combustible Particulate Solids
NFPA 651 Standard for the Machining and Finishing of Aluminum and the Production and Handling of Aluminum Powders
NFPA 652 Standard on the Fundamentals of Combustible Dust
NFPA 654 Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
NFPA 655 Standard for Prevention of Sulfur Fires and Explosions
NFPA 664 Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
NFPA 703 Standard for Fire Retardant—Treated Wood and Fire–Retardant Coatings for Building Materials
NFPA 704 Standard System for the Identification of the Hazards of Materials for Emergency Response
NFPA 705 Recommended Practice for a Field Flame Test for Textiles and Films
NFPA 715 Standard for the Installation of Fuel Gases Detection and Warning Equipment
NFPA 720 Standard for the Installation of Carbon Monoxide(CO) Detection and Warning Equipment
NFPA 730 Guide for Premises Security
NFPA 731 Standard for the Installation of Premises Security Systems
NFPA 750 Standard on Water Mist Fire Protection Systems
NFPA 770 Standard on Hybrid (Water and Inert Gas) Fire Extinguishing Systems
NFPA 780 Standard for the Installation of Lightning Protection Systems
NFPA 790 Standard for Competency of Third-Party Field Evaluation Bodies
NFPA 791 Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation
NFPA 801 Standard for Fire Protection for Facilities Handling Radioactive Materials
NFPA 803 Standard for Fire Protection for Light Water Nuclear Power Plants
NFPA 804 Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants
NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants

NFPA 806 Performance-Based Standard for Fire Protection for Advanced Nuclear Reactor Electric Generating Plants Change Process
NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities
NFPA 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
NFPA 851 Recommended Practice for Fire Protection for Hydroelectric Generating Plants
NFPA 853 Standard for the Installation of Stationary Fuel Cell Power Systems
NFPA 855 Standard for the Installation of Stationary Energy Storage Systems
NFPA 900 Building Energy Code
NFPA 901 Standard Classifications for Incident Reporting and Fire Protection Data
NFPA 902 Fire Reporting Field Incident Guide
NFPA 903 Fire Reporting Property Survey Guide
NFPA 904 Incident Follow-up Report Guide
NFPA 906 Guide for Fire Incident Field Notes
NFPA 909 Code for the Protection of Cultural Resource Properties - Museums, Libraries, and Places of Worship
NFPA 914 Code for the Protection of Historic Structures
NFPA 915 Standard for Remote Inspections
NFPA 921 Guide for Fire and Explosion Investigations
NFPA 950 Standard for Data Development and Exchange for the Fire Service
NFPA 951 Guide to Building and Utilizing Digital Information
NFPA 1000 Standard for Fire Service Professional Qualifications Accreditation and Certification Systems
NFPA 1001 Standard for Fire Fighter Professional Qualifications
NFPA 1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications
NFPA 1003 Standard for Airport Fire Fighter Professional Qualifications
NFPA 1005 Standard for Professional Qualifications for Marine Fire Fighting for Land-Based Fire Fighters
NFPA 1006 Standard for Technical Rescue Personnel Professional Qualifications
NFPA 1021 Standard for Fire Officer Professional Qualifications
NFPA 1022 Standard on Fire Service Analysts Technical Specialists Professional Qualifications
NFPA 1026 Standard for Incident Management Personnel Professional Qualifications
NFPA 1030 Standard for Professional Qualifications for Fire Prevention Program Positions
NFPA 1031 Standard for Professional Qualifications for Fire Inspector and Plan Examiner
NFPA 1033 Standard for Professional Qualifications for Fire Investigator
NFPA 1035 Standard on Fire and Life Safety Educator, Public Information Officer, Youth Firesetter Intervention Specialist and Youth Firesetter Program Manager Professional Qualifications
NFPA 1037 Standard on Fire Marshal Professional Qualifications
NFPA 1041 Standard for Fire and Emergency Services Instructor Professional Qualifications
NFPA 1051 Standard for Wildland Firefighting Personnel Professional Qualifications
NFPA 1061 Standard for Public Safety Telecommunications Personnel Professional Qualifications
NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications
NFPA 1072 Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications
NFPA 1078 Standard for Electrical Inspector Professional Qualifications
NFPA 1081 Standard for Facility Fire Brigade Member Professional Qualifications
NFPA 1082 Standard for Facilities Fire and Life Safety Director Professional Qualifications
NFPA 1091 Standard for Traffic Incident Management Personnel Professional Qualifications
NFPA 1122 Code for Model Rocketry
NFPA 1123 Code for Fireworks Display
NFPA 1124 Code for the Manufacture, Transportation, and Storage of Fireworks and Pyrotechnic Articles
NFPA 1125 Code for the Manufacture of Model Rocket and High-Power Rocket Motors
NFPA 1126 Standard for the Use of Pyrotechnics Before a Proximate Audience
NFPA 1127 Code for High Power Rocketry
PYR 1128 Standard Method of Fire Test for Flame Breaks
PYR 1129 Standard Method of Fire Test for Covered Fuse on Consumer Fireworks
NFPA 1140 Standards for Wildland Firefighting
NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas
NFPA 1142 Standard on Water Supplies for Suburban and Rural Fire Fighting
NFPA 1143 Standard for Wildland Fire Management
NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire
NFPA 1145 Guide for the Use of Class A Foams in Fire Fighting

NFPA 1150 Standard on Foam Chemicals for Fires in Class A Fuels
NFPA 1192 Standard on Recreational Vehicles
NFPA 1194 Standard for Recreational Vehicle Parks and Campgrounds
NFPA 1201 Standard for Providing Fire and Emergency Services to the Public
NFPA 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems
NFPA 1225 Standards for Emergency Services Communications
NFPA 1231 Standard on Water Supplies for Suburban and Rural Fire Fighting
NFPA 1250 Recommended Practice in Fire and Emergency Service Organization Risk Management
NFPA 1300 Standard on Community Risk Assessment and Community Risk Reduction Plan Development
NFPA 1321 Standard for Fire Investigation Units
NFPA 1401 Recommended Practice for Fire Service Training Reports and Records
NFPA 1402 Standard on Facilities for Fire Training and Associated Props
NFPA 1403 Standard on Live Fire Training Evolutions
NFPA 1404 Standard for Fire Service Respiratory Protection Training
NFPA 1405 Guide for Land-Based Fire Departments that Respond to Marine Vessel Fires
NFPA 1407 Standard for Training Fire Service Rapid Intervention Crews
NFPA 1408 Standard for Training Fire Service Personnel in the Operation, Care, Use, and Maintenance of Thermal Imagers
NFPA 1410 Standard on Training for Emergency Scene Operations
NFPA 1451 Standard for a Fire and Emergency Service Vehicle Operations Training Program
NFPA 1452 Guide for Training Fire Service Personnel to Conduct Community Risk Reduction for Residential Occupancies
NFPA 1500™ Standard on Fire Department Occupational Safety, Health, and Wellness Program
NFPA 1521 Standard for Fire Department Safety Officer Professional Qualifications
NFPA 1561 Standard on Emergency Services Incident Management System and Command Safety
NFPA 1581 Standard on Fire Department Infection Control Program
NFPA 1582 Standard on Comprehensive Occupational Medical Program for Fire Departments
NFPA 1583 Standard on Health-Related Fitness Programs for Fire Department Members
NFPA 1584 Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises
NFPA 1585 Standard on Contamination Control
NFPA 1600® Standard on Continuity, Emergency, and Crisis Management
NFPA 1616 Standard on Mass Evacuation, Sheltering, and Re-entry Programs
NFPA 1620 Standard for Pre-Incident Planning
NFPA 1660 Standard on Community Risk Assessment, Pre-Incident Planning, Mass Evacuation, Sheltering, and Re-entry Programs
NFPA 1670 Standard on Operations and Training for Technical Search and Rescue Incidents
NFPA 1700 Guide for Structural Fire Fighting
NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments
NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments
NFPA 1730 Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations
NFPA 1801 Standard on Thermal Imagers for the Fire Service
NFPA 1802 Standard on Two-Way, Portable RF Voice Communications Devices for Use by Emergency Services Personnel in the Hazard Zone
NFPA 1851 Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
NFPA 1852 Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)
NFPA 1855 Standard on Selection, Care, and Maintenance of Protective Ensembles for Technical Rescue Incidents
NFPA 1858 Standard on Selection, Care, and Maintenance of Life Safety Rope and Equipment for Emergency Services
NFPA 1859 Standard on Selection, Care, and Maintenance of Tactical Operations Video Equipment
NFPA 1877 Standard on Selection, Care, and Maintenance of Wildland Fire Fighting Clothing and Equipment
NFPA 1891 Standard on Selection, Care, and Maintenance of Hazardous Materials Clothing and Equipment
NFPA 1900 Standard for Aircraft Rescue and Firefighting Vehicles, Automotive Fire Apparatus, Wildland Fire Apparatus, and Automotive Ambulances

NFPA 1901 Standard for Automotive Fire Apparatus
NFPA 1906 Standard for Wildland Fire Apparatus
NFPA 1910 Standard for Marine Firefighting Vessels and the Inspection, Maintenance, Testing, Refurbishing, and Retirement of In-Service Emergency Vehicles
NFPA 1911 Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles
NFPA 1912 Standard for Fire Apparatus Refurbishing
NFPA 1914 Standard for Testing Fire Department Aerial Devices
NFPA 1915 Standard for Fire Apparatus Preventive Maintenance Program
NFPA 1917 Standard for Automotive Ambulances
NFPA 1925 Standard on Marine Fire-Fighting Vessels
NFPA 1931 Standard for Manufacturer's Design of Fire Department Ground Ladders
NFPA 1932 Standard on Use, Maintenance, and Service Testing of In-Service Fire Department Ground Ladders
NFPA 1936 Standard on Rescue Tools
NFPA 1937 Standard for the Selection, Care, and Maintenance of Rescue Tools
NFPA 1951 Standard on Protective Ensembles for Technical Rescue Incidents
NFPA 1952 Standard on Surface Water Operations Protective Clothing and Equipment
NFPA 1953 Standard on Protective Ensembles for Contaminated Water Diving
NFPA 1961 Standard on Fire Hose
NFPA 1962 Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances
NFPA 1963 Standard for Fire Hose Connections
NFPA 1964 Standard for Spray Nozzles and Appliances
NFPA 1965 Standard for Fire Hose Appliances
NFPA 1971 Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
NFPA 1975 Standard on Emergency Services Work Apparel
NFPA 1976 Standard on Protective Ensemble for Proximity Fire Fighting
NFPA 1977 Standard on Protective Clothing and Equipment for Wildland Fire Fighting
NFPA 1981 Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services
NFPA 1982 Standard on Personal Alert Safety Systems (PASS)
NFPA 1983 Standard on Life Safety Rope and Equipment for Emergency Services
NFPA 1984 Standard on Respirators for Wildland Fire Fighting Operations
NFPA 1986 Standard on Respiratory Protection Equipment for Tactical and Technical Operations
NFPA 1987 Standard on Combination Unit Respirator Systems for Tactical and Technical Operations
NFPA 1989 Standard on Breathing Air Quality for Emergency Services Respiratory Protection
NFPA 1990 Standards for Protective Ensembles for Hazardous Material and Emergency Medical Operations
NFPA 1991 Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents
NFPA 1992 Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies
NFPA 1994 Standard on Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents
NFPA 1999 Standard on Protective Clothing and Ensembles for Emergency Medical Operations
NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems
NFPA 2010 Standard for Fixed Aerosol Fire-Extinguishing Systems
NFPA 2112 Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire
NFPA 2113 Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire
NFPA 2400 Standard for Small Unmanned Aircraft Systems (sUAS) Used for Public Safety Operations
NFPA 2500 Standards for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services
NFPA 2800 Standard for Emergency Action Planning
NFPA 3000™ (PS) Standard for an Active Shooter/Hostile Event Response (ASHER) Program
NFPA 5000® Building Construction and Safety Code®
NFPA 8501 Standard for Single Burner Boiler Operation
NFPA 8502 Standard for the Prevention of Furnace Explosions/Implosions in Multiple Burner Boilers
NFPA 8503 Standard for Pulverized Fuel Systems
NFPA 8504 Standard on Atmospheric Fluidized-Bed Boiler Operation
NFPA 8505 Standard for Stoker Operation
NFPA 8506 Standard on Heat Recovery Steam Generator Systems

Reason 2:
Consistency with the International Codes. All I-Code publications have measurements listed as imperial (metric) format:
International Building Code
International Residential Code
International Mechanical Code
International Plumbing Code
International Energy Code
International Fuel Gas Code
International Fire Code
Other I-Codes

Reason 3: It's easier and better for the inspector in the field.
Believe it or not, many times inspectors are pressed for time and need to look things up quickly and provide information to customers.
One time - I read the code too fast and gave the customer the metric measurement (thinking that it was imperial) and thus I inadvertently created a problem and subsequent code violation.
Maybe it is fine to have the metric (imperial) format while sitting in an office. But when the rubber hits the road, the inspector needs to see OUR form of measurement as the first measurement, and not the second (in parentheses).

Did I make a mistake? Sure. But when literally every other code I reference during every day is written in imperial (metric) format, you can understand how easy it was for this electrical inspector to get frazzled out in the field.

Reason 4: The NEC uses the AMERICAN wire guage (AWG). This is sometimes known as the Brown & Sharpe wire gauge. It is a logarithmic stepped standardized wire gauge system used since 1857, predominantly in North America. It is somewhat disingenuous that the NEC puts metric measurements first, and then uses AWG as it's standard. We say 12-guage wire. We don't use metric, etc.

Submitter Information Verification

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Committee: NEC-P01

Committee Statement

Resolution: The NEC Style Manual provides the rules in Section 3.2.7.2 for dual system of units. The system of units (SI) shall appear first, and the inch-pounds shall immediately follow in parentheses. While this may not seem consistent with other NFPA publications, the NEC is an international code and aligns with International code publications that use the metric format.

Public Input No. 207-NFPA 70-2019 [Global Input]

"no less than"
change to
"not less than"

Statement of Problem and Substantiation for Public Input

The term "no less than" is used approximately 6 times in the NEC.
The term "not less than" is used approximately 881 times in the NEC.

Reason for the global change is for consistency, and to comply with the style manual. The "no less than's" can be found in:

Definitions, Overcurrent Protective Device, Branch-Circuit.
240.21(B)(4)(9)
430.109(F)
600.32(A)(4) [appears twice in this section]
691.1

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 26 19:34:36 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: No changes are required under the purview of CMP-1.

Public Input No. 225-NFPA 70-2019 [Global Input]

90.9 Units of Measurement.

This proposal is to switch from millimeters to centimeters. Outside the US, the use of centimeters is more common than millimeters. All rulers and measuring tapes whether purchased in the US or outside are in centimeters and not millimeters.

Statement of Problem and Substantiation for Public Input

It is a lot easier to distinguish the centimeters from the millimeters reading from the rulers or measuring tapes. Also the measurements will be more accurate.

Submitter Information Verification

Submitter Full Name: Lorenzo Adam
Organization: City Of Mason
Street Address:
City:
State:
Zip:
Submittal Date: Mon Dec 30 11:12:15 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: The revised NEC Style Manual provides the format of the NEC. The Panel concludes that any changes to the presentation of units must be addressed in the NEC Style Manual, with ultimate approval of the NFPA Standards Council.

Public Input No. 2409-NFPA 70-2020 [Global Input]

Institute a standard grammatical nomenclature to be used globally and consistently, whenever specific verbiage in code text is given to be applied to; 1) equipment marks, 2) labels, and 3) signage.

Institute in text of code itself an adherence to the ANSI standard Z535.4 Sign and Label Requirements, as regards the appropriate boundaries of use for the terms; "danger", "warning", "caution", "notice", and "instruction." Revise label and sign verbiage to not use the term "warning" unless warranted, in compliance to ANSI's definition which is; "to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury."

Apply the ANSI standard Z535.4 Sign and Label Requirements to signs and labels generally, not to Hazard markings only, as indicated by 110.16(B), and 110.21(B).

Institute actual requirements of ANSI standard Z535.4 (or similar to Z535.4), by more than informational note which is technically not code enforceable.

Statement of Problem and Substantiation for Public Input

Code will cite specific text for equipment marks, labels and signs, but will employ varying grammatical marks to encapsulate the specific verbiage to be used, whether; quotes, parentheses, square brackets, or at times no grammatical marks at all. Some sign verbiage is made distinct by separation from the rest of the code text and centering the text, but this is not consistently done.
The suggestion is to employ a common nomenclature throughout the NEC (and/or all NFPA) for consistency and clarity. It may be prudent that equipment markings, like those shown in tables [e.g. Table 506.9(C)(2)(3)] are treated distinct from the conventions that will yet establish consistency for the label and sign verbiage.
The NEC invokes, by informational note, an abiding by the ANSI standard Z535.4 Sign and Label Requirements as in 110.16(B), 110.21(B). This standard reserves the use of the term "warning" to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury. Similar to the term "warning", other terms in this ANSI standard Z535.4 have specific boundaries for use; "danger", "caution", "notice", "instruction." For consistency of code text, the use of these five terms should be reserved as label headers and only used only as appropriate to ANSI's definitions. For like reasons, the use of colors in header text and in the backgrounds of header text could benefit from a more consistent application, which could be accomplished by referencing the ANSI standard Z535.4 more directly in regards to all signs and labels generally and not just for Hazard topics of 110.21(B) , and not just by informational note, which is non-enforceable.

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 19 16:00:23 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input. The Panel concludes that the submitter did not provide any proposed text to be considered.

Public Input No. 259-NFPA 70-2020 [Global Input]

"unless permitted by..." or "unless permitted by Article..."
change to
"unless permitted in..."

Statement of Problem and Substantiation for Public Input

Basically this is just clean up language, and to be in accordance with section 4.1.2 of the style manual. Let's pick one or the other. I believe that the correct language should be "unless permitted in..."

The unless permitted by's are located in:

300.13(A)

348.20(A)

356.20(A)

411.5(B)

625.46

626.26

725.136(A)

760.136(A)

The unless permitted in's are located in

225.30

230.2

348.20

356.20

411.5(B)

625.46

626.26

725.136(A)

760.136(A)

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire

Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 08 14:31:09 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: No changes are required under the purview of CMP-1.

Public Input No. 276-NFPA 70-2020 [Global Input]

(capable of being) locked in the open position

to

(capable of being) lockable open

Statement of Problem and Substantiation for Public Input

There are approximately 21 references to, "capable of being locked in the open position..."
and
there are approximately 26 references to, "capable of being lockable open..."

Let's pick one. Reason for change is consistency throughout NEC

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jan 11 17:27:37 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input. The Panel concludes that the submitter did not provide any proposed text to be considered and has not identified a problem with either version of the terms in the Code.

Public Input No. 277-NFPA 70-2020 [Global Input]

(capable of being) lockable open

change to

(capable of being) locked in the open position

Statement of Problem and Substantiation for Public Input

There are approximately 26 references to, "capable of being lockable open..."

and

there are approximately 21 references to, "capable of being locked in the open position..."

Let's pick one. Reason for change is consistency throughout NEC. Personally, I prefer "capable of being locked in the open position."

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jan 11 17:33:21 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input. The Panel concludes that the submitter did not provide any proposed text to be considered and has not identified a problem with either version of the terms in the Code.

Public Input No. 2989-NFPA 70-2020 [Global Input]

Regarding the division of NEC Articles into “Parts”;

Where "Parts" are used to sub-divide NEC Articles by topic, it is proposed to amend the Part description text with a set of brackets that enclose the span of paragraph numbers that is encompassed by the respective Part category.

For example, NEC Chapter 2, Article 210, Part III.

This "Part" text string is represented as;

Part III. Over 1000 Volts

The proposal is to revise this "Part" text string to;

Part III. Over 1000 Volts (210.50-.70)

And, to do the same for all "Parts" of all NEC Articles.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION: to facilitate quicker more efficient code searches by providing a context clue via association of the paragraphs that are correlated to the "Part" sub-category. Page-by-page code searches that miss seeing the keyword "Part" somewhere on the page, could now be less prone to such erroneous mis-associations

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 19:32:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The recommended action is a publishing matter and is not under the purview of NFPA technical committees. NFPA staff will take the recommendation under advisement.

Public Input No. 3013-NFPA 70-2020 [Global Input]

Move all definitions in the code to Article 100, arrange them in alphabetical order and without any subdivisions.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The Revisions to the NEC Style require all the definitions to be moved to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 21:41:22 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-9324-NFPA 70-2021

Statement: This revision moves all definitions previously in Section 2 of Articles 690, 692, 694 and 705 to Article 100.

The NEC Style Manual also requires that for definitions that apply in only one article, the article number in parentheses shall follow the definition.

CMP-4 identified the following definitions that apply to only one article:

690: AC Module System, AC Module, Array, Direct-Current Combiner, Module, Monopole Circuit, PV Output Circuit, PV Source Circuit, PV System DC Circuit.

692: Fuel Cell Output Circuit

694: Maximum Output Power, Maximum Voltage, Nacelle, Rated Power, Tower, Wind Turbine Output Circuit.

These have been moved to Article 100 with the relevant article number appended. All other definitions have been moved with no article number identified.

All definitions were moved with the annotation (CMP-4) appended to indicate the code panel responsible for the definition in accordance with NEC Style Manual Section 2.2.2.3.3.

Public Input No. 3141-NFPA 70-2020 [Global Input]

Move all definitions in current (2020) NEC text to Article 100. Insert those definitions in alphabetical order. For definitions that apply in only one article, the article number in parentheses shall follow the definition. The CMP responsible for the definition shall be identified in parentheses at the end of the definition following any extract or article information.

Type your content here ...

Statement of Problem and Substantiation for Public Input

This revision provides a more usable code by providing a uniform process to find definitions. Users are currently required to look in multiple locations to determine if a term is defined. Other NFPA codes and standards utilize a single location for all definitions.

Submitter Information Verification

Submitter Full Name: Donald Cook
Organization: Shelby County Department of De
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 05 15:11:40 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-9324-NFPA 70-2021

Statement: This revision moves all definitions previously in Section 2 of Articles 690, 692, 694 and 705 to Article 100.

The NEC Style Manual also requires that for definitions that apply in only one article, the article number in parentheses shall follow the definition.

CMP-4 identified the following definitions that apply to only one article:

690: AC Module System, AC Module, Array, Direct-Current Combiner, Module, Monopole Circuit, PV Output Circuit, PV Source Circuit, PV System DC Circuit.

692: Fuel Cell Output Circuit

694: Maximum Output Power, Maximum Voltage, Nacelle, Rated Power, Tower, Wind Turbine Output Circuit.

These have been moved to Article 100 with the relevant article number appended. All other definitions have been moved with no article number identified.

All definitions were moved with the annotation (CMP-4) appended to indicate the code panel responsible for the definition in accordance with NEC Style Manual Section 2.2.2.3.3.

Public Input No. 3327-NFPA 70-2020 [Global Input]

Review the revisions to the new NEC Style Manual and make changes to comply with the Style Manual.

Statement of Problem and Substantiation for Public Input

The NEC Style Manual has been revised and every code making panel needs to review the manual and make changes to their code articles to comply with the Style Manual revisions.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:31:11 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8495-NFPA 70-2021

Statement: CMP-1 revises Article 100 by removing Part 1. General, Part II. Over 1000 Volts, Nominal, and Part III Hazardous (Classified) Locations (CMP-14).

The Scope of Article 100 was modified by removing language for those terms used in two or more articles, the XXX.2 reference and the last paragraph of the Scope statement.

The panel understands that approval of Scope statements is the responsibility of the National Electrical Code Correlating Committee.

The Panel concludes that this revision complies with the revised Style Manual 2.2.2 that Article 100 shall not be subdivided. NFPA staff will organize all definitions in alphabetical order.

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered throughout the Code, many of them in the .2 section of the articles. Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. All the definitions throughout the NEC are being relocated to Article 100. The scope of Article 100 has been changed to reflect these changes. The Parts have been eliminated and all definitions will be re-alphabetized.

Public Input No. 3328-NFPA 70-2020 [Global Input]

Review the Articles with multiple parts to comply with the revisions made to the NEC Style Manual. Make changes based on the Style Manual revisions.

Statement of Problem and Substantiation for Public Input

Section 2.1.4 was revised by adding the last two sentences. Where an article contains multiple parts and includes general installation requirements, such requirements shall be located in the first part titled “Part I. General”. Part titles shall be descriptive and as concise as possible.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:34:42 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8495-NFPA 70-2021

Statement: CMP-1 revises Article 100 by removing Part 1. General, Part II. Over 1000 Volts, Nominal, and Part III Hazardous (Classified) Locations (CMP-14).

The Scope of Article 100 was modified by removing language for those terms used in two or more articles, the XXX.2 reference and the last paragraph of the Scope statement.

The panel understands that approval of Scope statements is the responsibility of the National Electrical Code Correlating Committee.

The Panel concludes that this revision complies with the revised Style Manual 2.2.2 that Article 100 shall not be subdivided. NFPA staff will organize all definitions in alphabetical order.

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered throughout the Code, many of them in the .2 section of the articles. Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. All the definitions throughout the NEC are being relocated to Article 100. The scope of Article 100 has been changed to reflect these changes. The Parts have been eliminated and all definitions will be re-alphabetized.

Public Input No. 3329-NFPA 70-2020 [Global Input]

Revise the Definition Title Structure to comply with the NEC Style Manual.

Statement of Problem and Substantiation for Public Input

Review the Style Manual Revisions in 2.2.2.3 Definition Title Structure. Definitions that have sub-parts shall be listed alphabetically by the base term, with a comma and then the modifying descriptor.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:36:42 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that Definitions comply with proper formatting as required in 2.2.2.3 of the revised NEC Style Manual. Exceptions are written in complete sentences as required in 3.1.4.1 of the revised NEC Style Manual. Definitions comply with the use of acronyms required in 3.2.3 for of the revised NEC Style Manual. The parts within an article and the section numbers for parts of an article conform to the revised NEC Style Manual, 2.4.2.1. The numbering of Informational notes comply with the revised NEC Style Manual 2.4.3. Article Part titles are as descriptive and concise as possible in conformance to the revised NEC Style Manual, 2.1.4.

Public Input No. 3330-NFPA 70-2020 [Global Input]

Verify that all exceptions are written in completed sentences.

Statement of Problem and Substantiation for Public Input

The NEC Style Manual requires that all exceptions are written as complete sentences in accordance with 3.1.4.1.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:40:56 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that Definitions comply with proper formatting as required in 2.2.2.3 of the revised NEC Style Manual. Exceptions are written in complete sentences as required in 3.1.4.1 of the revised NEC Style Manual. Definitions comply with the use of acronyms required in 3.2.3 for of the revised NEC Style Manual. The parts within an article and the section numbers for parts of an article conform to the revised NEC Style Manual, 2.4.2.1. The numbering of Informational notes comply with the revised NEC Style Manual 2.4.3. Article Part titles are as descriptive and concise as possible in conformance to the revised NEC Style Manual, 2.1.4.

Public Input No. 3331-NFPA 70-2020 [Global Input]

Revise the definitions in Article 100 to include an acronym, as desired, for subsequent use in the NEC without having to state the term.

Statement of Problem and Substantiation for Public Input

The permitted use of acronyms in the NEC has changed with the Style Manual revisions in 3.2.3. When a term is defined in Article 100 and includes an acronym, that acronym is permitted to be used elsewhere through out the code.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:43:12 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that Definitions comply with proper formatting as required in 2.2.2.3 of the revised NEC Style Manual. Exceptions are written in complete sentences as required in 3.1.4.1 of the revised NEC Style Manual. Definitions comply with the use of acronyms required in 3.2.3 for of the revised NEC Style Manual. The parts within an article and the section numbers for parts of an article conform to the revised NEC Style Manual, 2.4.2.1. The numbering of Informational notes comply with the revised NEC Style Manual 2.4.3. Article Part titles are as descriptive and concise as possible in conformance to the revised NEC Style Manual, 2.1.4.

Public Input No. 3332-NFPA 70-2020 [Global Input]

Review the structure of all Informational Notes to comply with the revised NEC Style Manual.

Statement of Problem and Substantiation for Public Input

Sections 3.1.3.1 and 4.1.3 of the revised NEC Style Manual includes designed structure for references in Informational Notes.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:48:58 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8354-NFPA 70-2021
Statement: The Panel revised the references in Informational Notes in Article 90 and 110 to conform with the designated structure in 3.1.3.1 and 4.1.3 of the revised NEC Style Manual.

Public Input No. 3333-NFPA 70-2020 [Global Input]

Review all references to articles or parts of articles to comply with the Style Manual.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 References to a Part Within an Article. Except for Article 100, references shall not be made to an entire article. References to parts within articles shall be permitted.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 07:50:17 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8350-NFPA 70-2021
Statement: The reference to Part IX of Article 430 in 110.58 was added in the last sentence to comply with 4.1.4 of the revised NEC Style Manual.

Public Input No. 3335-NFPA 70-2020 [Global Input]

Review the use of Parts within an article and the section number for parts of an article.

Statement of Problem and Substantiation for Public Input

The code panels need to review the sections under their purview to comply with the revisions made to the NEC Style Manual. 2.4.2.1 Parts. If an article is subdivided into parts, it is recommended that the section numbering within each part start with the next decade as a minimum to allow for future growth. New or significantly reorganized articles shall follow this numbering convention. Where an article has multiple parts, Part I. shall be titled “General”.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 08:02:00 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that Definitions comply with proper formatting as required in 2.2.2.3 of the revised NEC Style Manual. Exceptions are written in complete sentences as required in 3.1.4.1 of the revised NEC Style Manual. Definitions comply with the use of acronyms required in 3.2.3 for of the revised NEC Style Manual. The parts within an article and the section numbers for parts of an article conform to the revised NEC Style Manual, 2.4.2.1. The numbering of Informational notes comply with the revised NEC Style Manual 2.4.3. Article Part titles are as descriptive and concise as possible in conformance to the revised NEC Style Manual, 2.1.4.

Public Input No. 3336-NFPA 70-2020 [Global Input]

More than one informational note in a section or subdivision shall be consectutively numbered.

Statement of Problem and Substantiation for Public Input

The numbering of informational notes need to comply with the changes made to the revised Style Manual. 2.4.3. Numbering Informational Notes. If there are two or more informational notes in a definition, section or subdivision, consecutive numbering of the informational notes shall only occur in that definition, section or subdivision.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 08:10:27 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that Definitions comply with proper formatting as required in 2.2.2.3 of the revised NEC Style Manual. Exceptions are written in complete sentences as required in 3.1.4.1 of the revised NEC Style Manual. Definitions comply with the use of acronyms required in 3.2.3 for of the revised NEC Style Manual. The parts within an article and the section numbers for parts of an article conform to the revised NEC Style Manual, 2.4.2.1. The numbering of Informational notes comply with the revised NEC Style Manual 2.4.3. Article Part titles are as descriptive and concise as possible in conformance to the revised NEC Style Manual, 2.1.4.

Public Input No. 3490-NFPA 70-2020 [Global Input]

100 Definitions

Defined terminology associated with Manufacture and Construction activities.

(1) The term “Construction” shall be defined as the process of deploying product or installation of a device, material, or item of equipment in accordance to its designated purpose. An owner or owner's agent (e.g. contractor) implements construction at a specific worksite location for either a permanent installation, or a temporary application as permitted by code. Installation shall comply with manufacturer terms and ratings unless permitted otherwise in this code. All code delegated responsibilities for testing, marking, labeling, identification, documentation, etc., which are not the clear accomplished responsibility of the manufacture production process, shall be the due diligence responsibility of those involved with the construction process, unless approved otherwise by the authority having jurisdiction.

Informational Note: construction applications include, but are not limited to, activities associated with activities involved with: install, field installed, field applied, field tested, field assembled, field evaluation, field wiring, field marking, field conversion, and field labeled.

(1) The term “Fabricated” shall be defined to apply to equipment or an assembly that is neither necessarily listed nor mass-produced. For example, custom equipment, a custom assembly, or equipment that is altered from its original listing. Fabrication may occur in whole or part onsite or offsite. Component parts and materials may be listed, or may be required to be listed by this code or by the authority having jurisdiction. Generally, where fabricated products are permitted by this code, code compliant product qualification shall be by a Field Evaluation Body, where duties typically include: product testing, marking, labeling, identification, standards compliance, product documentation and instructions sufficient for the safe operation appropriate per the application criteria. Fabricated applications also include reconditioned equipment and retrofit equipment, as permitted by this code, wherever equipment is functionally restored to other than conformance to the original manufacturer's equipment ratings and life cycle projections. Fabricated equipment and systems that encompass, in part or whole, any associated construction activities and elements, shall absorb the associated due diligence responsibilities involved, except as approved otherwise by the authority having jurisdiction.

Informational Note: fabrication applications generally include, but are not limited to, activities associated with pre-fabricated equipment and systems: electrical system assemblies, mechanical system assemblies, and modular building assemblies. Where the assembly is listed as a unit, then the manufacture application responsibilities apply.

(1) The term “Pre-fabricated” shall be defined to apply to those fabricated equipment assembly activities that occur at a site other than the permanent installation location.

(2) The term “Manufacture” shall be defined as the factory assembly of a product, characteristically mass produced and distributed. Examples include: equipment, wire, devices, material, and compounds. The manufacture process includes production activities including: factory testing, marking, labeling, identification; NRTL Listing where applicable; standards compliance, product document publication for sales and designer specifications including those used for: shipping, install, field testing, owner use, and maintenance. By definition, final assembly or other in-field activites of a product at its permanently installed location will not constitute an aspect of manufacture, unless performed by the manufacturer.

Informational Note 1: applications where a product's permanent or temporary installation occurs at a point-of-use location under direct supervision of the manufacturer, the requirement duties of both the manufacture process(es) and associated construction process shall be the responsibility of the manufacturer, except as approved otherwise by the authority having jurisdiction.

Informational Note 2: manufacture applications shall include modular equipment, where an assemblage of different products has been hybridized into a singular unit, when the unitized equipment is listed. Where the unitized equipment is not listed as a unit, then the fabricated application responsibilities apply.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION:
The term "construction" is used throughout NEC in reference to code requirements that are aimed at typically different segments of industry, which only occasionally overlap each other's general task sets. Product construction during manufacture is one application, versus product install during site construction. The code text describes both contexts as construction. Where practicable, it would improve functional clarity in code text requirements to employ distinct construction-like terms wherever reasonable and appropriate. The terms and definitions proposed are suggestions; to serve as a basis to move this discussion and consensus forward.
Where code requirements clearly intend compliance fulfillment to be about the product's activities prior to leaving the factory, distinct terminology can communicate this with added clarity. Similarly, where code compliance fulfillment clearly applies to the implementation of a product, as regards its permanent installation, a distinctly defined term for 'construction' will yield improved comprehension as to intended context. A third distinct category can also be established by definition that encompasses fabrication, to serve to encompass custom fabrication assemblies, reconditioned equipment, and retrofits.
Applications where the code responsibility can fall into gray areas for accountability between the three, can be attended to by a default assignment of responsibility. This explicit clarity helps ensure that enforceable code compliance responsibilities are clearly stated. Allowance for an exception, per AHJ acceptance, provides a mechanism to formally transfer an obligation of responsibility.
Where the code speaks to putting an identifying mark, or information, or color onto a cable or item of equipment, it more often refers to those which would intend to be understood as the responsibility of the manufacturer. The following two sets of code citations illustrate where the manufacturer is to provide a mark or color (first set) versus where the installer is to provide a mark or color. The third set of code citations is where it is intuitively apparent that either the manufacturer or installer could either be involved (or both involved) in providing a mark or color on the electrical equipment.
Example requirements for manufacturer marks or color include but are not necessarily limited to; 110.14(D), 110.28, 200.4(B), 200.6, 200.7, 200.9, 200.10(B), 200.10(D), 215.12(A), 215.12(B), 225.30(A)(7), 230.46, 230.66(A), 230.70(B), 230.77, 240.50(C), 240.81, 240.82, 240.83(A&B), 240.83(D), 240.85, 250.28(B), 250.110 Ex3, 250.119, 250.119(A), 250.119(B), 250.119(C), 250.126, 250.28(B), 250.112, 250.114, 250.119, 250.126, 300.11(B)(1), 300.11(B)(2), 310.3(D), Table 310.4(A), 310.6(ABC), 310.8(C)&(D), 310.10(C), 310.10(D), 311.14, 311.16(A), 311.16(B)(1&2)), 311.16(B4&C), 311.32, 314.16(C)(2), 322.56(B), 322.120(C), 336.120, 338.120, 368.12(E), 386.70, 388.70, 406.3(D), 406.3(E), 406.10(B), 406.13 (A-D), 409.110, 430.52(C)(5), 500.8, 501.5, 501.17, 501.105(B)(1), 501.130(A)(1, 502.6, 502.130(B)(1), 502.130(B)(2), 503.130(A), 504.80(C), 505.8, 505.20(B&C), 505.22, 505.26, 506.9(C)(1), 506.9(C)(2), 506.9(D), 517.18(A), 517.19(A), 517.61(C)(2), 530.21(B), 530.22(B), 545.22(A), 551.77(A), 552.10(B)(3), 552.10(E)(2), 555.8, 555.33(B)(2), 600.23(F), 600.33(A)(3), 600.33(A)(4), 690.12(C), 690.51, 694.22(A), 700.10(A), 705.12(D), 705.20, 706.15(C), 708.10(A)(2), 712.37, 725.3(P), 725.179, 760.3(O), 760.30, 760.176(G), 760.179(G)(1), 770.179, 800.182, 805.179, 820.179, 830.90(A)(2), 830.179(C&D), 840.170(B), and 840.170(E).
Example requirements for the installer to do the marks or color indications include but are not necessarily limited to; 200.4(B), 200.6, 210.5(C)(1), 210.5(C)(2), 210.12, 215.12(A), 215.12(C)(1), 215.12(C)(2), 225.30(B), 225.38(C), 225.52(D&E), 230.72(A), 300.5(D)(3), Table 300.50, 310.6(ABC), 311.14, 406.3(E), 406.10(B), 408.3(E)(2), 408.3(F)(1), 408.3(F)(2), 408.3(F)(3), 408.3(F)(4), 408.3(F)(5), 517.18(A), 517.19(A), 517.160(A)(5), 530.21(B), 530.22(B), 547.9(A)(10, 550.33(A), 552.43(C), 620.53, 620.55, 647.4(C), 647.7(A)(4), 668.21(C), 690.54, 690.55, 700.10(A), 712.25, 712.55, 725.124, 760.30, and 770.179(F).
Example requirements for either the manufacturer and/or the installer to do the marks or color indications include but are not necessarily limited to; 230.56, 250.21(C), 250.167(C), 408.3(E)(1), 409.102(B), 430.97(B), 430.109(A)(6), 430.109(E), 517.31(C)(1), 517.31(E), 517.42(E), 520.44(C)(3), 520.54(C), 520.54(J)(1), 520.54(K), 530.21(B), 530.22(B), 550.10(I), 690.1, 690.31(B)(1), 690.31(D)(2), 770.179(G), 805.90(A)(2), and 805.170(A).

As regards reconditioned equipment and retrofit equipment, the code is in its developing infancy as regards code requirements for marks, as they are few, yet likely to grow in upcoming code cycles. Having distinct groups for manufacture, installation, and fabrication also serves to help make obvious, the places in code that similar code requirements between them may be missing but warranted.
Similar to the topic above for equipment marks between manufacture, installation, and fabrication, are topics for labels and signage which are beyond marks.
In NEC Chapter 3,4 and 7 the term “manufacture specifications” can substituted for “construction specifications”. And in NEC Chapter 5 and 6, where specifications have other terminology variations based on product qualities, “manufacture specifications” can be used with such term descriptors for NEC consistency to augment transparency when a code specification is intended to apply to manufacture apart from installation criterion.
Another example benefit from having a distinction between manufacture, installation, and fabrication are for the code required documentation and whom is to provide it. Such as; instructions for shipping, install, or maintenance, versus installer instructions for operation sequence, equipment ratings guidance or site-specific diagnostic protocols.
Where an entity assumes multiple roles of manufacture, installation, and/or fabrication, they are intended to assume the respective responsibilities. And, what those responsibilities are will have improved certainty, when there are improvements to distinctions of terminology and nomenclature. Inspections and commissioning processes will similarly be improved for the same basis of improved enforceable clarity.
SIDEBAR: a supplemental suggestion, in the earnest of minimizing code text where practicable, is to utilize a letter or symbol icon, for use in NEC margins, that correlates to each of the three definitions for, manufacture, versus fabricated, versus construction. For example, a symbol icon for manufacturer (e.g. Hex Note enclosing an 'M'), versus those affiliated with the product install construction process (e.g. Hex Note with 'C'), versus the symbol for the fabrication process (e.g. Hex Note with 'F'). One example of benefit of deploying a symbolic nomenclature is the topic of labels, signage, and markings; which are often able to be grouped by: manufacturer, fabricated, or installer. Each instance in code for label, mark, or sign can include one or more of these three symbols in the margin alongside the code text without adding pages to the code. A raised bar of label and signage compliance is likely the result, plus an improved ease and capacity for enforcement by way of inspection or commissioning.

Submitter Information Verification

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Submittal Date: Tue Sep 08 17:16:57 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The suggested definitions contain requirements that do not comply with the NEC Style Manual 2.2.2.2.

Public Input No. 368-NFPA 70-2020 [Global Input]

Please provide page headers with the appropriate identifiers to make use of the code less confusing.

Example 1:	Chapter 1 Article 100 - Definitions - PART III - Haz Locs
Example 2:	110.31 Article 110 - Reqs for Electrical Installations -Part III - OVER 1000 VOLTS nom
Example 3:	Annex C- Tables Informative Annex C - Table C-3 (FMC) cont.

Statement of Problem and Substantiation for Public Input

Earlier versions of the document included shorthand page headers that greatly improved user ease of finding the correct code sections. As written now the document is confusing with important distinctions hard to ferret out. For example the sections that are limited in application to certain voltages or locations may run for pages but the transition to that distinction is hard to find, and any page after the initial distinguishing information is not notated in any way to indicate that a limitation of scope applies.. Identifiers such as Part III Over 1000 volts is not prominently distinguished in the body of the text and is not reflected in the page heading on latter pages, leading to much confusion when using the document in the field. (Earlier versions also had the PART III or similar transitions prominently bold to make finding them easier.)
Please accept my apology if this is submitted in the incorrect format or to the incorrect panel or group. This would appear to be a style request more than a code request but I did not find any public input option for style or page headers.

Submitter Information Verification

Submitter Full Name: Joe Kunkel
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City:
State:
Zip:
Submittal Date: Sun Jan 26 12:24:46 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The format and language used in the Code follows guidelines established by NFPA and published in the NEC Style Manual. The recommended action is a publishing matter and is not under the purview of NFPA technical committees. NFPA staff will take the recommendation under advisement.

Public Input No. 4035-NFPA 70-2020 [Global Input]

Revisit the entire premise of NEC requirements for ratings nameplates. Either add revisions for each individual equipment application that does not yet have a rating nameplate requirement but should, or else insert a new general requirement for rating nameplates, or craft a hybrid combination of both solutions.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION: 110.21(A)(1) only requires the manufacturer's name/trademark to be on electrical equipment categorically. However, manufacturer equipment ratings are not categorically required for electrical equipment. It is only a requirement where specified elsewhere in this code. Yet such requirements for a nameplate or other ratings are not present in many unexpected applications.
Some may argue a potential explanation for this apparent set of omissions, that the requirement is covered by other means of code text. For certain applications or equipment categories, the code has at times made requirements for equipment and materials to be "identified" for the use, either generally, or for an aspect of specific use. But the intent of the term "identified" has latitude and can be qualified by any manner of published documentation about the item. Hence this approach to dismiss whether there are omissions of nameplate requirements, because of "identification" requirements, fails to appreciate that at best, "identification" requirements only manifest compliance as nameplates or markings intermittently, and not because code mandates it.

Where is the 'identification' documentation to be readily located when the topic of electrical ratings for a specific item of existing electrical equipment is to be revisited for integrity duties? How is such documentation to be relied upon to inform tasks with existing distribution equipment that may include re-design with load changes, or electrical studies necessary to qualify fault bracing equipment duty, or arc flash calculations. If this method is to be relied upon as adequate for the on-going safety and reliability of power distribution equipment, would it not be prudent to treat such documentation, at least in certain cases or importance factors, with special considerations as regards NEC's general requirements? For example, nowhere in code is generator paralleling gear required to have a nameplate. Alternatively, to reliance upon 'identification' means, such electrical ratings criteria can instead be assuredly required by code, even generally, to be marked onto the equipment as a default premise. This base premise requirement for ratings nameplates (or markings) can then be modified otherwise, as warranted for specific applications.

NEC citations for equipment that specifically requires a ratings nameplate or other ratings marking include: Plug Fuses And Fuse Holders 240.50(B); Plug Fuses And Fuse Holders <15A 240.50(C); Cartridge Fuses 240.60(C); Circuit Breakers 240.83; Conductors 310.8(A)&(B); MV Cable 311.16(A); Busway (368.120); Cablebus (370.120); Flex Cord And Cable 400.6(A); 1-Pole Locking Connector 406.13 (A-D); Panelboards 408.58; Industrial Control Panels 409.110; Luminaires 410.74(A); Luminaire power supply components 410.74(B); Appliances 422.60(A)&(B); Cables of Space Heating Systems 424.35; Electrode Boiler MCA 424.82; Electrode/Fixed-Resistance Heating elements 425.29; Electrode Boiler 424.86; Electric Heating Panels 424.92; Fixed Industrial Electrode Boiler 425.86; Fixed Snow Melt Heating Elements 426.25; Pipe & Vessel Heating Elements 427.20; Motors and Multimotor Equipment 430.7; Motor Controller 430.8; ACR Hermetic Motor-Compressor 440.4(A); Generators 445.44; Transformers 450.11; Capacitors 450.12; Equipment Over 1000 Volts 490.21(A)(3); Hazardous Location Equipment 500.8; Zone 0, 1, 2; Equipment Suitability 505.9; Zone 0, 1, 2; Extra Safe Motor & Controller 505.22; Motion Picture Projection Room Equipment 540.21; Sign Lighting And Outline Systems 600.4(A); Cranes And Hoists 610.14(G); Elevator Motor Controller; Short Circuit 620.16(A); Electric Welder 630.14; I.T. Equipment 645.16; Modular Data Center Equipment 646.5; Induction/Dielectric Heating Equipment 665.27; Industrial Machinery; 670.3(A); Irrigation Machine Control Panel 675.6; Electric Pool Lift; 680.85; Fuel Cell Power Source 692.53; Energy Storage System 706.4; Class 1,2 & 3 PLTC Elec Circuit Protection System 725.179; ITC Cable; 727.7; and Fire Rated Cable Grounding Conductor 728.60.

There are no Code requirements yet identified for a ratings nameplate or other ratings marking for the following applications of electrical equipment.

- Disconnecting means must be marked for purpose, and readily indicate open or closed status, and show series ratings if any, but no requirement for general manufacturer ratings such as for voltage, current, or interrupt rating; this includes bus disconnects.

- Meter-mounted transfer switches must have certain ratings, must be listed and must even have certain text markings, but there is not a requirement for a ratings nameplate.

- Aside from medium voltage which has a nameplate requirement categorically, per 490.21(A)(3), service equipment must be marked that it is service equipment, but has no requirement for a ratings nameplate.

- A surge protective device must be listed and have a short circuit rating but has no requirement for a ratings nameplate.

- Listed cord-and-plug double-insulated tools and equipment shall be marked that they're double insulated but have no nameplate requirement, except where categorized as an appliance; because appliances categorically require a nameplate.

SIDEBAR: if you perceive that a nameplate requirement is inferred from a listing requirement, it isn't; even a marking that tells of merely the listing itself (apart from ratings) is not required to be marked onto equipment unless specifically required in Code.

- Instrument transformers have no requirement for a marking of ratings.

- Outdoor auxiliary gutters must be listed for sun and weather exposure, and for ambient temperature, yet the only marking required is for the temperature rating of the conductors installed within.

- Cellular concrete floor raceways have no requirement for a marking of ratings. The application does make it difficult after install, unless it was able to be observed from the access point(s).

- Cellular metal floor raceways (Article 374) and other metal wireways (Article 376) have no requirement for a marking of ratings.

- Nonmetallic raceways (Article 378) must only be marked for cross-sectional area and limited smoke.

- Nonmetallic raceway extensions (Article 382) must be marked for all the conductor marking requirements of 310.8(A), plus: material of conductors maximum temperature rating, and ampacity.

- Strut-type channel raceway (Article 384), Surface Metal Raceways (Article 386), Surface Nonmetallic Raceways (Article 388), Underfloor Raceways (Article 390), Cable Trays (Article 392), and Low-Voltage Suspended Ceiling Power Distribution Systems (Article 394), all have no requirement for a marking of ratings.

- Switchboards, Switchgear, and Panelboards are encompassed together in Article 384, but only panelboards have a requirement for a marking of ratings (408.58). Switchboards and Switchgear have no requirement for a nameplate marking of ratings. With the caveat that medium voltage switchgear applications do have a requirement for a nameplate marking of ratings.

- Low-Voltage Lighting (Article 411), Phase Converters (Article 455), and Resistors and Reactors (Article 470), all have no requirement for a marking of ratings.

- Storage Batteries (Article 480) have no requirement for a marking of ratings on the battery equipment itself. However, the battery voltage must be field marked close by the battery.

- Electrical equipment associated specifically to Commercial Garages, Repair and Storage (Article 511), Aircraft Hangars (Article 513), Motor Fuel Dispensing Facilities (Article 514), Bulk Storage Plants (Article 515), and Spray Applications (Article 516), that is not already encompassed by the requirements for hazardous applications or other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings. Similarly, for Health Care Facilities (Article 517), Assembly Occupancies (Article), Theater type Occupancies (Article 520), Amusement Facilities (Article 522), Carnival type facilities (Article 525), TV Studio type facilities, along with the applications of Articles; 545, 547, 550, 551, 552, 555, and 590.

- Manufactured Wiring Systems (Article 604) are to mark the type of cable, flexible cord, or conduit per 604.100(B); but no other ratings nameplate or markings are required.

• Electrical equipment associated specifically to Office Furnishings (Article 605), Elevator and Escalator class of equipment (Article 620), Electric Vehicle Power Transfer System (Article 625), Electrified Truck Parking Spaces (Article 626), Audio processing (Article 640), Sensitive Electronic Equipment (Article 647), Pipe Organs (Article 605), X-ray Equipment (Article 660), Electrolytic Cells (Article 668), Electroplating (Article 669), Body of Water applications (Article 682), Integrated Electrical Systems (Article 685), Solar Photovoltaic Systems (Article 690), Large-Scale Photovoltaic Electric Supply Stations (Article 691), and Wind Electric Systems (Article 694), that is not already encompassed by the other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings.

• Electrical equipment associated specifically to Emergency Systems (Article 700), Legally Required Standby Systems (Article 701), Optional Standby Systems (Article 702), Interconnected Electric Power Production Sources (Article 705), Critical Operations Power Systems (Article 708), Stand-Alone Systems (Article 710), Direct Current Microgrids (Article 712), Circuits and Equipment Operating at Less Than 50 Volts (Article 720), Energy Management Systems (Article 750), and Fire Alarm Systems (Article 760), that is not already encompassed by the other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings.

• Electrical equipment associated specifically to General Requirements for Communications Systems (Article 800), Communications Circuits (Article 805), Radio and Television Equipment (Article 810), Community Antenna Television and Radio Distribution Systems (Article 820), Network-Powered Broadband Communications Systems (Article 830), and Premises-Powered Broadband Communications Systems (Article 840), that is not already encompassed by the other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings.

SIDEBAR: the above bulleted list of applications, of equipment that has no Code requirement for a nameplate marking of the equipment ratings, is not an all-inclusive list.

Where nameplates of component parts are integral to a packaged equipment assembly so that an item of assembly could have multiple nameplates, there shall be a title for the principal assembly's nameplate that uniquely distinguishes it by name of the assembly, obviously distinct from the other component nameplates.

Where agreed that there are electrical rating nameplates that are not yet required in code text as appropriate for select equipment, code revision is warranted to resolve the disparity. One simple and functional way is to accomplish the revision is a general requirement for ratings, where appropriate to generalization. This achieves a base standard for nameplate requirements. Distinctive variations may be amended to the base requirements by including a caveat that gives opportunity for "other code text" to outline the terms for exemptions, exclusions, and supplemental required information. Other code text will still remain suitable for when non-standard electrical ratings for a nameplate or marking are to be identified specifically. One example of benefit is that interrupt ratings are often required but are not as often attended by a requirement for that rating to be marked onto the equipment.
Durability, permanence, and legibility of labels, signs, nameplates, marks and tags are dealt with inconsistently throughout the code case-by-case. Oftentimes such considerations are reserved for "warning" signs and such, such as all code text that 110.16 is referenced. What is to stop a manufacturer from claiming code compliance by deploying a paper nameplate label whose glue may fail half way through the equipment's projected life cycle, so that the label easily separates from the equipment, attributed perhaps to a modestly humid environment? Generalized consistency in code for all such kinds of applications may provide improvement of standardizations on the topic. Requirements may best be addressed generally for all equipment, devices and materials associated with electrical applications, not just for 'warning' signs. Aren't most all labels, signs, nameplates, marks and tags, that the code makes a point to require, also worthy of permanence, legibility, and durability?
Another consideration related to this topic of rating nameplates is reconditioned equipment. The advance of Code changes regarding reconditioned equipment is perhaps due a backcheck. The question to consider is whether or not the reconditioned equipment is to have had a ratings nameplate prior to reconditioning. Where there exists an original nameplate from when the equipment was manufactured new. Such a nameplate requirement could, or perhaps should, play a factor in safe practices; as regards the boundaries of such guidance yet to be outlined in Code permitting reconditioning.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4028-NFPA 70-2020 [Section No. 110.21(A)(1)]	similar topic

Public Input No. 4028-NFPA 70-2020 [Section No. 110.21(A)(1)]
Public Input No. 4276-NFPA 70-2020 [Section No. 110.21(A)(2)]

Submitter Information Verification

Submitter Full Name: John Blissett
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Submittal Date: Wed Sep 09 18:23:17 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input. The panel concludes there is no revised or new text to consider.

Public Input No. 4337-NFPA 70-2020 [Global Input]

Many diverse undefined terminologies are used to invoke some manner of required approval from an AHJ. It may benefit the clarity of intent to either consolidate the use of terminologies or to define their distinctions in respect to each other, or to do some combination of both.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION
Here are examples of the diverse types of AHJ approval requirements in code;
1. Approved means; 215.12(C)(1), 215.12(C)(2), 230.24, 230.30(A&B), 230.40, 230.50(B), 230.51, 230.53, 240.5(B)(1) , 240.21(B)(2&3), 240.67(A), 250.6(B) 250.68(C)(2), 250.70 (4), 250.94 exception (3), 300.4(H), 300.5, 300.5(F), 300.5(K), 300.6(A)(2), 300.6(A)(2), 300.6(A)(3), 300.6(C)(1), 300.6(C)(2), 300.11(C), 300.15, 300.19(B&C), 300.21, 300.25, 300.50(C).
2. Acceptable to AHJ; 500.8(A), 505.9, 506.9(A).
3. Made available if requested by AHJ; 110.31(A)(3), 110.70, 215.5, 225.56(A) 399.30(A), 399.30(B), 691.6, 691.7, 691.8, 691.9.
4. Made available to AHJ; 110.41, 230.95(C), 240.67(C), 240.87(C) 490.48(A), 517.17(D), 590.6(B)(2), 645.27.
5. Given to AHJ prior to energization; 225.56(B).
6. If Adopted by Local AHJ; 220.12(B), 225.22, 225.36.
7. Preventative Maintenance Plan Required by AHJ; 708.6 (A-E)
8. Initial/Periodic Witness Test by AHJ; 700.3(A), 700.3(D), 708.6 (A-E).

Submitter Information Verification

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Submittal Date: Thu Sep 10 10:37:56 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input. The panel concludes there is no revised or new text to consider.

Public Input No. 4390-NFPA 70-2020 [Global Input]

When an Article has Parts the revised Style Manual requires the following in 2.1.4.
Part titles shall be descriptive and as concise as possible.
Example:
Part I. General
Part II. Installation
Part III. Construction

Statement of Problem and Substantiation for Public Input

The revised Style Manual requires Article Part titles to be descriptive and concise as possible and provides examples for the code panels to use.

Submitter Information Verification

Submitter Full Name: David Williams
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Submittal Date: Thu Sep 10 11:45:05 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that Definitions comply with proper formatting as required in 2.2.2.3 of the revised NEC Style Manual. Exceptions are written in complete sentences as required in 3.1.4.1 of the revised NEC Style Manual. Definitions comply with the use of acronyms required in 3.2.3 for of the revised NEC Style Manual. The parts within an article and the section numbers for parts of an article conform to the revised NEC Style Manual, 2.4.2.1. The numbering of Informational notes comply with the revised NEC Style Manual 2.4.3. Article Part titles are as descriptive and concise as possible in conformance to the revised NEC Style Manual, 2.1.4.

Public Input No. 454-NFPA 70-2020 [Global Input]

Type your content here: I would like to see one of the two things I have listed happen; either put all definitions in article 100 no matter how many times the term is used throughout the NEC or keep the NEC at the current format limiting article 100 for definitions of terms used more than twice in the NEC and using xxx.2 for definitions that are only used in that particular article. Do not use xxx.2 for anything besides definitions. Currently if an article does not contain any definitions, xxx.2 is used for anything. Example; 90.2 SCOPE, 110.2 APPROVAL, 200.2 GENERAL, plus many other articles, although this change would not in essence save lifes, it would add consistincey to the NEC, ...

Statement of Problem and Substantiation for Public Input

This would add consistency to the NEC,

Submitter Information Verification

Submitter Full Name: Ray Pritchett
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City:
State:
Zip:
Submittal Date: Sun Feb 09 22:55:07 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8495-NFPA 70-2021

Statement: CMP-1 revises Article 100 by removing Part 1. General, Part II. Over 1000 Volts, Nominal, and Part III Hazardous (Classified) Locations (CMP-14).

The Scope of Article 100 was modified by removing language for those terms used in two or more articles, the XXX.2 reference and the last paragraph of the Scope statement.

The panel understands that approval of Scope statements is the responsibility of the National Electrical Code Correlating Committee.

The Panel concludes that this revision complies with the revised Style Manual 2.2.2 that Article 100 shall not be subdivided. NFPA staff will organize all definitions in alphabetical order.

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered throughout the Code, many of them in the .2 section of the articles. Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. All the definitions throughout the NEC are being relocated to Article 100. The scope of Article 100 has been changed to reflect these changes. The Parts have been eliminated and all definitions will be re-alphabetized.

Public Input No. 4707-NFPA 70-2020 [Global Input]

Globally revise the use of term "Listed", and revise use of the term "Labeled"

To distinguish the NRTL (testing lab) context for the term "labeled" and "listed" from other NEC context uses of these words in all their forms; label, labels, labeling and labeled, it recommended to apply capitalization to the word "Labeled" and "Listed" when intended for this particular context of a testing organization. Capitalization as proper nouns will make this context more readily recognizable.

For additional distinctive clarity for this context of these terms 'listed' and "labeled", apply them with their "NRTL" modifier; and deploy "NRTL Listed" and "NRTL Labeled" throughout the Code text. Of course, all variants formed for grammatical correctness would also be amended and capitalized, such as "NRTL Listing" and "NRTL Label" etc.

In the definitions, it is appropriate to associate NRTL to "Nationally Recognized Testing Laboratory", which is generally the type of testing agency. Any other testing agency, where approved by an AHJ, is allowed. It is also appropriate to include a reference to the industry standard organization that acknowledged to govern this industry acceptance standard for each NRTL, the Occupational Safety and Health Administration (OSHA). With OSHA acknowledged as the official agency, it becomes a Code-legitimized reference, able to facilitate any follow-up enquiries regarding code compliance. To help facilitate back-checks has never been more suitable than in this age of ever-increasing pirating of product and other pretenders to suitability.

Wherever the term 'Labeled' is used as part of 'NRTL Listed and Labeled', it shall refer to the equipment mounted labeling that is pertinent to all of the equipment item's application-specific Listing(s) and shall include the equipment ratings.

Wherever the term 'Marked' is used as part of 'NRTL Listed and Marked' or 'NRTL Listed and Labeled and Marked', 'marked' shall refer to the marking or labeling that is associated with the Listing and shall include the specific qualification of use mentioned in code. E.g. listed and labeled and marked as being suitable for use as service equipment.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION:

The term 'Listing' and 'Listed' will be capitalized and treated as a proper noun; short for 'NRLT Listing' and 'NRTL Listed'. The term 'Labeled' will also be capitalized as a proper noun when used to indicate 'NRTL Labeled' or 'Manufacturer Labeled' as regards the manufacturer's terms of use for the equipment. NFPA codes does not capitalize these three terms generally so they are indistinguishable from the other contexts for a list or label. Manufacturer terms of use regarding labeling can include ratings, Listing types, or other declarations of compliance to particular industry standards.

There Code text of NEC 110.3, Part (C) may have intended for equipment generally to be Listed, but technically it is not ever stated. All that is stated is the terms for who will do the testing and evaluation as regards a Listing.

The Occupational Safety and Health Administration (OSHA) is the official agency that recognizes qualified testing laboratories, of which there are 23 approved labs to date. OSHA confirms that NEC's "electrical" sub-distinction of labs in NEC 110.3, Part (C) doesn't formally exist as an industry recognized group. The 'electrical' testing laboratory distinction is an obscure reference used in two other places in the NEC [90.7, 490.48(A)], but not in the NEC's other (14) references of a testing laboratory. Underwriter Laboratories (UL) is the only distinct NRTL lab whose standards are cited in the NEC and there are hundreds of UL citations (see. NEC Informative Annex A). One relevant ATS example is cited in NEC; UL1008 for transfer switches

up to 600V. And one relevant ATS example is not cited in NEC; UL1008A for 750V-46kV ATSs. Whether another NRTL lab other than UL may qualify NEC's intent as an "electrical lab" is unknown. The NEC requirements are functional without the "electrical" sub-distinction, and so this likely warrants deletion of "electrical" in an upcoming NEC code revision.

Though these code articles infer an expectation that an ATS shall be used, an ATS is not overtly mandated as required. Only when an ATS is used, then definitive code requirements apply, like a Listing for emergency use.

NEC Article 705 applies to Interconnected Power Production Sources that parallel with the normal source, which is typically the utility supplied power source. There is an incongruence of code due to what NEC 705 allows. That is whenever the 705 code language is interpreted as an absolute permission due to the omission of disallowances of use as an essential-class power system. The code requirement variance compared to similar applications is a risk, because it then grants an emergency power distribution topology absolution because the code language allows it. NEC Article 705 has no requirements for equipment to be Listed for any aspect.

NEC 705 applies to distribution gear that interconnects normal power (e.g. utility) with an alternate source of power (e.g. generator). The 705 distribution gear may serve in place of an automatic transfer switch because the code does not disallow that use. Yet code does not require it be listed for emergency use, nor does it even require the automated switching mechanisms to be electrically operated and mechanically held. The NEC 705 gear has latitude to have more than two sources and more than one load. The function of NEC 705 gear may be no less critical but it is more susceptible to dysfunction than an ATS. It is arguably more important even than any single automatic transfer switch as it can perform the duty of multiple transfer switches or be the power source to many ATSs. It is like using a string to support a chain. This example illustrates how language of one NEC article (705) can permit use of a power distribution topology that is inconsistent to all other instances of code text regarding transfer switching of emergency power, which would otherwise be fairly consistent.

Application Specific Code Requirements

A summary of code findings on power source selection for emergency applications is as follows;

1. FOR ALL CODIFIED POWER SYSTEM TYPES OTHER THAN NORMAL: An ATS shall be NRTL Listed for Emergency Use (and also identified for Standby Use). Exceptions are:

A. Optional Standby Power System (NEC 702; other Listing requirements may apply)

B. Fire Pump (NEC 695; other Listing applies)

C. Interconnected Power Production Sources (NEC 705)

D. Medium Voltage (see caveats below)

2. MEDIUM VOLTAGE CAVEATS:

A. NFPA 99 indicates an ATS <600V must be Listed for the purpose. No mention of requirements for other voltages >600V. Allowance for ATS >600V to not be Listed is one logical inference.

B. NFPA 110 states MV transfer of central plant or mechanical equipment is allowed using electrically interlocked medium voltage circuit breakers; but the equipment branch MV transfer switch is not to include life safety (LS), emergency (RE), or critical branch (CR) loads. By mention of critical branch this code regards healthcare but is not correlated by any healthcare code; neither by NFPA 99 nor by NEC 517. Allowance by Listing omission may be logically inferred for power system types not mentioned; SEPSS (NFPA 111), RSPSS (NEC 701), EQ (NEC 517), FPPSS (NEC 695), FCPSS (NEC 692), and EPSS (NFPA 110). Note that an MV transfer equipment is not disallowed for LS, RE, or CR if the MV switch is separated from mechanical loads. Also, there is no disallowance to separate loads if the MV ATS is Listed.

C. NFPA 70 (NEC) does not mandate a Listing requirement specific to distribution gear generally, including medium voltage (MV) equipment. NEC makes no mention of MV ATSs, nor provides any specific exemption for an MV ATS. That paralleling gear has no Listing requirement at all would apparently extend to MV types of paralleling gear.

3. FOR FIRE PUMP APPLICATIONS: A fire pump's local ATS and/or controller shall be NRTL Listed for

electric motor-driven fire pump service. Other transfer equipment upstream of a fire pump ATS does not qualify it as a fire pump ATS also; so only the lower level ATS must meet these 'Fire Pump ATS' requirements.

4. GENERAL REQUIREMENTS: NRTL Listing types compound for each condition of use that applies; 'emergency', 'wet location', etc; whenever the NRTL Listed Use is an available product offering. An ATS must be NRTL Listed for all of the load types to be served. Field labeling by a Field Evaluation Body is an alternate compliance path for a Listing requirement generally, except where a Listing is overtly stated as the only compliance path such as for an ATS and select other NEC applications.

5. OPTIONAL STANDBY APPLICATIONS: Transfer equipment shall be NRTL 'Listed as Transfer Equipment' wherever supplemental circuit protection devices (CPD) are integral to the transfer equipment. No other Listing requirements apply for Optional Standby transfer equipment.

6. INTERCONNECTED POWER PRODUCTION SOURCES are a recognized transfer switch application apart from an ATS. NEC 705 scope only applies to multiple sources if the normal source (e.g. utility) is one of the sources. Where field labeling is provided, the NEC does not mandate any requirement for a Listing of any kind. Even if it is Listed, NEC doesn't require the gear to be NRTL 'Listed as Transfer Equipment' (as CPD optional standby transfer equipment must do), nor 'Listed for Emergency Use' (as all other emergency power transfer equipment must do). Where NEC 705 is applied to critical grade topologies, NEC suffers a glaring omission for any code-required NRTL type validation for a failsafe style of integrity, suitable for essential-class loads.

7. PARALLELING GEAR for automatic transfer switching of multiple sources (apart from an Article 705 type system) has no code article that governs its performance requirements. Only if the paralleling gear is connected to a normal (utility) source must it then comply with NEC 705. But even then the 705 requirements are not up to the usual code standards for critical or emergency gear and so it does not impose any failsafe standard for integrity including associated Listings.

Ironically, NEC 110.3(B) does state (by omission) that only the Listed or Labeled equipment needs to be used in accordance with the equipment manufacturer's instructions. Because the NEC makes no similar requirement of equipment that is not Listed nor Labeled, this equipment category escapes the stipulation to comply with the manufacturer's terms of use. This however is recognizable as nonsense, and an intonation of NEC intent must be interpolated.

NEC 110.3, Part (C) fails to identify that multiple Listings may be required for a product, and that one Listing may not be adequate. An individual separate Listing for each specific category of use is required whenever such Listing categories apply to the conditions of the equipment use.

NEC 110.3, Part (C) also fails to identify NEC's own exemptions for its general requirement that everything be Listed, and whether there are terms for when these exceptions are permitted or disallowed. One category is custom fabricated equipment, of which certain field assemblies may qualify as hybrid sub-category. One other category is equipment that has been reconditioned, refurbished or remanufactured. One final category is non-Listed equipment where NEC has outlined the specific terms of permitted use based on application. The problems arising from potential distinctions of allowances for non-Listed equipment is much more pronounced when the inconsistencies of Listing requirements by specific application are attempted to be put into a proper context (more on this in Chapter 8).

A best practice default for equipment selection is to choose a Listed product whenever one is available, and include each Listing application type that applies. Only when a Listed product cannot meet the design requirement should an alternative be considered; such as a custom fabricated product. Even then, such non-Listed applications shall be responsibly managed to best show coherence to all other code intent toward trustworthy integrity of; the components, the assembly work, and the resultant functionality. And where NEC outlines terms for use specific to "non-Listed" equipment (as done in Chapter 8), it shall be considered an acceptable form of compliance.

The NEC variations of terminology for Listed and for Labeled is diverse but the reason for this inconsistency is not always evident. The numeral in parenthesis is the number of occurrences found for each term in the NEC.

SIDEBAR: As the deadline for 2020 Public Comment is impending, the values and citations from here forward were not back-checked to 2020 NEC from the v2017 they were derived from .

1. Listed (1715), Listing (247), List (9)

2. Approved (473), Approving (2), Approval (44)

3. Labeled (65), Labeling (30), Labels (57), Label (55), Field Labeled (3), clearly Labeled (1)

4. Identified (2), Identifying (35), Identify (41)

5. Marked (647), Marking (555), Mark (31), Marks (3)

6. " Listed for" (332)

7. "Listed and Labeled" (21)

8. "Listed and Labeled for" (2)

9. "Listed or Labeled" (6)

10. "Listed, Labeled, and identified" (18)

11. "Listed, Labeled, or identified" (1)

12. "Prominently Labeled" (2)

13. "Listed, Labeled, and marked" (1)

14. "Listed and Labeled or field identified" (1)

Situation specific NEC requirements for equipment to be "Listed" vary case-by-case, whether by code article, or by site application type, or by equipment category. The way the requirements varied indicate that either code intent is not always consistent, or that the manner in which NEC requirements are written are a mixed bag of inconsistencies. In actuality, it is both.

The code citations below are selected to indicate general requirements and the requirements specific to switch transfer of emergency power sources. Other unrelated code citations are included to illustrate how the code may show consistency and how it shows inconsistency.

1. Listing Requirements by NEC Article

Every material item used for Trailer Parks (NEC 552), RVs (NEC 551), and mobile homes (NEC 550) must be Listed. But not a thing is mandated as needing to be Listed for hospitals (NEC 517), floating buildings (NEC 553), and certain other applications in NEC such as; Cablebus (370), Multioutlet Assemblies (380), Underfloor Raceways (390), Concealed Knob and Tube Wiring (394), Open Wiring on Insulators (398), Outdoor Overhead Conductors Over 1000V (399), Flexible Cords and Flexible Cables (400; though only nearly nil), Fixture Wires (402), Industrial Control Panels (409), Fixed Industrial Heating Equipment (455), Capacitors (460), Resistors and Reactors (470), Equipment Over 1000V (490), Integrated Electrical Systems (685), Interconnected Power Production Sources (705; aka paralleling gear), Circuits and Equipment Under 50V (720), and Energy Management Systems (750).

2. Listing Requirements by Equipment Category

For other NEC articles, the requirements for Listed equipment amounts to an honorable mention of oddities in bits and pieces; not because those bits are especially significant, or associated with criticality. NEC will mention a Listing requirement for the parenthetically consequential 1% and miss the more essential 99%. Switchgear (408) requires that insulated conductors are Listed, but NEC invokes no other requirements of anything else to do with switchgear to be Listed. There are times that NEC chapters or paragraphs only apply technically for any equipment which is Unlisted.

Most all raceways and cabling, but one, are required to be Listed from the 300 series articles of NEC. But at many points amongst the other code articles, only the fittings are indicated as needing to be Listed. The singular 300-series article for cablebus that was inadvertently skipped, is likely an oversight.

3. Listing Requirements by Application Type

Some aspects of Listings are meant to apply categorically, like a Wet Location Listing for any equipment in

wet locations; but NEC consistency is sporadic and omissions prolific where they should apply. This inconsistency is similar to the requirements mentioned for sun exposure considerations.

At some points of code there are common applications with common importance factors but they are treated with uncommon requirements.

4. Observations of Inconsistent and Irrelevant Text

The terminologies for similar types of Listings has aspects of inconsistency, such as the five different terms used for an ATS to be Listed for Emergency Use. The verbiage variations could infer that these refined differences in text vary for good reason (with potentially varying requirements), but under scrutiny they do not.

There are code sentences that are superfluous because the Listing requirement for a subcomponent item being mentioned was already imposed generally at some other NEC article prior. Such as for particular conduit fittings to be Listed. To make matters worse, the requirements at one location in code doesn't always match the other location.

Other code text is a waste of language as the statement is redundant unto itself. Such as stating that use of equipment is okay if the Listing says it's okay. Or employing a double-negative to state that equipment is not to be used in a way that the Listing doesn't say is okay. As a side issue, such statements infer that there are "Listing Instructions" to follow for each Listing type. That such instructions exist and are published respective to Listing types is not affirmed to be an industry accepted understanding. How is it proposed that such reference materials are to be captured with consistent integrity by electrical system designers?

At times one or two specifications or features of the Listing itself, are mentioned with the NEC code text. But the exclusion of the other Listing features beckons follow-up questions as to why a partial redundant mention is relevant for some features of the Listing but not the others.

Some NEC text has inferences that a Listing requirement exists without an actual requirement of a Listing ever being stated overtly, only as an inference that the requirement already exists. Conditional statements employing logical grouping sometimes miss clear meaning due to commas missing at relevant points of the sentence.

The benefit that the above comments hope to achieve is in universal applications of Listing requirements as a categorical default wherever practicable, with caveats to follow as to exceptions or specialty additions, such that taken together, the Code edits would amount to less text and simpler forms of clarity. It would be an aide, perhaps suited to Chapter 9 indexes if nowhere else, to have a running list of all potential types of Listings that may be suited to electrical applications governed by NEC. Of course, such a reference list would be subject to on-going updates, but to see them all is perhaps the opportune way to know them.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	similar topic
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	similar topic
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	similar topic
Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]	similar topic

Submitter Information Verification

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Submittal Date: Thu Sep 10 18:05:35 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: Regarding revisions to the terms “Listed” and “Labeled” The Regulations Governing the Development of NFPA Standards provides definitions for use in all NFPA codes and standards in section 3.3.6.1. These definitions are not under the purview of the National Electrical Code Committees. Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input. The panel concludes there is no revised or new text to consider.

Public Input No. 991-NFPA 70-2020 [Global Input]

620.11 Insulation of Conductors.

The insulation of conductors shall comply with 620.11(A) through (D).

Informational Note: One method of determining that the insulation of conductors is flame retardant is by testing the conductors or cables to the FV-2/ VW-1 test ~~(Vertical-Wire) Flame Test~~ in ANSI/UL ~~1581-2011~~ 255 6 , *Standard for Wire and Cable Test Methods* ~~*Reference Standard for Electrical Wires, Cables, and Flexible Cords*~~ .

650.6(D) Cable Covering.

Each cable shall be provided with an outer covering, either overall or on each of any subassemblies of grouped conductors. Tape shall be permitted in place of a covering. Where not installed in metal raceway, the covering shall be resistant to flame spread, or the cable or each cable subassembly shall be covered with a closely wound listed fireproof tape.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the FV-2/ VW-1 test ~~(vertical-wire)~~ ~~flame test~~ in ANSI/UL 2556, *Standard for Wire and Cable Test Methods* ~~1581- 2017~~ ~~, *Reference Standard for Electrical Wires, Cables and Flexible Cords*~~ .

725.179(D) Types CL2X and CL3X.

Types CL2X and CL3X limited-use cables shall be marked as Type CL2X or CL3X, and be listed as suitable for use in dwellings and raceways and shall be listed as resistant to flame spread.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the FV-2/ VW-1 test ~~(vertical wire) flame test~~ in ANSI/UL 2556, *Standard for Wire and Cable Test Methods* ~~1581-2011, *Reference Standard for Electrical Wires, Cables and Flexible Cords*~~ .

800.179(D) Limited-Use Cables.

Type CMX limited-use communications cables, Type CATVX limited-use community antenna television coaxial cables, and Type BLX limited-use network-powered broadband low-power cables shall be listed as being suitable for use in dwellings and for use in raceway and shall also be listed as being resistant to flame spread.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the FV-2/ VW-1 test ~~(vertical-wire)~~ flame ~~test~~ in ANSI/UL 2556, *Standard for Wire and Cable Test Methods* ~~1581-2017, *Reference Standard for Electrical Wires, Cables and Flexible Cords*~~ .

805.179(B) Type CMUC Undercarpet Wires and Cables.

Type CMUC under-carpet communications wires and cables shall be listed as being suitable for under-carpet use and shall also be listed as being resistant to flame spread.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the FV-2/ VW-1 test ~~(vertical-wire~~) flame test in ANSI/UL 2556, *Standard for Wire and Cable Test Methods* ~~1581-~~2017~~, *Reference Standard for Electrical Wires, Cables and Flexible Cords*~~ .

Annex A Product safety standards

Note – only a portion of the table is shown for brevity

300	UL 263	Fire Tests of Building Construction and Materials

	UL Subject 267	**Wire Pulling Compounds**
	UL 514B	**Conduit, Tubing, and Cable Fittings**
	UL 635	**Insulated Bushings**
	UL 1479	**Fire Tests of Through-Penetration Firestops**
	UL 1565	**Positioning Devices**
	UL 1581	**Reference Standard for Electrical Wires, Cables, and Flexible Cords**
	UL 2043	**Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces**
	UL 2239	**Hardware for the Support of Conduit, Tubing and Cable**
	UL Subject 2419	**Electrically Conductive Corrosion Resistant Compounds**
	UL 2556	**Standard for Wire and Cable Test Methods**
	UL 60730-1	**Automatic Electrical Controls — Part 1: General Requirements**

Additional Proposed Changes

File Name	Description	Approved
1581_code_proposal.docx	proposal	

Statement of Problem and Substantiation for Public Input

During the last several years, the specifics regarding many tests found in UL 1581 have been relocated to UL 2556, the Standard for Wire and Cable Test Methods, which is harmonized across the US, Canada and Mexico. UL 1581 has a reference to UL 2556 for those documents that still reference UL 1581. In order to point directly to the standard where the method resides, it is proposed to remove the reference to UL 1581 and replace it with a reference directly to UL 2556.

The name of the test in UL 2556 is FV-2/VW-2 to accommodate North American naming conventions. This change is also reflected as an update.

Note – footnote to Table 8 shall continue to reference UL 1581 as this info is not contained in UL 2556.

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Submittal Date: Thu May 07 08:18:34 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8406-NFPA 70-2021

Statement: This revision to Informative Annex A is designed to bring it in line with the requirements for 2 parts in Informative Annex A in the 2020 NEC Style Manual, 4.2.1.1 and 4.2.1.2.

The first revisions for PIs 2253, 2265, 2553, 2658, 2755, 3011, 793, 2076, 2178, 2179 that have been accepted will be incorporated into Informative Annex A.

Work on the standards that may be included in Part II will be a work in progress.

Public Input No. 991-NFPA 70-2020 [Global Input]

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Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the FV-2/ VW-1 test ~~(vertical-wire)~~ flame ~~test~~ in ANSI/UL 2556, *Standard for Wire and Cable Test Methods* ~~1581-2017, *Reference Standard for Electrical Wires, Cables and Flexible Cords*~~ .

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Annex A Product safety standards

Note – only a portion of the table is shown for brevity

300	UL 263	Fire Tests of Building Construction and Materials
	UL Subject 267	Wire Pulling Compounds
	UL 514B	Conduit, Tubing, and Cable Fittings

	UL 635	**Insulated Bushings**
	UL 1479	**Fire Tests of Through-Penetration Firestops**
	UL 1565	**Positioning Devices**
	UL 1581	**Reference Standard for Electrical Wires, Cables, and Flexible Cords**
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	UL 2239	**Hardware for the Support of Conduit, Tubing and Cable**
	UL Subject 2419	**Electrically Conductive Corrosion Resistant Compounds**
	UL 2556	**Standard for Wire and Cable Test Methods**
	UL 60730-1	**Automatic Electrical Controls — Part 1: General Requirements**

Additional Proposed Changes

File Name	Description	Approved
1581_code_proposal.docx	proposal	✓

Statement of Problem and Substantiation for Public Input

During the last several years, the specifics regarding many tests found in UL 1581 have been relocated to UL 2556, the Standard for Wire and Cable Test Methods, which is harmonized across the US, Canada and Mexico. UL 1581 has a reference to UL 2556 for those documents that still reference UL 1581. In order to point directly to the standard where the method resides, it is proposed to remove the reference to UL 1581 and replace it with a reference directly to UL 2556.

The name of the test in UL 2556 is FV-2/VW-2 to accommodate North American naming conventions. This change is also reflected as an update.

Note – footnote to Table 8 shall continue to reference UL 1581 as this info is not contained in UL 2556.

Submitter Information Verification

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Committee:

Copyright Assignment

I, Susan Stene, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Susan Stene, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 972-NFPA 70-2020 [Section No. 90.1(B)]

(B) Adequacy.

This *Code* contains ~~provisions that~~ minimum requirements that are considered necessary for safety. Compliance therewith and proper maintenance result in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.

Informational Note: Hazards often occur because of overloading of wiring systems by methods or usage not in conformity with this *Code*. This occurs because initial wiring did not provide for increases in the use of electricity. An initial adequate installation and reasonable provisions for system changes provide for future increases in the use of electricity.

Statement of Problem and Substantiation for Public Input

The word “provisions” indicates something that is provided. The word “requirements” is more appropriate for this text.

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Committee: NEC-P01

Committee Statement

Resolution: The Foreword to the NEC Style Manual states “The Code contains those provisions considered necessary for safety.” and “provisions“ is referenced in 2.1.1. The addition of the word “minimum” has not been substantiated. Additional information, although not an enforceable part of the Code, is provided in Informational Notes and Informative Annexes that contribute to the overall applicability and effectiveness of the Code.

Public Input No. 374-NFPA 70-2020 [Section No. 90.1(C)]

(C) Relation to Other International Standards.

(1) The requirements in this *Code* address the fundamental principles of protection for safety contained in Section 131 of International Electrotechnical Commission Standard 60364-1, *Electrical Installations of Buildings* .

(2) Products covered by this *Code* shall comply with the appropriate country where the product is to be used. When the product is intended for use in more than one country, the product shall comply with the installation codes and standards for all countries where it is intended to be used.

Informational Note: IEC 60364-1, Section 131, contains fundamental principles of protection for safety that encompass protection against electric shock, protection against thermal effects, protection against overcurrent, protection against fault currents, and protection against overvoltage. All of these potential hazards are addressed by the requirements in this *Code*.

Statement of Problem and Substantiation for Public Input

The problem is the code simple states the product (equipment) only needs to be listed. The problem is whether or not a listing actually needs to meet a US standard. This vagueness leads to the misuse of third party listings not inline with US standards. the new language would make it clear it is required to meet US standard. This is similar to the language is use in many UL standards

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Submittal Date: Tue Jan 28 12:41:43 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The term “listed” is defined in Article 100 as evaluated by “…an organization that is acceptable to the authority having jurisdiction”. The definition further states that “… the equipment, material, or service meets appropriate designated standards …”. The definition is inclusive of all countries (authority having jurisdiction). Reference to Section 131 of International Electrotechnical Commission Standard 60364-1, Electrical Installations of Buildings, is currently cited in 90.1(C). It is not under the purview of the NEC to define jurisdictional requirements where the NEC is not adopted or enforced.

Public Input No. 3-NFPA 70-2019 [New Section after 90.2(A)]

New Sub-Section Under Article 90.2(A) is Needed To Address Gaps with Communications/Telecommunications Utilities

Problem Statement

Article 90.2 Scope (A) Covered, needs an additional sub-section (5) to address a significant safety gap as it relates to communications/telecommunications utility companies. Telecommunications utilities are essentially identical to Electric utility companies when it comes to facilities, buildings and structures that are not directly related to the utility part of the operation. Electric utilities are under the jurisdiction of 29CFR 1910.269 while telecommunications fall under 1910.268, which addresses how electrical work and installations are governed for PBX rooms, overhead and underground cable installations, switching centers, right of ways, etc.

However, like electric utility companies, telecommunication utility companies also own, install, build and operate other buildings, structures and locations which are not an integral part of the utility's direct operations. For example, such telecommunications companies employ administrative offices, customer service offices, warehouses, vehicle garages, recreational buildings where unqualified employees and the general public have access to and are exposed to the hazards of improper electrical installations. As currently writtent telecommunications utilties are exempt from the code requirements which compromises the safety of the public and unqualified employees working in such locations. Therefore, such property belonging to telecommunications msut be included into the covered criteria of article 90.2(A) to ensure the electrical installations of such locations are properly and adequately installed according to the NEC.

The following new sub-section is offered:

Article 90.2(A)(5) Installations used by the communications utility such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of the communications switching center, PBX facility, communications hub, control center, or distribution networks.

Statement of Problem and Substantiation for Public Input

This proposal will ensure new installations, modifications, remodeling or upgrades of electrical equipment in these offices, warehouses garages, recreation buildings, etc. belonging to telecommunications utilities will be performed in accordance with the National Electric Code, NFPA 70 to ensure public safety and the safety of unqualified employee working in these facilities.

Submitter Information Verification

Submitter Full Name: George Cole
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Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 01 12:06:35 EDT 2019
Committee: NEC-P01

Committee Statement

Resolution: Section 90.2(B)(4) excludes from NEC coverage only those “installations of communications equipment under the exclusive control of the communications utilities located outdoors or in building spaces used exclusively for such installations”. It has long been understood that communications personnel office space, outdoor cable on the customer premises and inside premises wire and cables (including those owned by the communications customer) are not subject to the exclusivity afforded the communications utility and are subject to the NEC requirements.

Public Input No. 120-NFPA 70-2019 [Section No. 90.2(A)]

(A) Covered.

This *Code* covers the installation and removal of electrical conductors, cables, cords, equipment, and raceways; signaling and communications conductors, cables, equipment, and raceways; and optical fiber cables for the following:

(1) Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings

(2) Yards, lots, parking lots, carnivals, and industrial substations

(3) Installations of conductors and equipment that connect to the supply of electricity

(4) Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of a generating plant, substation, or control center

(5) Installations supplying shore power to ships and watercraft in marinas and boatyards, including monitoring of leakage current

(6) Installations used to export electric power from vehicles to premises wiring or for bidirectional current flow

Statement of Problem and Substantiation for Public Input

Adding the words cables, and cords clarifies that this Code applies to that type of wiring too. Conductors, cables, and cords are different items and have different Code rules for each, but nonetheless, they are all covered under the scope of this Code and should be specified as such.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
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City:
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Zip:
Submittal Date: Wed Nov 20 09:34:39 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: The term “conductors” is inclusive of cables and cords. Cables and cords are electrical conductors and are covered in the Code within their respective Articles. The Panel concludes that the proposed change does not improve clarity.

Public Input No. 401-NFPA 70-2020 [Section No. 90.2(A)]

(A) Covered.

This *Code* covers the installation, replacement, and removal of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables for the following:

(1) Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings

(2) Yards, lots, parking lots, carnivals, and industrial substations

(3) Installations of conductors and equipment that connect to the supply of electricity

(4) Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of a generating plant, substation, or control center

(5) Installations supplying shore power to ships and watercraft in marinas and boatyards, including monitoring of leakage current

(6) Installations used to export electric power from vehicles to premises wiring or for bidirectional current flow

Statement of Problem and Substantiation for Public Input

There are numerous Sections in the code covering "replacement" of equipment. 210.12(D) has AFCI provisions for when branch circuit wiring is replaced. 230.67(D) applies to replacement service equipment. 250.130 has grounding provisions for replacement of receptacles. 404.2 has provisions for replacement switches. 406.4(D) has many provisions for replacement receptacles. 410.44 has exceptions for replacement luminaires. 680.26(B)(6) has provisions for replacement pool motors. There are many other code sections addressing replacement of equipment or wiring too. I am not going to list them all here, but I think I've made my point. The code does in fact cover "replacements" too. This needs to be included in the scope to recognize what it covers.

Submitter Information Verification

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Submittal Date: Sun Feb 02 09:10:58 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The term “installation” is inclusive of replacement. The Panel concludes that the proposed change does not improve clarity.

Public Input No. 287-NFPA 70-2020 [Section No. 90.2(B)]

(B) Not Covered.

This *Code* does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

Informational Note: Although the scope of this *Code* indicates that the *Code* does not cover installations in ships, portions of this *Code* are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

(3) Installations of railways for generation, transformation, transmission, energy storage, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

(5) Installations under the exclusive control of an electric utility where such installations

(6) Consist of service drops or service laterals, and associated metering, or

(7) Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy, or

(8) Are located in legally established easements or rights-of-way, or

(9) Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

(10) Installations exceeding 35000 volts

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

Only Installations exceeding 35000 is being proposed, NFPA 70 is inadequate in addressing systems above this voltage (35000). Even at the MV range is code book falls short. To think this code can provide the practical safeguarding of property and personnel (90.1) at voltages above this range is misleading. As a result a need is required for this voltage limitation within the code. This new line would clarify this code book can provide the safe outcome of installation under 35000 volts.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: master electricain
Street Address:
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Submittal Date: Wed Jan 15 10:09:18 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The NEC covers systems above 1000 volts. Installations that are not under the purview of the National Electrical Safety Code are covered by the NEC. There are numerous references in the NEC that address this issue. A Correlating Committee Medium Voltage task group has submitted public input to attempt to clarify these areas in the NEC for this cycle.

Public Input No. 3899-NFPA 70-2020 [Section No. 90.2(B)]

(B) Not Covered.

This *Code* does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

Informational Note: Although the scope of this *Code* indicates that the *Code* does not cover installations in ships, portions of this *Code* are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

(3) Installations of railways for generation, transformation, transmission, energy storage, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

(5) Installations under the exclusive control of an electric utility where such installations

(6) Consist of service drops or service laterals, and associated metering, or

(7) Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy, or

(8) Are located in legally established easements or rights-of-way, or

(9) Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational ~~Note to (4) and (~~ Note (5): Examples of electric utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) ~~or communications systems (such as telephone, CATV, Internet, satellite, or data services)~~ . Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, and the Federal Energy Regulatory Commission~~, and the Federal Communications Commission~~ .

Statement of Problem and Substantiation for Public Input

If a definition of a “communications utility” as recommended by PI 3897 is adopted, the Informational Note to 4 will be superfluous.

Related Public Inputs for This Document

Related Input	Relationship

Public Input No. 3897-NFPA 70-2020 [New Definition after Definition: Communications Equipment.]	Companion Change

Submitter Information Verification

Submitter Full Name: Jeff Silveira
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Submittal Date: Wed Sep 09 15:04:18 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The panel concludes that the examples of utilities in the Informational Note to (4) and (5) are important information for users to understand what is not covered in 90.2(B).

Public Input No. 4679-NFPA 70-2020 [Section No. 90.2(B)]

(B) Not Covered.

This *Code* does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

Informational Note: Although the scope of this *Code* indicates that the *Code* does not cover installations in ships, portions of this *Code* are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable

(3) Installations of railways for generation, transformation, transmission, ~~energy storage, or~~ or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes

(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations

(5) Installations under the exclusive control of an electric utility where such installations

(6) Consist of service drops or service laterals, and associated metering, or

(7) Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission,

~~energy storage,~~

a. or distribution of electric energy, or

b. Are located in legally established easements or rights-of-way, or

c. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission,

~~energy storage,~~

a. or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities may include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

Statement of Problem and Substantiation for Public Input

This proposal removes requirements for certain energy storage system (ESS) to not have to comply with the Code, which for the most part reverts to the exclusions found in the 2014 edition of NFPA 70. I agree that the

NEC should not cover installations associated with the generation, transformation and transmission of power or electric energy. However, there are significant hazards associated with energy storage systems (ESS), particularly lithium-ion based ESS, that are not effectively addressed if these exemptions remain in the Code. The hazards associated with a these ESS are the same regardless of who owns or operates the ESS, whose owns or leases the property on which the ESS is located, or if a commission or regulatory agencies exempts the installation.

Complicating the issue is that ownership and control of ESS installations is subjective. In one case a utility is providing ESS for installation in single family homes via a rental agreement. The utility owns the ESS. Both the renter (dwelling occupant) and the utility benefit from the installation, the renter for peak shaving and back p power, the utility for reducing peak loads on the grid and providing power back into the grid. Should these units not meet NFPA 855 and fire code requirements just because the utility owns them while units purchased by a homeowner would be required to meet the NFPA 855 and fire code requirements? There is no different in hazard. This type of relationship includes all scales of energy storage up o and including grid scale storage in suburban and urban environments. Some installations are on business properties providing back up power to the property and energy for the grid when needed. With the current exclusion of energy storage systems there is a dangerous two-tiered system of protection. Side by side installations could meet entirely different standards of safety based upon who is considered owner of the installation.

The NEC, in Articles 706 and 705, include protection requirements for ESS and grid connected ESS that are applicable for all types of ESS, ranging from residential to commercial to utility installations. The NEC ESS requirements, in conjunction with other standards such as NFPA 855, provide an excellent safety framework for these installations. The IEEE C2 National Electrical Safety Code, which is used at many electric utilities, includes nonmandatory language and does not offer the same level of protection as NEC 70 and NFPA 855 to safeguard persons and property from hazards arising from ESS.

Without the proposed change, 90.2 (B) exempts all electric utility ESS installations, including the one located in Surprise, AZ that seriously injured four firefighters who responded to a thermal runaway event. An incident some participants in the drafting of 2018 fire code language and NFPA 855 routinely warned could occur. It also exempts electric utility installations in urban areas and mixed-use buildings that are owned or leased by electric utilities.

It must be noted that when this new exclusion was added to the NEC the two model fire codes were in the process of updating the requirements of those codes to effectively addressed the hazards of ESS that were coming to light with a better understanding f the various technologies. Both of those fire codes were used in forming NFPA 855. Neither fire code has exclusions for ESS based upon ownership other than existing lead-acid stationary storage battery systems and both fire codes were correlated with and rely on NFPA 70 for the overall safety of the installation.

In reviewing the code development history, the hazards of the ESS technology, the various location where they could be installed and the new joint ownership use models for ESS were not addressed. Simply who would regulate a site. I argue that what codes apply for ESS and whom inspects for the proper installation is a decision for state or regional authorities and AHJs.

First Revision No. 2-NFPA 70-2015 [Section No. 90.2(B)]
Committee Statement:

This revision adds “storage” to the list of NEC scope exclusions which enhances clarity of the code as it relates to installations that are excluded from the scope. These exclusions did not include energy storage. This meant that an energy storage system could be subject to
the NEC and inspection by the local AHJ.

The word “power” was revised to “electric energy” in 90.2(B)(3) for consistency.

Public Input No. 4067-NFPA 70-2014 [Section No. 90.2(B)]
Statement of Problem and Substantiation for Public Input

This public input was developed by the NEC DC Task Force of the Technical Correlating Committee. The Task Force is chaired by John R. Kovacik, UL LLC. The participants in the task force and their employers/associations are listed in a separate document which is on file with NFPA.

The scope of the NEC is defined in Article 90. It excludes installations of railways in 90.2(B)(3) "... for

generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes." This exclusion does not include energy storage. This means that a railway-owned energy storage system could be subject to the NEC and inspection by the local AHJ, which is not consistent with the present differentiation of scope between the NEC and applicable Codes for railways. This PI proposes to add "energy storage" to the list of NEC scope exclusions for railways in 90.2(B)(3).

Companion PIs have been submitted for 90.2(B)(5)b. and 90.2(B)(5)d.

Submitter Information Verification

Submitter Full Name: Robert Davidson
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Affiliation: None
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Submittal Date: Thu Sep 10 16:42:44 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This section deals with facilities that are under the exclusive control of the electric utility and not subject to access by untrained personnel or the general public. Energy storage systems not under the exclusive control of the utility are subject to the NEC requirements of Article 706.

Public Input No. 3160-NFPA 70-2020 [Section No. 90.3]

90.3 Code Arrangement.

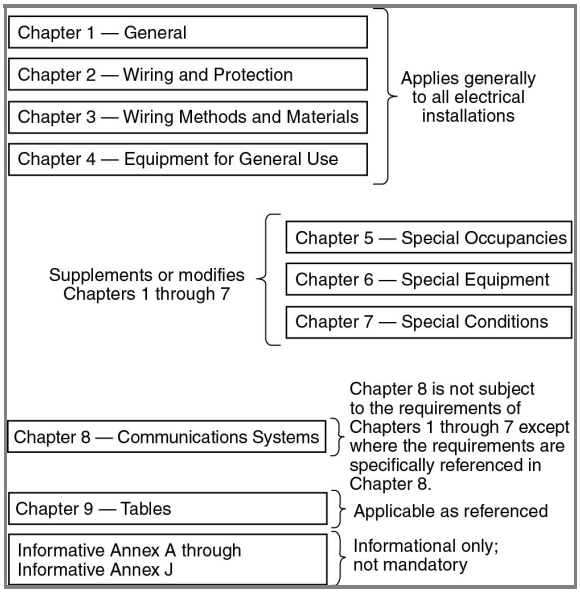
This *Code* is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1, 2, 3, and 4 apply generally. Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions and may supplement or modify the requirements in Chapters 1 through 7.

Chapter 8 covers communications systems and is ~~not~~ subject to the requirements of Chapters 1 through 7 ~~except where the requirements are specifically referenced in Chapter~~ 8 .

Chapter 9 consists of tables that are applicable as referenced.

Informative annexes are not part of the requirements of this *Code* but are included for informational purposes only.

Figure 90.3 Code Arrangement.



Statement of Problem and Substantiation for Public Input

Communication installations were historically installed by utility companies as complete systems from the utility outside plant installation to the communication device. That is not the case today. Owners or contractors currently install communication systems from a demarcation point to the communication device. That installation should be subject to all the applicable requirements in Chapters 1-7. Figure should also be revised to match this PI. See NEC 90.2 (B) (4) for clarification of utility installation.

Submitter Information Verification

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Affiliation: self
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City:
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Submittal Date: Sat Sep 05 22:43:34 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: As currently written, Chapter 8 is clear with invoking references to Chapters 1-7, where applicable. There has not been adequate substantiation provided to indicate that there is a safety issue or an issue with the current arrangement of the Code.

Public Input No. 2336-NFPA 70-2020 [Section No. 90.4]

90.4 Enforcement.

This *Code* is intended to be suitable for mandatory application by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors. The authority having jurisdiction for enforcement of the *Code* has the responsibility for making interpretations of the rules, for deciding on the approval of equipment and materials, and for granting the special permission contemplated in a number of the rules.

By special permission, the authority having jurisdiction may waive specific requirements in this *Code* or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.

This *Code* may require new products, constructions, or materials that may not yet be available at the time the *Code* is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this *Code* adopted by the jurisdiction.

Informational Note: Annex H-Administration and Enforcement is a model law that can be used to create an electrical inspection and enforcement program and to adopt the National Electrical Code.

Statement of Problem and Substantiation for Public Input

All annexes need in text references. The code doesn't contain any informational notes that point to Annex H. Annex H was created to provide and adoption and enforcement mechanism. It was originally published as a separate document, NFPA 70L. It is in an annex because jurisdictions often create their own adoption ordinances. However, some jurisdictions want the convenience of a workable model law.

Submitter Information Verification

Submitter Full Name: Mark Earley
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Affiliation: Self
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Submittal Date: Sat Aug 15 11:28:26 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8401-NFPA 70-2021
Statement: Usability is enhanced by inclusion of the added Informational Note. The Panel revised the text and concludes that Informative Annex H is a model “of guidelines” not a “law” unless adopted.

Public Input No. 2346-NFPA 70-2020 [Section No. 90.4]

90.4 Enforcement.

(A) Application. This *Code* is intended to be suitable for mandatory application by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors.

(B) Interpretations. The authority having jurisdiction for enforcement of the *Code* has the responsibility for making interpretations of the rules, for deciding on the approval of equipment and materials, and for granting the special permission contemplated in a number of the rules.

(C) Specific Requirements and Alternative Methods. By special permission, the authority having jurisdiction may waive specific requirements in this *Code* or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.

(D) New Products, Constructions, or Materials. This *Code* may require new products, constructions, or materials that may not yet be available at the time the *Code* is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this *Code* adopted by the jurisdiction.

Statement of Problem and Substantiation for Public Input

This public input only seeks to add clarity, usability and to bring this section more in line with the Regulations Governing Committee Projects by including separate titled subdivisions. There are no technical changes to the requirements.

Submitter Information Verification

Submitter Full Name: Mark Hilbert
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Submittal Date: Mon Aug 17 12:58:00 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8378-NFPA 70-2021
Statement: The editorial revision places the items in list format and complies with the Style Manual 2.1.5.1, improving clarity and promoting usability.

Public Input No. 2951-NFPA 70-2020 [Section No. 90.5]

90.5 Mandatory Rules, Permissive Rules, and Explanatory Material.

(A) Mandatory Rules.

Mandatory rules of this *Code* are those that identify actions that are specifically required or prohibited and are characterized by the use of the terms *shall* or *shall not*.

(B) Permissive Rules.

Permissive rules of this *Code* are those that identify actions that are allowed but not required, are normally used to describe options or alternative methods, and are characterized by the use of the terms *shall be permitted* or *shall not be required*.

(C) Explanatory Material.

Explanatory material, such as references to other standards, references to related sections of this *Code,* or information related to a *Code* rule, is included in this *Code* in the form of informational notes. Such notes are informational only and are not enforceable as requirements of this *Code*.

When any code or standard references without a revision date/year appearing in information Notes and Annex A of this Code shall be interpreted as referring to the latest edition of that code or standard.

Brackets containing section references to another NFPA document are for informational purposes only and are provided as a guide to indicate the source of the extracted text. These bracketed references immediately follow the extracted text.

> Informational Note: The format and language used in this *Code* follows guidelines established by NFPA and published in the *NEC Style Manual*. Copies of this manual can be obtained from NFPA.

(D) Informative Annexes.

Nonmandatory information relative to the use of the *NEC* is provided in informative annexes. Informative annexes are not part of the enforceable requirements of the *NEC*, but are included for information purposes only.

Statement of Problem and Substantiation for Public Input

Revision years for standards or codes should be optional when referenced in Informational Notes or in Annex A. There are several published standards other than NFPA that have removed revision dates when referencing standards with the understanding that the most current edition should be used. Since Informational Notes and Annex's are only for information and are not enforceable a Code Making Panel should have this option. The proposed language clarifies this rule.

Submitter Information Verification

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Submittal Date: Thu Sep 03 13:33:58 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8379-NFPA 70-2021

Statement: The Panel concludes that this revision provides clarity and improves usability.

Public Input No. 307-NFPA 70-2020 [Section No. 90.5(B)]

(B) Permissive Rules.

Permissive rules of this *Code* are those that identify actions that are allowed but not required, are normally used to describe options or alternative methods, that the designer or installer may use and are characterized by the use of the terms *shall be permitted* or *shall not be required*.

Statement of Problem and Substantiation for Public Input

The problem is some inspector believe they make the decision on whether an option or alternate method can be used. Shall be permitted or shall be required if the inspector approves it. However this allowance or option is at the designer or installers discretion. The new text makes this clear.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 16 11:07:09 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The Code is not intended as a design specification or instruction manual (see 90.1(A)). Permissive rules are provided for more than just designers and installers.

Public Input No. 1543-NFPA 70-2020 [Section No. 90.5(C)]

(C) Explanatory Material.

Explanatory material, such as references to other standards, references to related sections of this *Code,* or information related to a *Code* rule, is included in this *Code* in the form of informational notes, or an Informative Annex . Unless the standard reference includes a date, the reference is to be considered as the latest edition of the standard. Such notes are informational only and are not enforceable as requirements of this *Code*.

Brackets containing section references to another NFPA document are for informational purposes only and are provided as a guide to indicate the source of the extracted text. These bracketed references immediately follow the extracted text.

Informational Note: The format and language used in this *Code* follows guidelines established by NFPA and published in the *NEC Style Manual*. Copies of this manual can be obtained from NFPA.

Statement of Problem and Substantiation for Public Input

The NEC® has references to hundreds of other Standards. As required by the Style Manual, these references are included in either an informative annex (for example, Annex A for Product Safety Standards), or in Informational Notes. Every cycle, a considerable effort is expended to update these references to ensure the latest edition of the standard is identified. In the vast majority of these cases, this is an effort that yields little benefit, as the intent in most cases is to maintain a reference to the latest edition of the Standard. There are limited cases where the CMP makes an intentional decision to cite an older edition of the Standard, but this is by far the exception, not the rule. To reduce the effort needed to maintain an up-to-date citation for an informative reference, this Public Input would note that, unless a date is included, that the reference is to be considered as the latest edition of that standard.

Submitter Information Verification

Submitter Full Name: Robert Osborne
Organization: UL LLC
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Zip:
Submittal Date: Tue Jun 16 11:39:52 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8379-NFPA 70-2021
Statement: The Panel concludes that this revision provides clarity and improves usability.

Public Input No. 176-NFPA 70-2019 [Section No. 90.6]

90.6 Formal Interpretations.

To promote uniformity of interpretation and application of this *Code,* formal interpretation procedures have been established and are found in the ~~NFPA~~ Regulations Governing ~~Committee Projects~~ the Development of NFPA Standards .

Statement of Problem and Substantiation for Public Input

The name of the reference document has changed and therefore needs to be updated.

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
Zip:
Submittal Date: Mon Dec 09 16:20:04 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: FR-8380-NFPA 70-2021
Statement: The name of the referenced document is changed to reflect the current title.

Public Input No. 3865-NFPA 70-2020 [Section No. 90.6]

90.6 Formal Interpretations.

To promote uniformity of interpretation and application of this *Code,* formal interpretation procedures have been established and are found in the ~~NFPA~~ Regulations Governing ~~Committee Projects~~ the Development of NFPA Standards .

Statement of Problem and Substantiation for Public Input

This is a no-brainer. We have not been using the Regulations governing Committee Projects for two cycles and will not be again.

Submitter Information Verification

Submitter Full Name: Frederic Hartwell
Organization: Hartwell Electrical Services, Inc.
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 14:18:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8380-NFPA 70-2021
Statement: The name of the referenced document is changed to reflect the current title.

Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]

90.7 Examination of Equipment for Safety.

For specific items of equipment and materials referred to in this *Code*, examinations for safety made under standard conditions provide a basis for approval where the record is made generally available through promulgation by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determination through field inspections. This avoids the necessity for repetition of examinations by different examiners, frequently with inadequate facilities for such work, and the confusion that would result from conflicting reports on the suitability of devices and materials examined for a given purpose.

It is the intent of this *Code* that original factory-installed internal wiring or the original construction of new equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory that is recognized as having the facilities described in the preceding paragraph and that requires suitability for installation in accordance with this *Code*. Consideration of equipment permitted elsewhere in this Code to be reconditioned shall not be based solely upon the original listings of the equipment or upon that equipment's original factory-installed internal wiring or the original construction where either are replaced or modified. Suitability for installation and for the specific purpose, function, use, environment, and application shall be determined by application of requirements that are compatible with this *Code*.

Informational Note No. 1: See requirements in 110.3.

Informational Note No. 2: *Listed* ~~is~~ and *Reconditioned* are defined in Article 100.

Informational Note No. 3: Informative Annex A contains a list of product safety standards that are compatible with this *Code*.

Additional Proposed Changes

File Name	Description	Approved
Public_Input_No._1941-NFPA_70-2020_Section_90.7_.docx	Clean MSWord DOCX copy of this Public Input No. 1941 WITHOUT TerraView alteration of the Submitter's intent	

Statement of Problem and Substantiation for Public Input

See the uploaded attachment of a manual entry of this Public Input with text content that hasn't been Terrarized and is consequently readable.

.

Not all equipment and materials are mandated by the Code to be listed. New equipment, if listed at the original manufacturer’s discretion, may later in its usage be marked as reconditioned but not necessarily re-listed. Although requirements for the removal of the original listing mark from reconditioned equipment might reduce enforcement confusion, there’s no assurance short of re-listing that internal wiring or that modified constructions are adequately suitable. Further, because of the recent additions of reconditioned equipment, there is a need to differentiate suitability for installation (restoration adequacy) versus suitability for the intended purpose, function, use, environment, and application (see definition for “Identified”).
Reference to the definition of “Reconditioned” is added to address the possibility of salvaged conductors, equipment, or materials.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	Correlated revisions
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	Correlated revisions

Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	Correlated revisions
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	Correlated revisions
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	Affiliated addition of new definition "Manufacturer"
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 19 10:32:10 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: CMP-1 does not revise the text. The submitter’s intent is already addressed by requirements presently in 110.21.

NFPA Public Input Form

NOTE: All Public Input must be received by 5:00 pm EST/EDST on the published Public Input Closing Date.

For further information on the standards-making process, please contact the Codes and Standards Administration at 617-984-7249 or visit www.nfpa.org/codes.

For technical assistance, please call NFPA at 1-800-344-3555

FOR OFFICE USE ONLY

Log #:

Date Rec'd:

Date 2020-July-19 **Name** Brian E. Rock **Tel. No.** [redacted]

Company Hubbell Incorporated **Email** [redacted]

Street Address 40 Waterview Drive **City** Shelton **State** CT **Zip** 06484

Please indicate organization represented (if any) Hubbell Incorporated

1. (a) Title of NFPA Standard National Electrical Code® **NFPA No. & Year** 70 - 2023

(b) Section/Paragraph 90.7

2. Public Input Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposed Text of Public Input (include proposed new or revised wording, or identification of wording to be deleted):
[Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

90.7 Examination of Equipment for Safety.

For specific items of equipment and materials referred to in this *Code*, examinations for safety made under standard conditions provide a basis for approval where the record is made generally available through promulgation by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determination through field inspections. This avoids the necessity for repetition of examinations by different examiners, frequently with inadequate facilities for such work, and the confusion that would result from conflicting reports on the suitability of devices and materials examined for a given purpose.

It is the intent of this Code that original factory-installed internal wiring or the original construction of new equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory that is recognized as having the facilities described in the preceding paragraph and that requires suitability for installation in accordance with this *Code*. Consideration of equipment permitted elsewhere in this *Code* to be reconditioned shall not be based solely upon the original listings of the equipment or upon that equipment's original factory-installed internal wiring or the original construction where either are replaced or modified. Suitability for installation and for the specific purpose, function, use, environment, and application shall be determined by application of requirements that are compatible with this *Code*.

Informational Note No. 1: See requirements in 110.3.

Informational Note No. 2: *Listed* ~~is~~ and *Reconditioned* defined in Article 100.

Informational Note No. 3: Informative Annex A contains a list of product safety standards that are compatible with this *Code*.

4. Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

Not all equipment and materials are mandated by the Code to be listed. New equipment, if listed at the original manufacturer's discretion, may later in its usage be marked as reconditioned but not necessarily re-listed. Although requirements for the removal of the original listing mark from reconditioned equipment might reduce enforcement confusion, there's no assurance short of re-listing that internal wiring or that modified constructions are adequately suitable. Further, because of the recent additions of reconditioned equipment, there is a need to differentiate suitability for installation (restoration adequacy) versus suitability for the intended purpose, function, use, environment, and application (see definition for "Identified").

Reference to the definition of "Reconditioned" is added to address the possibility of salvaged conductors, equipment, or materials.

5. Copyright Assignment

(a) ☒ I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.

(b) ☐ Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

I hereby grant and assign to the NFPA all and full rights in copyright in this Public Input (including both the Proposed Text and the Statement of Problem and Substantiation). I understand that I acquire no rights in any publication of NFPA in which this Public Input in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this assignment.

Signature (Required) [redacted]

PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To: Secretary, Standards Council National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

9/17/2020

Public Input No. 1492-NFPA 70-2020 [Section No. 90.8]

90.8~~.~~ 8 Electrical Plan Review and Wiring Planning.

Plans Review. Review of plans and specifications shall conform to (A) through (C).

(A) Authority. For new construction, modification, or rehabilitation, the authority having jurisdiction shall be permitted to review construction documents and drawings.

(B) Responsibility of the Applicant. It shall be the responsibility of the applicant to ensure the following:

(1) The construction documents include all of the electrical requirements.

(2) The construction documents and drawings are correct and in compliance with the applicable codes and standards.

(C) Responsibility of the Authority Having Jurisdiction. It shall be the responsibility of the authority having jurisdiction to promulgate rules that cover the following:

(1) Review of construction documents and drawings shall be completed within established time frames for the purpose of acceptance or to provide reasons for nonacceptance.

(2) Review and approval by the authority having jurisdiction shall not relieve the applicant of the responsibility of compliance with this Code.

(3) Where field conditions necessitate any substantial change from the approved plan, the authority having jurisdiction shall be permitted to require that the corrected plans be submitted for approval.

(D) Future Expansion and Convenience.

Plans and specifications that provide ample space in raceways, spare raceways, and additional spaces allow for future increases in electric power and communications circuits. Distribution centers located in readily accessible locations provide convenience and safety of operation.

(~~B~~ E) Number of Circuits in Enclosures.

It is elsewhere provided in this *Code* that the number of circuits confined in a single enclosure be varyingly restricted. Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault.

Statement of Problem and Substantiation for Public Input

The title of 90.8 is revised to address the propose expansion of requirements. Former subdivisions (A) and (B) have been reidentified as (D) and (E). Electrical blueprints for construction are required to comply with applicable Codes and Standards. Most authorities having jurisdiction have a designated plans examining department that reviews submitted construction blueprints to ensure the electrical design complies with the minimum requirements of the applicable codes, such as the NEC. While submitted plans should conform to the minimum electrical code rules, most jurisdictions do not have specific language that requires engineering and design firms to comply with the Code in their design submittal to the jurisdiction. This can be very problematic for jurisdictions and typically requires a lot of back and forth before the plans attain substantial Code compliance. Other than perhaps an administrative regulation that requires Code compliance for submitted plans, there is a gap in many jurisdictions. This leads to many nonconformities to minimum requirements in the NEC. Many jurisdictions struggle with this. Some jurisdictions don't have plan review processes, thus further emphasizing the need for this rule. The added text of this section is actually derived from Section 80.21 in Annex H of the NEC. The new requirements for electrical plans (blueprints) to meet Code requirements is not out of step with what jurisdictions already require anyway and will go a long way in helping inspection jurisdictions attain Code compliance proactively and support inspectors during the construction process.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 09 12:19:11 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The need for the recommended content in Section 90.8 addressing electrical plan review has not been adequately substantiated. Informative Annex H provides guidelines on the review of construction documents and guidelines that can be adopted by jurisdictions.

Public Input No. 188-NFPA 70-2019 [Section No. 90.9]

90.9 Units of Measurement.

(A) Measurement System of Preference.

For the purpose of this *Code*, metric units of measurement are in accordance with the modernized metric system known as the International System of Units (SI).

(B) Dual System of Units.

SI units shall appear first, and ~~inch-pound~~ United States Standard (US Standard) units shall immediately follow in parentheses. Conversion from ~~inch-pound~~ US Standard units to SI units shall be based on hard conversion except as provided in 90.9(C).

(C) Permitted Uses of Soft Conversion.

The cases given in 90.9(C)(1) through (C)(4) shall not be required to use hard conversion and shall be permitted to use soft conversion.

(1) Trade Sizes.

Where the actual measured size of a product is not the same as the nominal size, trade size designators shall be used rather than dimensions. Trade practices shall be followed in all cases.

(2) Extracted Material.

Where material is extracted from another standard, the context of the original material shall not be compromised or violated. Any editing of the extracted text shall be confined to making the style consistent with that of the *NEC*.

(3) Industry Practice.

Where industry practice is to express units in ~~inch-pound~~ US Standard units, the inclusion of SI units shall not be required.

(4) Safety.

Where a negative impact on safety would result, soft conversion shall be used.

(D) Compliance.

Conversion from ~~inch-pound~~ US Standard units to SI units or from SI units to US Standard units shall be permitted to be an approximate conversion. Compliance with the numbers shown in either the SI system or the ~~inch-pound~~ US Standard system shall constitute compliance with this *Code*.

Informational Note No. 1: Hard conversion is considered a change in dimensions or properties of an item into new sizes that might or might not be interchangeable with the sizes used in the original measurement. Soft conversion is considered a direct mathematical conversion and involves a change in the description of an existing measurement but not in the actual dimension.

Informational Note No. 2: SI conversions are based on IEEE/ASTM SI 10-1997, *Standard for the Use of the International System of Units (SI): The Modern Metric System*.

Statement of Problem and Substantiation for Public Input

The United States Standard system of measurements goes far beyond inch-pound (which is just a single unit of measurement) and is properly known as US Standard. It should not be referred to as the inch-pound system of measurements, by this logic the Metric system should be referred to as the Newton-meter system which is preposterous. This proposal is to properly denote that we are converting between the Metric and US Standard systems of measurements.

Submitter Information Verification

Submitter Full Name: Jeremiah McRoberts
Organization: Self
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 18 09:17:47 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: The format and language used in the Code follows guidelines established in the NEC Style Manual. Any change to the presentation of units must be addressed in the NEC Style Manual, with ultimate approval of the NFPA Standards Council.

Public Input No. 4271-NFPA 70-2020 [Section No. 90.9(B)]

(B) Dual System of Units.

SI units shall appear first, and inch-pound units shall immediately follow in parentheses. Conversion from inch-pound units to SI units shall be based on hard conversion except as provided in 90.9(C) .

Exception: The column headings for the tables located in Informative Annex C shall have the conduit trade size, in nominal inches, listed on top and the conduit size metric designator, in SI units, shall be below in parentheses.

Statement of Problem and Substantiation for Public Input

90.9(B) Tells us that SI units hall appear first and inch-pound units shall follow in parentheses. This appears to be accurate, except for the tables in the Informational Annex C. The column headings for these tables list the trade size, in nominal inches, first (on top) and the metric designator (SI units) second (on bottom) and in parentheses. The easiest way to resolve this inconsistency is to add an exception to 90.9(B).

The other, perhaps better solution, would be to edit all of the table headings in the Informative Annex C to be consistent with 90.9(B) and the rest of the NEC.

Submitter Information Verification

Submitter Full Name: Darin Mason
Organization: IBEW Local 226, TEJATC
Affiliation: IBEW Local 226, Topeka Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 08:57:30 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8390-NFPA 70-2021
Statement: CMP-1 adds an exception to reflect the current use of dual units in Informative Annex C tables.

Public Input No. 962-NFPA 70-2020 [New Article after 100]

Basement

Any story of a building wholly or partly below grade plane that is not considered the first story above grade plane. (BLD-FUN 3.3.53)

Statement of Problem and Substantiation for Public Input

The term basement is used in Article 210 roughly 10 times and in Chapter 3 of the NEC roughly 6 times. The term is used within rules that require critical judgement and necessitates consistent application of specific receptacle outlet rules and ground-fault circuit interrupter requirements. The need for consistency is evident, but a definition is required as a starting point to help users understand what a basement is. The proposed definition is derived from NFPA 5000 and is very similar to the definition in the building codes. There are other related defined terms in NFPA 5000 that help users make critical determinations about basement levels as compared to first floor levels of buildings and structures. The definition of grade plane is also included in NFPA 5000.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 06 09:22:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed definitions could create correlation issues in other areas of the Code. A one story home can be built wholly or partially below grade and qualify as a basement under the proposed defined term. Some of the proposed Public Inputs also include a requirement which is not allowed for definitions by the 2020 NEC Style Manual, 2.2.2.2.

Public Input No. 1473-NFPA 70-2020 [Definition: Accessible (as applied to equipment).]

Accessible (as applied to equipment).

Admitting close approach; Capable of being reached for operation, renewal, and inspection; not guarded by locked doors, elevation or other effective means: capable of being reached or exposed without damaging the building structure or finish or not permanently enclosed by the structure or finish, finish of furniture .or building. (CMP-1)

Additional Proposed Changes

File Name	Description	Approved
02272020_030859_PM.JPG	Receptacle Devices Behind Wall Unit Finishes #1	
04152020_022152_PM.JPG	Receptacle Devices Behind Wall Unit Finishes #2	

Statement of Problem and Substantiation for Public Input

The current text has become limited in scope and the does not satisfactorily address equipment. Devices are being installed behind head wall finishes covering devices and rendering them not accessible without removing these finishes. These finishes will generally require 2-3 well able workers to move. An attachment cap must be Readily Accessible and anything inserted into a Receptacle Device must be Accessible without removing these finishes.

A device that is hidden behind any finish is Not Accessible to the occupant or any Non Qaulified person requiring access to disconnect a potential hazard.

Submitter Information Verification

Submitter Full Name: James Hathorn
Organization: City Of Irving
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jun 06 20:52:10 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed text does not provide clarity. Adequate substantiation to expand the list has not been provided. In regards to PI-1473, the proposed changes could introduce confusion with the definition of “accessible (as applied to equipment)” and “readily accessible” due to the similarity.

Public Input No. 1813-NFPA 70-2020 [Definition: Accessible (as applied to equipment).]

Accessible (as applied to equipment).

Capable of being reached for performing work, modifications, maintenance, operation, renewal, and inspection. (CMP-1)

Statement of Problem and Substantiation for Public Input

The text “performing work, modifications, maintenance,” should be included in the definition, since these tasks are often what the term applies to in addition to operation, renewal, and inspection. “Access” is required to perform work, modifications, or maintenance on the equipment or a system, beyond being reached for operation, inspection, renewal as the current text indicates, but access cannot be used in the definition because of NEC Style Manual rules. The definition should reflect what actually occurs in the field.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 09 09:09:44 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed text does not provide clarity. Adequate substantiation to expand the list has not been provided. In regards to PI-1473, the proposed changes could introduce confusion with the definition of “accessible (as applied to equipment)” and “readily accessible” due to the similarity.

Public Input No. 511-NFPA 70-2020 [Definition: Accessible (as applied to wiring methods).]

Accessible (as applied to wiring methods).

Capable of being removed or exposed without damaging the building structure or finish ~~or~~ , or not permanently closed in by the structure or finish of the building, or not blocked by any permanently installed electrical equipment or other permanently installed mechanical systems . (CMP-1)

Additional Proposed Changes

File Name	Description	Approved
4456C6EB-84AB-45CA-9D1F-89DFD8582AE1.jpeg	blocked conduit body 1	
9820CD65-58C6-47B1-B6D1-9EB16EBFE481.jpeg	blocked conduit body 2	
D57BD59D-99C6-4947-8B76-9A56D733BABE.jpeg	blocked conduit body 3	
928AFA3C-0DF2-4867-9285-F83C3F43897D.jpeg	blocked box 1	
716D1BC8-FC84-4DF0-A8F0-F90E966FA812.jpeg	blocked box 2	
4854F964-0DC8-4C42-B19A-7B25694B8B7C.jpeg	blocked box 3	
2F6C76E2-951F-48E3-969D-F6E883D729F9.jpeg	blocked box 4	
2729DA9A-CA94-43D4-ABAE-7C1A3ECC8CB6.jpeg	blocked box 5	
03D284CD-5B57-442B-838D-2055D09818DA.jpeg	blocked box 6	
3D739F05-3B71-456F-BDE1-582FACE5FA7B.jpeg	blocked conduit body 4	
9F97F8A1-9C95-4A72-9A2E-E0874DB7809B.jpeg	blocked conduit body 5	
Conduit_body_requiring_dismantling_of_raceway_and_box_for_access.jpg	conduit not accessible unless raceway and box are dissassembled	
LB_requiring_raceway_dissassembly_for_access.jpg	conduit bodies not accessible unless raceway is disassembled	
pipe_blocking_box.jpg	box blocked by copper heating pipe that was too hot to touch!	
Raceway_and_strut_blocking_box.JPG	box blocked by raceway and strut	
raceway_blocking_box.jpg	box blocked by raceway	
Railing_blocking_box.jpg	railing blocking box.	

IMG_0176.JPG	Receptacle outlet blocked by plumbing pipes
IMG_0177.JPG	Junction box blocked by PVC vent pipe

Statement of Problem and Substantiation for Public Input

Looking at the many photo examples I have provided, it's clear to me that revisions are needed for this definition to clarify the intent here. In all of these photo examples I've provided, the boxes, and conduit bodies being completely blocked by raceways, plumbing pipes, and other mechanical systems are presently considered accessible per the literal wording since these mechanical systems are not really "the structure" or "building finish". And yet, gaining access to the wiring contained within those boxes or conduit bodies is virtually impossible unless plumbing pipes are cut out, raceways are removed, or other equipment is dismantled! My proposed revision makes it clear that wiring and electrical equipment blocked by pipes, ductwork, drains, raceways or other mechanical systems will NOT be considered "accessible".
By the way, I have hundreds more photos showing similar installations of boxes and conduit bodies being completely blocked and rendered inaccessible by items other than " the building finish"

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Fri Feb 21 10:58:43 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8399-NFPA 70-2021
Statement: Other building systems such as electrical raceways, plumbing pipes, and mechanical systems are presently considered accessible since they are not part of the structure or finish of the building. This revised wording clarifies the intent of the definition.

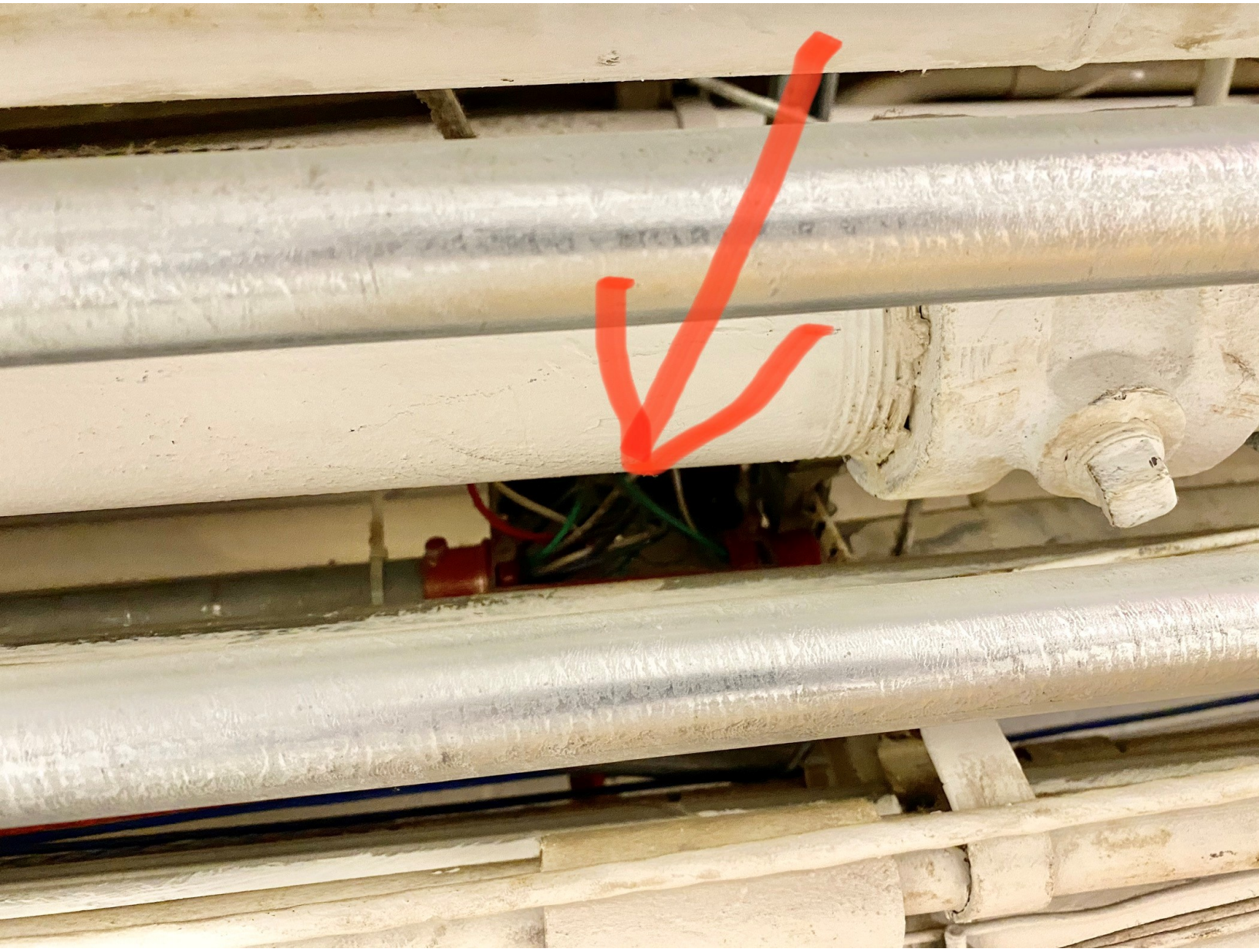
3 1/2" - 4" COVER

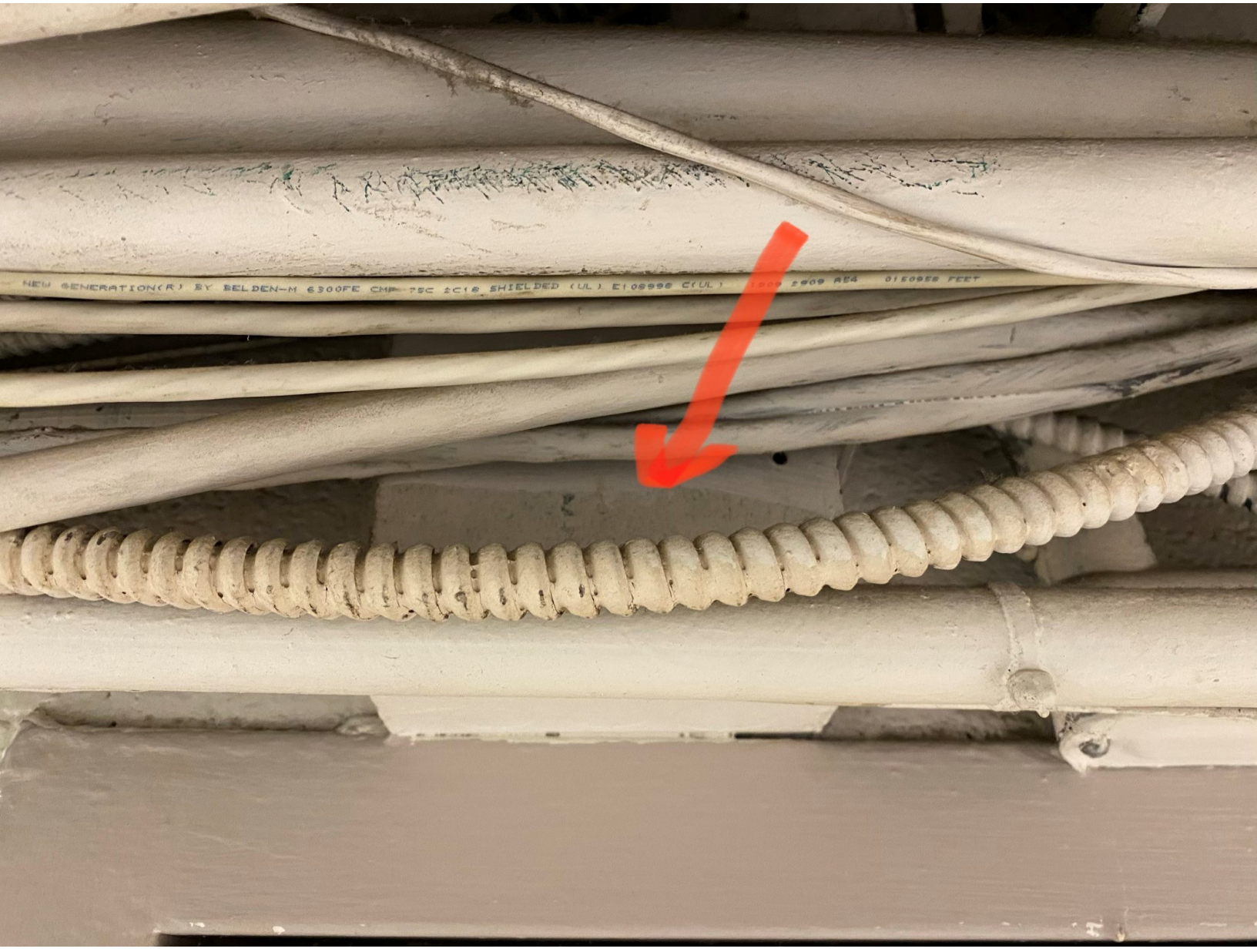





FUSE
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Cat. No.
Amps
Volts
Phase
Wire
Std. H.P.
Max. H.P.
CONTINUOUS LOAD CURRENT NOT TO EXCEED
80% OF THE RATING OF FUSES EMPLOYED IN
OTHER THAN MOTOR CIRCUITS
THE STARTING CURRENT OF MOTORS OF MORE
THAN THE STANDARD HORSEPOWER RATINGS
MAY REQUIRE THE USE OF FUSES WITH
APPROPRIATE TIME DELAY CHARACTERISTICS
For Short Circuit Current Rating
And Additional Information
See Inside of Cover.
Westinghouse Electric Corporation
MADE IN U.S.A.





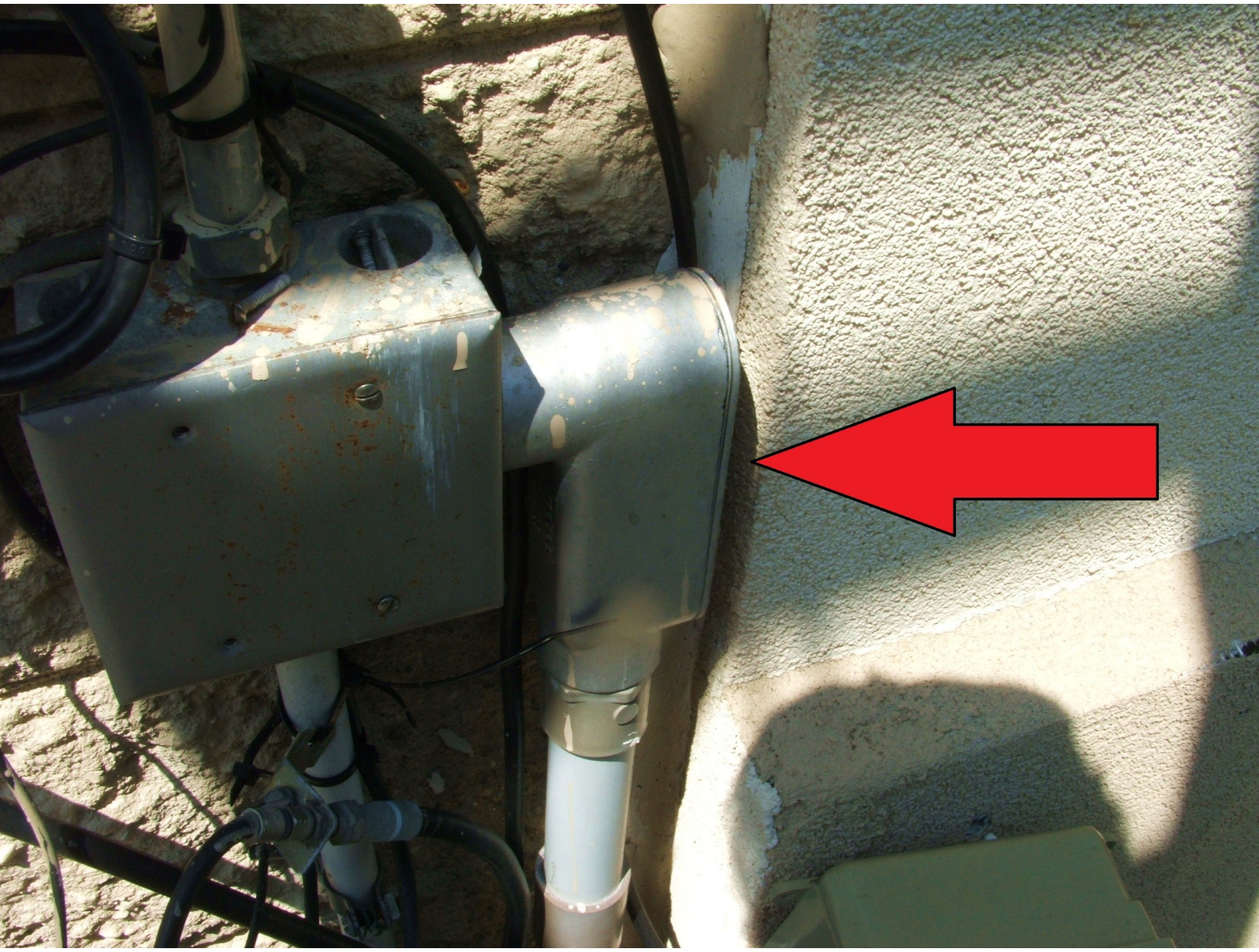

NEW GENERATION(R) BY BELDEN-M 6300FE CMP 75C 2C18 SHIELDED (UL) E108998 C(UL)






E254321
LISTED
2700
1 1/4& 1 1/2" COVER

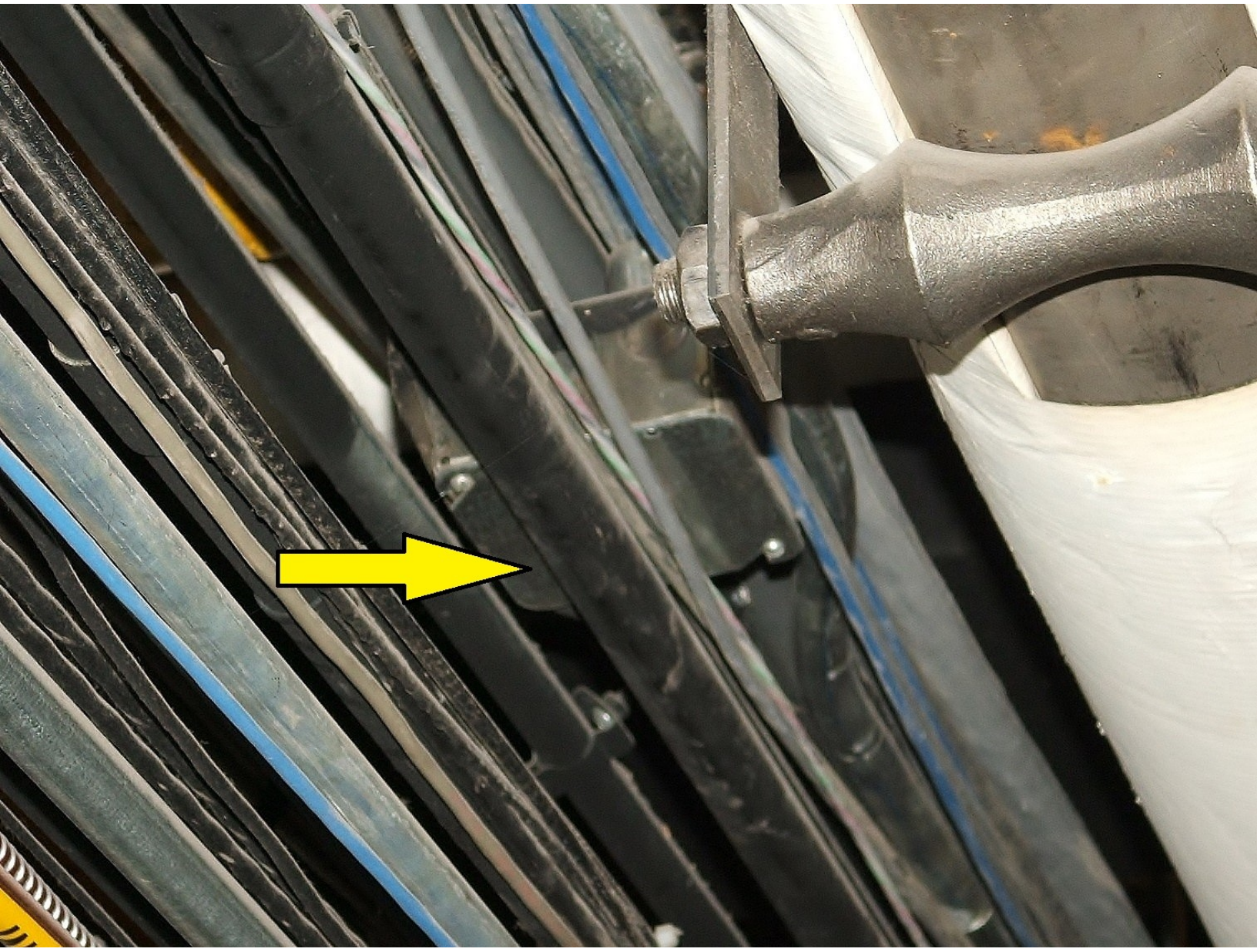







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sion Tank
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Public Input No. 1814-NFPA 70-2020 [Definition: Accessible, Readily (Readily Accessible).]

Accessible, Readily (Readily Accessible).

Capable of being reached quickly for performing work, modifications, maintenance, operation, renewal, or inspections without requiring those to whom ready access is requisite to take actions such as to use tools (other than keys), to climb over or under, to remove obstacles, or to resort to portable ladders, and so forth. (CMP-1)

Informational Note: Use of keys is a common practice under controlled or supervised conditions and a common alternative to the ready access requirements under such supervised conditions as provided elsewhere in the NEC.

Statement of Problem and Substantiation for Public Input

The text “performing work, modifications, maintenance,” should be included in the definition, since these tasks are often what the term applies to in addition to operation, renewal, and inspection. “Access” is required to perform work, modifications, or maintenance on the equipment or a system, beyond being reached for operation, inspection, renewal as the current text indicates, but access cannot be used in the definition because of NEC Style Manual rules. The definition should reflect what actually occurs in the field.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 09 09:10:57 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed text does not provide clarity. Adequate substantiation to expand the list has not been provided.

Public Input No. 2558-NFPA 70-2020 [Definition: Accessible, Readily (Readily Accessible).]

Accessible, Readily (Readily Accessible).

Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to take actions such as to use tools (other than keys), to climb over or under, to remove obstacles, or to resort to portable ladders, and so forth. Equipment requiring frequent testing, use or examination shall be not over 6’7’’ above the floor or working platform. (CMP-1)

Informational Note: Use of keys is a common practice under controlled or supervised conditions and a common alternative to the ready access requirements under such supervised conditions as provided elsewhere in the NEC.

Statement of Problem and Substantiation for Public Input

This input is being submitted on behalf of the Minnesota Department of Labor and Industry. The Department’s 15 office/field staff, and 65 plus contract electrical inspectors complete over 150,000 electrical inspections annually and are involved in the daily enforcement and interpretation of the National Electrical Code.

A height limitation will assure that the electrical devices and equipment will be considered readily accessible. Similar to overcurrent devices and switches, the language in sections 240.24 and 404.8 restricts the height for user accessibility. We have submitted a companion proposal to address the height limitations for GFCI receptacles in section 210.8.

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 16:58:56 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The existing definition already includes not having “to resort to portable ladders”. The proposed Public Input also includes a requirement which is not allowed for definitions by the 2020 NEC Style Manual, 2.2.2.2.

Public Input No. 3139-NFPA 70-2020 [Definition: Authority Having Jurisdiction (AHJ).]

Authority Having Jurisdiction (AHJ).

An organization, office, or individual responsible for enforcing the requirements of ~~a code or~~ this *standard* , ~~or~~ and for approving equipment, materials, an installation, or a procedure according to their responsibilities . (CMP-1)

Informational Note: The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

Statement of Problem and Substantiation for Public Input

the problem is this language is not specific to this Code which is actually an installation standard. as explained in the info note each AHJ may have other interest in for how something is installed. each AHJ enforcing its own interest. It is not uncommon to have multiple AHJs Licensing agency enforcement of the NEC for compliance, Insurance agency enforcement for risk assessment OSHA NEC compliance for worker safety and the Fire Marshall NEC compliance for building safety. the current language sounds like only one AHJ makes the decision to except that may be true in so instances but more prevalent is the multiple AHJ this new language makes it clear you may need approve from more than one AHJ.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 05 11:45:51 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed Public Input does not add any clarity. Removal of the word “code” is not appropriate. The existing Informational Note already includes enough clarity to understand the definition. The existing definition is also consistent with the definition for “AHJ” in other NFPA documents.

Public Input No. 1819-NFPA 70-2020 [Definition: Building.]

Building.

A structure that stands alone or that is separated from adjoining structures by fire walls as defined by the local building requirements . (CMP-1)

Statement of Problem and Substantiation for Public Input

Just because it meets the definition in the NEC it may not be considered a "fire wall". The level of fire separation is decided by the local building official and may vary from town to town.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 09 10:17:35 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed Public Input does not add clarity. Local building codes already apply without the additional proposed text. The term “fire wall” has a commonly accepted meaning in building codes.

Public Input No. 3501-NFPA 70-2020 [Definition: Circuit Breaker.]

~~**Circuit Breaker.**~~

~~A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.~~

Statement of Problem and Substantiation for Public Input

Delete this definition for Switching Device, Circuit Breaker. It is not used or necessary. The current term Circuit Breaker includes over 1,000 volts as well. When searching the NEC for those terms used together, there are no matches?

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 18:04:58 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8456-NFPA 70-2021

Statement: The tabulated items under switching devices include circuit breaker. As the parts in Article 100 are eliminated, the definition for “circuit breaker” makes the definition for “circuit breaker” as a subheading under switching devices extraneous. Therefore, the definition of circuit breaker under switching devices is deleted.

Public Input No. 4039-NFPA 70-2020 [Definition: Disconnecting Means.]

~~**Disconnecting Means.**~~

~~A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.~~

(Delete this definition)

Statement of Problem and Substantiation for Public Input

Delete this definition for Switching Device, Disconnecting Means. The definition is not necessary. The current term Disconnecting Means includes under and over 1,000 volts.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 18:36:58 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8410-NFPA 70-2021
Statement: When all of the definitions in Article 100 are consolidated because the parts are being eliminated, the definition for “disconnecting means” will be included under the definition for “switching device.” Therefore, a separate definition is redundant and unnecessary.

Public Input No. 2434-NFPA 70-2020 [Definition: Enclosure.]

Enclosure.

The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. (CMP-1)

Informational Note: See Table 110.28 for examples of enclosure types other than fences or walls surrounding an installation .

Statement of Problem and Substantiation for Public Input

Correlation with the more narrow use of "enclosures" or "enclosure types" in 110.28 and 300.6(A).versus in 110.31 and 110.31(D). As used in the Informational Note, "enclosure types" is not the same as "Enclosure Type Numbers" tabulated in Table 110.28 nor as Enclosure Type ratings used in the affiliated product standards.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1811-NFPA 70-2020 [Section No. 110.28]	Clarification that enclosures of 110.28 exclude fences and walls
Public Input No. 2438-NFPA 70-2020 [Section No. 300.6]	Revision correlation with Art 100 definition Enclosure and with Art 312
Public Input No. 1811-NFPA 70-2020 [Section No. 110.28]	
Public Input No. 2438-NFPA 70-2020 [Section No. 300.6]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 21 11:44:44 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed Public Input does not add clarity. The definition is already clear about fences and walls. Table 110.28 does not refer to fences and walls.

Public Input No. 2033-NFPA 70-2020 [Definition: Fitting.]

Fitting.

An accessory such as a locknut, bushing, connector, coupling, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function. (CMP-1)

Statement of Problem and Substantiation for Public Input

Connectors and couplings are fittings as covered by the UL product standards and should be included in this definition.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 12:23:00 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed Public Input does not add clarity. The examples in the existing definition are not meant to be an all-inclusive list.

Public Input No. 3664-NFPA 70-2020 [Definition: Garage.]

Garage.

A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes. (CMP-1)

Informational Note: For commercial garages, repair and storage, see ~~Article~~ 511. 1 .

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC(r) Style Manual prohibits reference to an entire article, other than to Article 100. As such, it is proposed that you instead refer to the scope of Article 511.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 10:23:09 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8415-NFPA 70-2021
Statement: This change will align the existing Informational Note with the NEC Style Manual Section 4.1.4.

Public Input No. 1938-NFPA 70-2020 [Definition: Identified (as applied to equipment).]

Identified (as applied to equipment).

Recognizable, on some basis beyond the manufacturer's declaration, as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular *Code* requirement. (CMP-1)

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

Statement of Problem and Substantiation for Public Input

The IN is not enforceable, but it seems to indicate the intent of "identified": not identical with "listed," but also something more than "read the label; if you recognize that the company is self-declaring their product is good for this, that's fine."

If we are going to take "identified" as more than a CE-equivalent, devoid of complying even with a foreign standard, it seems wise to make explicit the idea that what's "recognizable" has to mean more than whatever a manufacturer chooses to assert.

Could this change cause a problem, where the only information we have is a manufacturer's claim? No more than any Code requirement for a product that is not available. As in that case, the default is to accept what is presently in use--unless the AHJ decides to call in an FEB or equivalent. The advantage of adding this wording is that where some independent evaluation is available, a product that is qualified through that certification will more clearly fit the new definition of "identified" than one not tested. As a result, installers and inspectors can be more secure that they can rely on the identification.

Submitter Information Verification

Submitter Full Name: David Shapiro
Organization: Safety First Electrical
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 17 18:17:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The substantiation for this Public Input compares “identified” to “self-declaring”, which it is not. The submitter did not give sufficient substantiation why this change should be made.

Public Input No. 565-NFPA 70-2020 [Definition: Identified (as applied to equipment).]

Identified (as applied to equipment).

~~Recognizable as suitable~~ Designed and manufactured for the specific purpose, function, use, environment, application, and so forth, where described in a particular *Code* requirement. (CMP-1)

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include manufacturer instructions and spececifications, as well as investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

Statement of Problem and Substantiation for Public Input

This revision is needed to more clearly distinguish this term from the terms "listed" and "approved". Does an "identified" product need to be evaluated by a testing lab (listed)? Not necessarily, even though the present informational note seems to imply that it does. Does an identified product need to be designed and manufactured for the specific function, purpose, use, environment, etc.? Yes it does. I believe that this is the intent of this definition. What makes a product "recognizable" for the application? The reality is that manufacturer instructions and specifications do that for products that are not "listed". This is another reason why this revision is needed. Simply saying "recognizable" is way too vague! What does that really mean? Who "recognizes" it? The AHJ? The installer? The manufacturer? The testing lab? All four of them? Two of them? Which two? Three of them? Which three? This needs to be clarified.

"Approved" equipment only requires one level of an assurance of safety by the AHJ. All installations must be "approved" per 110.2.

For equipment required to be "identified", there will be at least two levels of an assurance of safety. The first level is when the manufacture designs and builds a product to engineered specifications. The second level is when the AHJ gives his/her approval of it's installation.

For products required to be "listed" there will be at least three levels of an assurance of safety. The first level is when the manufacture designs and builds a product to engineered specifications. The second level is the evaluation by a qualified testing lab. The third level is when the AHJ gives his/her approval of it's installation.

I believe that my proposed revision will help more clearly distinguish these terms that are not interchangeable terms.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sat Feb 29 07:45:10 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed wording seems to equate self-declaration to the specified methods for identification and does not add clarity to the definition.

Public Input No. 278-NFPA 70-2020 [Definition: In Sight From (Within Sight From, Within Sight).]

In Sight From (Within Sight From, Within Sight).

Where this *Code* specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible ~~and~~ , not more than 15 m (50 ft) distant from the other, and not obscured by walls, buildings, and alike . (CMP-1)

Statement of Problem and Substantiation for Public Input

Please give us what we need to enforce this important requirement, without people calling and complaining to our bosses.

Simply saying "visible" isn't enough. If a disconnect is around the corner of a building, and out of the line of sight from the equipment that serves, but still within 50-feet, does it meet the definition? The disconnect and the equipment can still be "visible" from the opposite direction when facing the disconnect. This is not what the code panel considers to be "visible." Building owners and contractors' tend to be real creative with their interpretation of the word "visible." Please fix this language so that it is not subject to interpretation.

Reason for change is clarity, and to aid with enforcement - to help the electrical inspector in the performance of his/her duties.

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jan 11 18:24:47 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The existing definition is sufficiently clear. The added language in this Public Input does not improve clarity.

Public Input No. 2837-NFPA 70-2020 [Definition: In Sight From (Within Sight From, Within Sight).]

~~**In Sight From (Within Sight From, Within Sight).**~~

~~Where this *Code* specifies that one equipment shall be "in sight from," "within sight from," or "within sight of," and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other. (CMP-1)~~

Statement of Problem and Substantiation for Public Input

The definition of "In sight from" has been in the NEC since the 1981 edition (see Proposal 43 in the ROP), but it has never really been a definition. It does not conform to the NFPA Manual of Style, clause 2.3.1.4, "Definitions shall not be written in mandatory language", or with clause 2.3.2.3, "Definitions shall not contain requirements." This "definition" doesn't just contain a requirement, it is a requirement. It operates very much like 110.21(B) and 110.25, stating that where something is required in the Code, it shall ... . This belongs in Article 110, exactly as written in existing Article 100. A companion proposal to add it to Art. 110 is being submitted. The only argument for leaving the definition as a definition instead of a rule is that people have been looking for it in Article 100 for 39 years. They can get used to finding it in Article 110, just as they got used to calling lighting fixtures luminaires.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2839-NFPA 70-2020 [New Section after 110.19]	

Submitter Information Verification

Submitter Full Name: William Fiske
Organization: Intertek Testing Services
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 02 09:38:35 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This term is used throughout the Code and thus it belongs in Article 100 definitions.

Public Input No. 3870-NFPA 70-2020 [Definition: In Sight From (Within Sight From, Within Sight).]

In Sight From (Within Sight From, Within Sight).

Where this *Code* specifies that one equipment shall be ~~"in sight from,"~~ "within sight ~~from," or "within sight of," and so forth, another~~ of" another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other. (CMP-1)

Statement of Problem and Substantiation for Public Input

The NEC needs to use a single term in this area. Multiple similar terms can be vague and also more difficult to identify. A single term "within sight of" should be used exclusively to eliminate any gray areas in the NEC, and also to assist when searching for the term.

Submitter Information Verification

Submitter Full Name: Mitch Maulik
Organization: OHM Electric, LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 14:28:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed change does not add clarity. There was not sufficient substantiation for the proposed revision.

Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]

NRTL Label, NRTL Labeled , NRTL Labeling . .

Equipment or materials , specific to a manufacturer, to which has been attached a label, symbol, or other identifying mark ~~of an organization that is~~ indicating that the equipment has been tested and qualified as safe for particular conditions use. The testing agency shall be an NRTL (Nationally Recognized Testing Laboratory), or other testing organization, third party to the manufacturer, acceptable to the authority having jurisdiction ~~and concerned with~~ . The testing agency shall be qualified for the respective type of product evaluation, ~~that maintains~~ with duties to maintain periodic inspection of ~~production of labeled~~ the manufacturing production process for the equipment or materials ~~, and by whose labeling the manufacturer indicates compliance~~ being NRTL Labeled. An NRTL Label shall be product specific and shall indicate that the manufacturer's product is compliant with appropriate standards and/ or performance ~~in a specified manner.~~ ~~(CMP-1)~~ criteria as specified by the supporting NRTL Label documentation specific to the product.

Informational Note 1 : If a listed product is of such a size, shape, material, or surface texture that it is not possible to apply legibly the complete label to the product, the complete label may appear on the smallest unit container in which the product is packaged.

Informational Note 2: refer to definition for NRTL Listed.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION: To distinguish the term "labeled" from other NEC uses of the words; label, labels, labeling and labeled, it recommended to apply capitalization to the word "Labeled" when intended for this particular context of a testing organization. Capitalizing Listed as a proper noun will make this context more readily recognizable apart from other context usage for the variations of the word "label". In the definitions, it is appropriate to associate NRTL to "Nationally Recognized Testing Laboratory", which is generally the type of testing agency. Any other testing agency, where approved by an AHJ, is allowed. It is also appropriate to include a reference to the industry standard organization that acknowledged to govern this industry acceptance standard for each NRTL, the Occupational Safety and Health Administration (OSHA). With OSHA acknowledged as the official agency, it becomes a Code-legitimized reference, able to facilitate any follow-up enquiries regarding code compliance. To help facilitate back-checks has never been more suitable than in this age of ever-increasing pirating of product and other pretenders to suitability.

Wherever the term ‘Labeled’ is used as part of ‘NRTL Listed and Labeled’, it shall refer to the equipment mounted labeling that is pertinent to all of the equipment item’s application-specific Listing(s) and shall include the equipment ratings.

Wherever the term ‘Marked’ is used as part of ‘NRTL Listed and Marked’ or ‘NRTL Listed and Labeled and Marked’, ‘marked’ shall refer to the marking or labeling that is associated with the Listing and shall include the specific qualification of use mentioned in code. E.g. listed and labeled and marked as being suitable for use as service equipment.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	similar topic
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	similar topic
Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]	similar topic
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	
Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]	

Public Input No. 4707-NFPA 70-2020 [Global Input]

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 15:28:49 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Use of the term “NRTL” is a violation of the NEC Style Manual 3.2.5.3. The proposed Public Input does not add clarity to the existing definition.

Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]

NRTL Listed , NRTL Listing .

Equipment , or materials, ~~or services included in a list published by an organization that is~~ specific to a manufacturer, which has been tested and qualified as safe for particular conditions use, with validation indicated by being registered onto an industry accepted list for approved equipment. The testing agency shall be an NRTL (Nationally Recognized Testing Laboratory), or other testing organization, third party to the manufacturer, acceptable to the authority having jurisdiction ~~and concerned with evaluation of products or services, that maintains~~ . The testing agency shall be qualified for the respective type of product evaluation, with duties to maintain periodic inspection of ~~production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose. (CMP-1)~~

~~Informational Note~~

the manufacturing production process for the equipment or materials being NRTL Listed. An NRTL Listing shall be product specific and shall indicate that the manufacturer's product is compliant with appropriate standards and/or performance criteria as specified by the supporting NRTL Listing documentation specific to the product.)

Informational Note 1 : The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Informational Note 2: refer to definition for NRTL Labeled.

Informational Note 3: The Occupational Safety and Health Administration (OSHA) is the agency that qualifies and recognizes Nationally Recognized Testing Laboratories (NRTLs).

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION: To distinguish the NRTL context of the term "Listing" from other NEC uses of the words; list, listed, or listing, it is recommended to apply capitalization to the word " Listing" whenever intended for this particular context of a testing organization. Capitalizing Listed as a proper noun will make this context more readily recognizable apart from other context usage for the variations of the word "label".

Include NRTL in the terminology with its definition, "Nationally Recognized Testing Laboratory".

Include a reference to the industry standard organization acknowledged to govern this industry acceptance standard for each NRTL, the Occupational Safety and Health Administration (OSHA). With OSHA acknowledged as the official agency, it becomes a legitimate reference for follow-up questions on code compliance. Any other testing agency, where approved by an AHJ, is allowed.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	similar topic
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	similar topic
Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]	similar topic
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	

Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]
Public Input No. 4707-NFPA 70-2020 [Global Input]

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 15:31:59 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Use of the term “NRTL” is a violation of the NEC Style Manual 3.2.5.3. The proposed Public Input does not add clarity to the existing definition.

Public Input No. 605-NFPA 70-2020 [Definition: Location, Dry.]

Location, Dry.

A location not normally subject to dampness or wetness. ~~A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.~~
(CMP-1)

Statement of Problem and Substantiation for Public Input

In the definition "Location, Dry" it states in part "A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction". I think this part of the definition needs to be removed. I am aware of a situation where a contractor called for a rough inspection on materials that were only rated for a dry location. When the inspector appeared on site, the installed material was soaked and had water dripping off of it. The contractor the hid behind this part of the definition (A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction). Please consider removing this part of the definition.

Submitter Information Verification

Submitter Full Name: James Murphy
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 05 08:01:17 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The language in the existing definition needs to remain. This makes it clear that a building under construction (for example) would not be considered a wet location permanently.

Public Input No. 1267-NFPA 70-2020 [Definition: Location, Wet.]

Location, Wet.

~~Installations underground or~~

A location that is one or more of the following:

1) unprotected and exposed to weather;

2) subject to saturation with water and other liquids;

3) underground;

4) in concrete slabs or masonry in direct contact with the earth~~; in locations subject to saturation~~ .

Informational Note: A vehicle washing area is an example of a wet location saturated with water or other liquids, ~~such as vehicle washing areas; and in unprotected locations exposed to weather.~~ (CMP-1).

Statement of Problem and Substantiation for Public Input

The current language gives the user an impression that when electrical equipment is approved for a “wet location” that it is approved for all the areas indicated in the current definition. The new definition clarifies that electrical equipment approved for a wet location can be approved for one or more areas.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 09:41:30 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8436-NFPA 70-2021
Statement: The revised language puts the items into a list format which enhances clarity. The new definition clarifies that electrical equipment approved for a wet location can be approved for one or more areas.

Public Input No. 482-NFPA 70-2020 [Definition: Outlet.]

Outlet.

A point on the wiring system at which ~~current~~ voltage is ~~taken~~ applied to supply utilization equipment. (CMP-1)

Statement of Problem and Substantiation for Public Input

Current is not taken, instead a true statement would be that voltage is applied to the equipment and as a result of the applied voltage pushing the electrons, current flows in the completed circuit. It is true that the current flowing creates the energy for conversion (heat , light or power)

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 19 10:30:29 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: This proposed change does not add clarity.

Public Input No. 132-NFPA 70-2019 [Definition: Qualified Person.]

Qualified Person.

One who has demonstrated skills and knowledge related to the construction and operation of ~~the~~ electrical equipment and installations and has received safety training to ~~recognize~~ identify the hazards and ~~avoid~~ reduce the ~~hazards involved~~ associated risk . (CMP-1)

Informational Note: Refer to *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

Statement of Problem and Substantiation for Public Input

This harmonizes the definition of qualified person with the current definition in NFPA 70E. As the two standards are closely connected, their definitions should align.

Submitter Information Verification

Submitter Full Name: Michael Kovacic
Organization: ES Squared Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 21 06:35:45 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: The word “avoid” is the appropriate term. The submitter’s use of “reduce” could still mean that a hazard exists but it has just been reduced. Not enough substantiation was provided for this change.

Public Input No. 3250-NFPA 70-2020 [Definition: Qualified Person.]

Qualified Person.

One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to ~~recognize~~ identify the hazards and ~~avoid~~ reduce the ~~hazards involved~~ associated risk . (CMP-1)

Informational Note: Refer to *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

Statement of Problem and Substantiation for Public Input

This input is for consistency with NFPA 70E definition.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 10:50:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The word “avoid” is the appropriate term. The submitter’s use of “reduce” could still mean that a hazard exists but it has just been reduced. Not enough substantiation was provided for this change.

Public Input No. 3855-NFPA 70-2020 [Definition: Qualified Person.]

Qualified Person.

One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

This person should be have attended, completed and passed educational training specific to the electrical industry including, but not limited to Electrical Apprenticeship, Electrical Engineering, 70E training. A Jouneyman, or Master level electrician or person holding an electrical engineering degree shall be considered qualified. (CMP-1)

Informational Note: Refer to *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

Statement of Problem and Substantiation for Public Input

The term qualified person is very vague. As it is written, with the IN referencing 70E training it would almost seem that 70E training is required to meet the standard. This would eliminate a huge majority of electricians as well as Electrical Engineers from being classified as a qualified person. A more definitive definition is necessary to eliminate the gray area of who the NEC considers qualified.

Submitter Information Verification

Submitter Full Name: Mitch Maulik
Organization: OHM Electric, LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 14:03:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This proposed language would add requirements in the definition which is not allowed per the NEC Style Manual, 2.2.2.2. The existing Informational Note already refers the user to NFPA 70E for additional information on training.

Public Input No. 2113-NFPA 70-2020 [Definition: Structure.]

Structure.

That which is built or constructed, other than equipment or an independent supporting system for the equipment . (CMP-1)

Additional Proposed Changes

File Name	Description	Approved
Structure.png	structure	

Statement of Problem and Substantiation for Public Input

This definition need to be revised to make it clear that the independent supporting system for electrical equipment, such as unistrut or a wood supporting member is not a structure.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 01 14:51:00 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed language does not add clarity. The meaning of independent supporting system is not clear.



Public Input No. 2443-NFPA 70-2020 [New Definition after Definition: Automatic.]

Basement
A story of a building that is mostly below finished ground level.

Statement of Problem and Substantiation for Public Input

There confusion in the field regarding what constitutes a basement when installing GFCI protection for personnel when encountering half basements or partial wall basements. By defining this term the installer and authority having jurisdiction will be on the same page with what constitutes a basement. This definition is derived from the IBC definition of a basement.

Submitter Information Verification

Submitter Full Name: Tj Woods
Organization: Wyoming Electrical Jatc
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 22 14:10:13 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed definitions could create correlation issues in other areas of the Code. A one story home can be built wholly or partially below grade and qualify as a basement under the proposed defined term. Some of the proposed Public Inputs also include a requirement which is not allowed for definitions by the 2020 NEC Style Manual, 2.2.2.2.

Public Input No. 591-NFPA 70-2020 [New Definition after Definition: Automatic.]

Basement

Any story of a building or structure wholly or partly below grade

Statement of Problem and Substantiation for Public Input

The term “basement” is used at least 10 times in this Code in at least 4 different Chapters including Chapters 1, 2, 3 and 7. Many requirements are based upon equipment or circuits being located in basements, yet this Code does not define this term. Does this include the bottom floor of a split-entry ranch? Does it include sub-basements too? What about a floor that is located only 6” below grade? Many other Codes and Standards include a definition of the term “basement” including NFPA 1, 101, 30, 30A, 30B, 33, 34, 35, 400 and 5000. The 2018 IBC and IRC also include a definition of “basement”. Why doesn’t the NEC? Which definition should NEC users refer too?
The 2019 edition of the NFPA Glossary of Terms indicates that several variations of the definition of basement are used throughout other NFPA Codes and Standards. My proposed wording is based on all of these other variations, but is worded to better fit the NEC. It’s time to include this term in the NEC to help make this document more “user friendly”.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Tue Mar 03 08:35:21 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed definitions could create correlation issues in other areas of the Code. A one story home can be built wholly or partially below grade and qualify as a basement under the proposed defined term. Some of the proposed Public Inputs also include a requirement which is not allowed for definitions by the 2020 NEC Style Manual, 2.2.2.2.

Public Input No. 1482-NFPA 70-2020 [New Definition after Definition: Bathroom.]

Basement - A story that is *not* a story above grade plane.

Story Above grade plane - Any story having its finished floor surface entirely above grade plane, or in which the finished floor surface of the floor next above is either of the following :

1. more than 6 feet above grade plane

2. more than 12 feet above the finished ground level at any point

Grade Plane - a reference plane representing the average of the finished ground level adjoining the building at all exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet from the building between the structure and a point 6 foot from the building.

(definitions taken from the 2018 IRC)

Statement of Problem and Substantiation for Public Input

according to the 2020 NEC GFCI protection is now required for basements. regardless if it finished or unfinished. There is nothing in the nec as to what constitutes as a basement. Some homes you walk in on the ground floor, on slab with no underground basement. They can be at grade or above and possibly prone to flooding. A definition as to what constitutes as a basement would remedy this issue.

Submitter Information Verification

Submitter Full Name: Jason Sieracki
Organization: Harford County Government
Affiliation: N/A
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 08 15:58:01 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed definitions could create correlation issues in other areas of the Code. A one story home can be built wholly or partially below grade and qualify as a basement under the proposed defined term. Some of the proposed Public Inputs also include a requirement which is not allowed for definitions by the 2020 NEC Style Manual, 2.2.2.2.

Public Input No. 2161-NFPA 70-2020 [New Definition after Definition: Copper-Clad Aluminum Condu...]

Crawl Space
An area of limited height under a floor or roof, giving access to electrical wiring and equipment.

Statement of Problem and Substantiation for Public Input

The term "crawl space" is used in several places in the NEC, most notably in section 210.8(A)(4) and 210.8(B)(9) for
equipment installed in limited access locations. This definition will help define what locations qualify as crawl spaces. The "limited height" dimension was chosen to correspond to any height less than typically required for working space.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: IEC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 05 13:25:27 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The word “limited” could be vague and unenforceable. Sufficient substantiation was not provided for why this definition is necessary.

Public Input No. 1187-NFPA 70-2020 [New Definition after Definition: Identified (as applied to ...]

Indoors

Indoor(s) – add a new definition to define what is “indoor” (a general definition) while on the surface this seems self-explanatory. The term indoor is used in many instances throughout the NEC. To lessen the opportunity for creative interpretations and application defining the term “indoor” is warranted. Build upon new Article 100 which defines what an “Outdoor Spray Area” as a starting point for what is not outdoors.

Type your content here ...

Statement of Problem and Substantiation for Public Input

Indoor(s) – add a new definition to define what is “indoor” (a general definition) while on the surface this seems self-explanatory. The term indoor is used in many instances throughout the NEC. To lessen the opportunity for creative interpretations and application defining the term “indoor” is warranted. Build upon new Article 100 which defines what an “Outdoor Spray Area” as a starting point for what is not outdoors.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: Submission is independent of employer.
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 23 04:39:56 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input.

Public Input No. 2494-NFPA 70-2020 [New Definition after Definition: Inherently Safe Optical Ra...]

TITLE OF NEW CONTENT

Industrial Establishment - Building(s) or structure(s) approved for industrial use by the authority having jurisdiction and with restricted access where the conditions of maintenance and engineering supervision ensure that only qualified persons design, install, operate and service the installation.

Statement of Problem and Substantiation for Public Input

The term industrial establishment is used throughout Articles 500 through 506. Where the term is used the following text is added: "restricted access where the conditions of maintenance and engineering supervision ensure that only qualified persons install and service the installation. By creating a definition, the added text can be removed from each location where the term appears. This will remove clutter from the section or subdivision where the term appears which will improve readability.

The proposed definition adds the requirement for the AHJ to approve the building for industrial use. This will help to add some consistency to the use of the less restrictive requirements for industrial establishments.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2495-NFPA 70-2020 [Section No. 501.10(A)(1)]	
Public Input No. 2496-NFPA 70-2020 [Section No. 501.10(A)(2)]	
Public Input No. 2497-NFPA 70-2020 [Section No. 501.10(B)(1)]	
Public Input No. 2498-NFPA 70-2020 [Section No. 501.105(B)(6)]	
Public Input No. 2499-NFPA 70-2020 [Section No. 502.10(A)(1)]	
Public Input No. 2500-NFPA 70-2020 [Section No. 502.10(A)(2)]	
Public Input No. 2502-NFPA 70-2020 [Section No. 502.10(B)(1)]	
Public Input No. 2504-NFPA 70-2020 [Section No. 502.150(B)(5)]	
Public Input No. 2505-NFPA 70-2020 [Section No. 505.15(B)(1)]	
Public Input No. 2506-NFPA 70-2020 [Section No. 505.15(B)(2)]	
Public Input No. 2507-NFPA 70-2020 [Section No. 505.15(C)(1)]	
Public Input No. 2508-NFPA 70-2020 [Section No. 506.15(A)]	
Public Input No. 2523-NFPA 70-2020 [Section No. 501.105(B)(6)]	
Public Input No. 2577-NFPA 70-2020 [Section No. 505.17(A)]	

Submitter Information Verification

Submitter Full Name: John Simmons
Organization: Florida East Coast JATC
Street Address:
City:
State:
Zip:
Submittal Date: Sun Aug 23 15:42:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: These types of installations are not restricted to only buildings or structures. They could include areas without buildings or structures.

Public Input No. 939-NFPA 70-2020 [New Definition after Definition: Location, Wet.]

Location, Submersion

A location were equipment is installed emersed in water or other liquids

Statement of Problem and Substantiation for Public Input

Currently there is no guidance on this type of location and people are confusing it with a wet location. submersion is stated in three Article and the use of listed or identified equipment for this application is necessary for a safe installation.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sun May 03 10:13:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Equipment intended for submersion will be identified as suitable. Another location definition has not been adequately substantiated.

Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]

Manufacturer.

The organization that is responsible for the original factory fabrication, original factory assembly, or commercial availability for field installation, or any combination thereof, of a new product. If the new product is listed, the organization that is also responsible at design submittal and in continuing production for that new product complying with requirements of appropriate designated standards or with tests to establish suitability for a specified purpose

Statement of Problem and Substantiation for Public Input

This Public Input seeks to define the Manufacturer as being the organization SPECIFICALLY responsible for FACTORY-FABRICATION, FACTORY-ASSEMBLY, and the COMMERCIAL AVAILABILITY of safe electrical products that are ready-for-use once properly installed. Safe electrical products are often the result of Manufacturers seeking Listing of the product designs and associated production integrity of newly-manufactured electrical products.

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If this definition is accepted by the Code-Making Panel, it will allow for brevity in expressed existing requirements elsewhere in this Code.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	Correlated revisions.
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	Affiliated revisions
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	Affiliated revisions
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	Affiliated revisions
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	Affiliated revisions
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 19 11:01:34 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The scope of Article 100 does not include commonly defined terms. The substantiation was

unclear on why this definition is necessary.

Public Input No. 1188-NFPA 70-2020 [New Definition after Definition: Nonlinear Load.]

Outdoors

Outdoor(s) – add a new definition to define what is “outdoor” (a general definition) while on the surface this seems self-explanatory. The term indoor is used in many instances throughout the NEC. To lessen the opportunity for creative interpretations and application defining the term “outdoor” is warranted. Build upon new Article 100 which defines what an “Outdoor Spray Area” as a starting point for what is outdoors.

Statement of Problem and Substantiation for Public Input

Outdoor(s) – add a new definition to define what is “outdoor” (a general definition) while on the surface this seems self-explanatory. The term indoor is used in many instances throughout the NEC. To lessen the opportunity for creative interpretations and application defining the term “outdoor” is warranted. Build upon new Article 100 which defines what an “Outdoor Spray Area” as a starting point for what is outdoors.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: Submission is independent of employer.
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 23 05:10:01 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards requires the proposed text to be included in the Public Input.

Public Input No. 160-NFPA 70-2019 [New Definition after Definition: Photovoltaic (PV) System.]

TITLE OF NEW CONTENT

Physical Damage

Damage that may adversely affect safe operation or mechanical strength of the equipment

Statement of Problem and Substantiation for Public Input

In many sections Physical Damage is a expectation of damage to occur. This varies from AHJs and causes confusing and inconstancy in the field. A better approach is to be clear of the affect of the damage, whereby providing guidance for the AHJ. The potential damage that could lead to a system failure. This new definition also goes hand in hand with the provisions of section 110.12 (B) and clarifies this is the expectation of physical damage.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Fri Nov 29 14:19:57 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: This is a determination most appropriately made by the AHJ based on specific conditions.

Public Input No. 2969-NFPA 70-2020 [New Definition after Definition: Service Point.]

Servicing
The process of following a manufacturer's set of instructions to analyze, adjust, and/or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment. Servicing often encompasses maintenance and repair activities.

Statement of Problem and Substantiation for Public Input

There is confusion between what is considered reconditioning versus normal servicing, maintenance and repair. The following are extracted from NEMA CS 100-2020, NEMA Technical Position on Reconditioned Electrical Equipment, which provides clarification on the proper application of rules related to reconditioning. The term servicing is included in the definition of reconditioned, but the NEC does not define this term and has created confusion in the field. Including this definition will aid with the distinction between reconditioned, servicing, maintenance, and repair.

Normal servicing is the process of following a manufacturer's set of instructions to analyze, adjust, and/or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment. Servicing often encompasses maintenance and repair activities.

Maintenance is the process of reviewing the operational performance of equipment according to a time-based, use-based, or performance-based schedule and providing any service to the equipment.

Repair is the process of restoring the designed performance of non-functional equipment to operational condition through replacement of damaged integral components, and/or service actions for use in the entity from which it was removed.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 15:14:10 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8449-NFPA 70-2021
Statement: This definition distinguishes servicing and maintenance activities from reconditioning.

Public Input No. 1695-NFPA 70-2020 [New Definition after Definition: Voltage (of a circuit).]

NEW DEFINITIONS

Voltage, Control . Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.

Voltage, Line. (1) (*controls*) Designed to operate using the supplied low-voltage power without transformation. (2) (*transmission lines, transformers, SPDs*) The line-to-line voltage of the supplying power system.

Voltage, Extra-Low . Not having electromotive force between any two conductors, or between a single conductor and ground, that exceeds 30 V ac rms, 42.4 V ac peak, or 60 V dc.

Voltage, Low . Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.

Voltage, Medium . Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 1 kV but not exceeding 69 kV.

Voltage, High . (1) (*circuits*) Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 69 kV but not exceeding 230 kV. (2) (*safety*) Having sufficient electromotive force to inflict bodily harm or injury.

Statement of Problem and Substantiation for Public Input

Authorities having jurisdiction throughout the US have enacted conflicting definitions of the term "low voltage."

In additional, the following rules in NFPA 70 have conflicting meanings when using the term "low voltage":

110.26(A)(1)(b) Low Voltage. By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater that 30 volts rms, 42 volts peak, or 60 volts dc.

110.34(B) Separation from Low-Voltage Equipment. Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less …

393.2 Definitions. The definitions in this section shall apply only within this article.
Low-Voltage Suspended Ceiling Power Distribution System. A system that serves as a support for a finished ceiling surface and consists of a busbar and busbar support system to distribute power to utilization equipment supplied by a Class 2 power supply.

Article 411 Low-Voltage Lighting
411.1 Scope. This article covers lighting systems and their associated components operating at no more than 30 volts ac or 60 volts dc. Where wet contact is likely to occur, the limits are 15 volts ac or 30 volts dc.
411.3 Low-Voltage Lighting Systems. Low voltage lighting systems shall consist of an isolating power supply, low voltage luminaires, and associated equipment that are all identified for the use. The output circuits of the power supply shall be rated for 25 amperes maximum under all load conditions.

Article 424 Part X. Low-Voltage Fixed Electric Space-Heating Equipment.
424.101(A) Power Unit. The power unit shall be an isolating type with a rated output not exceeding 25 ampers, 30 volts (42.4 volts peak) ac, or 60 volts dc under all load conditions.

517.64 Low-Voltage Equipment and Instruments.
(A) Equipment Requirements. Low-voltage equpment that is frequently in contact with bodies of persons or has exposed current-carrying elements shall comply with one of the following:
(1) Operate on an electrical potential of 10 volts or less
(2) Be approved as intrinsically safe or double-insulated equipment

(3) Be moisture resistant

551.2 Definitions.
Low Voltage. This definition shall apply only within this article. An electromotive force rated 24 volts, nominal, or less.

Article 552 Park Trailers
Term "Low Voltage" is used throughout this article but is not defined; but, as explained in the Handbook, this article applies to trailers that have electrical systems similar to mobile homes. The requirements seem to imply that both 12 volt and 120 volt are low voltage.

620.5 Working Clearances. …
(D) Low Voltage. Uninsulated parts are at a voltage not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

646.20 Working Space for ITE.
(A) Low-Voltage Circuits. The working space about ITE where any live parts that may be exposed during routine servicing operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc shall not be required to comply with the workspace requirements of 646.19.

660.47 General.
(A) High-Voltage Parts. …
(B) Low-Voltage Cables. …
The terms are not defined, but as discussed in the Handbook, it appears that "high voltage" means a few kV to 1000 kV, and "low voltage" means below 1000 V.

680.2 Definitions. The definitions in this section shall apply only within this article.
Low Voltage Contact Limit. A voltage not exceeding the following values:
(1) 15 volts (RMS) for sinusoidal ac
(2) 21.2 volts peak for nonsinusoidal ac
(3) 30 volts for continuous dc
(4) 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz
680.22(B)(6) Low-Voltage Luminaires. Listed low-voltage luminaires …

The term "Low-Voltage Luminaire" is used throughout both articles 411 and 680 but is not defined.

Since at least 1975, IEEE Std 100, IEEE Std 241, and IEEE/ANSI C84.1 have defined the following voltage classes for power distribution to industrial and commercial buildings:

Low Voltage	0 V - 1000 V
Medium Voltage	1 kV - 69 kV
High Voltage	70 kV - 230 kV
Extra-High Voltage	231 kV - 1000 kV
Ultra-High Voltage	Over 1000 kV

Since 2007, UL 60950-1 has adopted the following IEC-defined voltage class for utilization by information technology equipment:
Extra-Low Voltage: Voltage between any two conductors, or between any one conductor and earth, not exceeding 42.4 V peak or 60 V dc, under normal operating conditions.

All of these conflicting definitions for the same terminology make it extremely difficult for design professionals to clearly, consistently, and legally specify construction work in a manner that is acceptable to multiple jurisdications and for multiple systems of electrical and electronic equipment. A "low-voltage switch" or a "low-voltage luminaire" means something completely different depending on the context of the discussion. Construction specifications must be clear, concise, complete, and correct. This inconsistent meaning for a term commonly used throughout the construction codes is unacceptable, especially when a local jurisdiction can change the definition of the term, significantly impacting the interpretation of the NFPA standard's requirements.

The members of the American Institute of Architects (AIA) Electrical MasterSpec Engineering Review Committee (EMERC), recognizing how it has become increasingly more difficult to provide clear guide specification language for newer products (e.g., switches, dimmers, luminaires, cabling, fire-alarm devices), are requesting that the NFPA 70 Code Making Panels provide standard definitions for the voltage classes,

harmonize the language in all impacted articles within NFPA 70, and encourage authorities having jurisdiction that adopt NFPA 70 also to harmonize their regulations with these definitions.

This proposal also helps harmonize NFPA 70 with IEC standards for international manufacturers.

On behalf of the committee:
Paul A. Harouff, PE, CSI, CDT
Sr. Specifications Writer, Electrical Engineer for AIA MasterSpec
Deltek, Inc.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1700-NFPA 70-2020 [Section No. 110.26(A)(1)]	Need to be coordinated with each other
Public Input No. 1701-NFPA 70-2020 [Article 393]	Need to be coordinated with each other
Public Input No. 1703-NFPA 70-2020 [Article 411]	Need to be coordinated with each other
Public Input No. 1706-NFPA 70-2020 [Sections Part X., 424.100, 424.101, 424.102]	Need to be coordinated with each other
Public Input No. 1708-NFPA 70-2020 [Section No. 517.64]	Need to be coordinated with each other
Public Input No. 1710-NFPA 70-2020 [Article 551]	Need to be coordinated with each other
Public Input No. 1712-NFPA 70-2020 [Article 552]	Need to be coordinated with each other
Public Input No. 1714-NFPA 70-2020 [Section No. 620.5]	Need to be coordinated with each other
Public Input No. 1717-NFPA 70-2020 [Section No. 646.20(A)]	Need to be coordinated with each other
Public Input No. 1718-NFPA 70-2020 [Sections Part IV., 660.47]	Need to be coordinated with each other
Public Input No. 1719-NFPA 70-2020 [Article 680]	Need to be coordinated with each other

Public Input No. 1700-NFPA 70-2020 [Section No. 110.26(A)(1)]
Public Input No. 1701-NFPA 70-2020 [Article 393]
Public Input No. 1703-NFPA 70-2020 [Article 411]
Public Input No. 1706-NFPA 70-2020 [Sections Part X., 424.100, 424.101, 424.102]
Public Input No. 1708-NFPA 70-2020 [Section No. 517.64]
Public Input No. 1710-NFPA 70-2020 [Article 551]
Public Input No. 1712-NFPA 70-2020 [Article 552]
Public Input No. 1714-NFPA 70-2020 [Section No. 620.5]
Public Input No. 1717-NFPA 70-2020 [Section No. 646.20(A)]
Public Input No. 1718-NFPA 70-2020 [Sections Part IV., 660.47]
Public Input No. 1719-NFPA 70-2020 [Article 680]

Submitter Information Verification

Submitter Full Name: Paul Harouff
Organization: Deltek

Affiliation:	AIA Electrical MasterSpec Engineering Review Committee (EMERC)
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Jun 25 11:16:14 EDT 2020
Committee:	NEC-P01

Committee Statement

Resolution: Adequate substantiation has not been provided that these are the correct voltage levels for the terms being defined. Standards defining extra low voltage not only in terms of the operating voltage but also of insulation to other circuits have not been addressed.

Public Input No. 2333-NFPA 70-2020 [Article 110]

~~**Article 110**~~ Article 110 General Requirements for Electrical Installations

Part I. General

110.1 Scope.

This article covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations.

Informational Note: See Informative Annex J for information regarding ADA accessibility design.

110.2 Approval.

The conductors and equipment required or permitted by this *Code* shall be acceptable only if approved.

Informational Note: See 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, and Use of Equipment. See definitions of *Approved, Identified, Labeled,* and *Listed*.

110.3 Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment.

(A) Examination.

In judging equipment, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with this *Code*

Informational Note No. 1: Equipment may be new, reconditioned, refurbished, or remanufactured.

Informational Note No. 2: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

(3) Wire-bending and connection space

(4) Electrical insulation

(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

(6) Arcing effects

(7) Classification by type, size, voltage, current capacity, and specific use

(8) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

(B) Installation and Use.

Equipment that is listed, labeled, or both shall be installed and used in accordance with any instructions included in the listing or labeling.

(C) Listing.

Product testing, evaluation, and listing (product certification) shall be performed by recognized qualified electrical testing laboratories and shall be in accordance with applicable product standards recognized as achieving equivalent and effective safety for equipment installed to comply with this *Code*.

Informational Note: The Occupational Safety and Health Administration (OSHA) recognizes qualified electrical testing laboratories that perform evaluations, testing, and certification of certain products to ensure that they meet the requirements of both the construction and general industry OSHA electrical standards. If the listing (product certification) is done under a qualified electrical testing laboratory program, this listing mark signifies that the tested and certified product complies with the requirements of one or more appropriate product safety test standards.

110.4 Voltages.

Throughout this *Code*, the voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall not be less than the nominal voltage of a circuit to which it is connected.

110.5 Conductors.

Conductors used to carry current shall be of copper, aluminum, or copper-clad aluminum unless otherwise provided in this *Code*. Where the conductor material is not specified, the sizes given in this *Code* shall apply to copper conductors. Where other materials are used, the size shall be changed accordingly.

110.6 Conductor Sizes.

Conductor sizes are expressed in American Wire Gage (AWG) or in circular mils.

110.7 Wiring Integrity.

Completed wiring installations shall be free from short circuits, ground faults, or any connections to ground other than as required or permitted elsewhere in this *Code*.

110.8 Wiring Methods.

Only wiring methods recognized as suitable are included in this *Code*. The recognized methods of wiring shall be permitted to be installed in any type of building or occupancy, except as otherwise provided in this *Code*.

110.9 Interrupting Rating.

Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that is available at the line terminals of the equipment.

Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that must be interrupted.

110.10 Circuit Impedance, Short-Circuit Current Ratings, and Other Characteristics.

The overcurrent protective devices, the total impedance, the equipment short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit protective devices used to clear a fault to do so without extensive damage to the electrical equipment of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the equipment grounding conductor(s) permitted in 250.118. Listed equipment applied in accordance with their listing shall be considered to meet the requirements of this section.

110.11 Deteriorating Agents.

Unless identified for use in the operating environment, no conductors or equipment shall be located in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures.

Informational Note No. 1: See 300.6 for protection against corrosion.

Informational Note No. 2: Some cleaning and lubricating compounds can cause severe deterioration of many plastic materials used for insulating and structural applications in equipment.

Equipment not identified for outdoor use and equipment identified only for indoor use, such as “dry locations,” “indoor use only,” “damp locations,” or enclosure Types 1, 2, 5, 12, 12K, and/or 13, shall be protected against damage from the weather during construction.

Informational Note No. 3: See Table 110.28 for appropriate enclosure-type designations.

Informational Note No. 4: Minimum flood provisions are provided in NFPA 5000-2015 *Building Construction and Safety Code*, the *International Building Code (IBC)*, and the *International Residential Code for One- and Two-Family Dwellings (IRC)*.

110.12 Mechanical Execution of Work.

Electrical equipment shall be installed in a neat and workmanlike manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

(A) Unused Openings.

Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (¼ in.) from the outer surface of the enclosure.

(B) Integrity of Electrical Equipment and Connections.

Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

110.13 Mounting and Cooling of Equipment.

(A) Mounting.

Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials shall not be used.

(B) Cooling.

Electrical equipment that depends on the natural circulation of air and convection principles for cooling of exposed surfaces shall be installed so that room airflow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, clearance between top surfaces and adjacent surfaces shall be provided to dissipate rising warm air.

Electrical equipment provided with ventilating openings shall be installed so that walls or other obstructions do not prevent the free circulation of air through the equipment.

110.14 Electrical Connections.

Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10, shall be identified for the specific conductor class or classes.

(A) Terminals.

Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

(B) Splices.

Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

(C) Temperature Limitations.

The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.

(1) Equipment Provisions.

The determination of termination provisions of equipment shall be based on 110.14(C)(1)(a) or (C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.16 as appropriately modified by 310.12.

(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(2) Conductors rated 60°C (140°F).

(3) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.

(4) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.

(5) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(f) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(7) Conductors rated 75°C (167°F)

(8) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

(2) Separate Connector Provisions.

Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector.

Informational Note: With respect to 110.14(C)(1) and (C)(2), equipment markings or listing information may additionally restrict the sizing and temperature ratings of connected conductors.

(D) Terminal Connection Torque.

Tightening torque values for terminal connections shall be as indicated on equipment or in installation instructions provided by the manufacturer. An approved means shall be used to achieve the indicated torque value.

Informational Note No. 1: Examples of approved means of achieving the indicated torque values include torque tools or devices such as shear bolts or breakaway-style devices with visual indicators that demonstrate that the proper torque has been applied.

Informational Note No. 2: The equipment manufacturer can be contacted if numeric torque values are not indicated on the equipment or if the installation instructions are not available. Informative Annex I of UL Standard 486A-486B, *Standard for Safety-Wire Connectors*, provides torque values in the absence of manufacturer's recommendations.

Informational Note No. 3: Additional information for torquing threaded connections and terminations can be found in Section 8.11 of NFPA 70B-2019, *Recommended Practice for Electrical Equipment Maintenance*.

110.15 High-Leg Marking.

On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded, only the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is orange in color or by other effective means. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present.

110.16 Arc-Flash Hazard Warning.

(A) General.

Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

(B) Service Equipment.

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment

(4) The date the label was applied

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

110.18 Arcing Parts.

Parts of electrical equipment that in ordinary operation produce arcs, sparks, flames, or molten metal shall be enclosed or separated and isolated from all combustible material.

Informational Note: For hazardous (classified) locations, see Articles 500 through 517. For motors, see 430.14.

110.19 Light and Power from Railway Conductors.

Circuits for lighting and power shall not be connected to any system that contains trolley wires with a ground return.

Exception: Such circuit connections shall be permitted in car houses, power houses, or passenger and freight stations operated in connection with electric railways.

110.21 Marking.

(A) Equipment Markings.

(1) General.

The manufacturer’s name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this *Code*. The marking or label shall be of sufficient durability to withstand the environment involved.

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Reconditioned equipment shall be identified as “reconditioned” and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment’s original listing.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

(B) Field-Applied Hazard Markings.

Where caution, warning, or danger signs or labels are required by this *Code*, the labels shall meet the following requirements:

(1) The marking shall warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

(2) The label shall be permanently affixed to the equipment or wiring method and shall not be handwritten.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

(3) The label shall be of sufficient durability to withstand the environment involved.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

110.22 Identification of Disconnecting Means.

(A) General.

Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification of the circuit source that supplies the disconnecting means. The marking shall be of sufficient durability to withstand the environment involved.

(B) Engineered Series Combination Systems.

Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES.
IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems.

Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Informational Note: See IEEE 3004.5-2014 *Recommended Practice for the Application of Low-Voltage Circuit Breakers in Industrial and Commercial Power Systems*, for further information on series tested systems.

110.23 Current Transformers.

Unused current transformers associated with potentially energized circuits shall be short-circuited.

110.24 Available Fault Current.

(A) Field Marking.

Service equipment at other than dwelling units shall be legibly marked in the field with the available fault current. The field marking(s) shall include the date the fault-current calculation was performed and be of sufficient durability to withstand the environment involved. The calculation shall be documented and made available to those authorized to design, install, inspect, maintain, or operate the system.

Informational Note No. 1: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current and interrupting ratings of equipment. *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace,* provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Informational Note No. 2: Values of available fault current for use in determining appropriate minimum short-circuit current and interrupting ratings of service equipment are available from electric utilities in published or other forms.

(B) Modifications.

When modifications to the electrical installation occur that affect the available fault current at the service, the available fault current shall be verified or recalculated as necessary to ensure the service equipment ratings are sufficient for the available fault current at the line terminals of the equipment. The required field marking(s) in 110.24(A) shall be adjusted to reflect the new level of available fault current.

Exception: The field marking requirements in 110.24(A) and 110.24(B) shall not be required in industrial installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

110.25 Lockable Disconnecting Means.

If a disconnecting means is required to be lockable open elsewhere in this *Code*, it shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.

Exception: Locking provisions for a cord-and-plug connection shall not be required to remain in place without the lock installed.

Part II. 1000 Volts, Nominal, or Less

110.26 Spaces About Electrical Equipment.

Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

(A) Working Space.

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space.

The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

(3) Height of Working Space.

The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6½ ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6½ ft).

Exception No. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

(4) Limited Access.

Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1). The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space.

(5) Separation from High-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

(B) Clear Spaces.

Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

(C) Entrance to and Egress from Working Space.

(1) Minimum Required.

At least one entrance of sufficient area shall be provided to give access to and egress from working space about electrical equipment.

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(3) Personnel Doors.

Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard For Safety For Panic Hardware*. For fire exit hardware, see UL 305, *Standard For Panic Hardware*, and UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies*.

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

(E) Dedicated Equipment Space.

All switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

(2) Outdoor.

Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2)(c).

(a) *Installation Requirements.* Outdoor electrical equipment shall be the following:

(2) Installed in identified enclosures

(3) Protected from accidental contact by unauthorized personnel or by vehicular traffic

(4) Protected from accidental spillage or leakage from piping systems

(e) *Work Space.* The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(f) *Dedicated Equipment Space.* The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

(F) Locked Electrical Equipment Rooms or Enclosures.

Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

110.27 Guarding of Live Parts.

(A) Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this *Code,* live parts of electrical equipment operating at 50 to 1000 volts, nominal shall be guarded against accidental contact by approved enclosures or by any of the following means:

(1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

(2) By permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

(3) By location on a balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

(4) By elevation above the floor or other working surface as follows:

(5) A minimum of 2.5 m (8 ft) for 50 volts to 300 volts between ungrounded conductors

(6) A minimum of 2.6 m (8 ft 6 in.) for 301 volts to 600 volts between ungrounded conductors

(7) A minimum of 2.62 m (8 ft 7 in.) for 601 volts to 1000 volts between ungrounded conductors

(B) Prevent Physical Damage.

In locations where electrical equipment is likely to be exposed to physical damage, enclosures or guards shall be so arranged and of such strength as to prevent such damage.

(C) Warning Signs.

Entrances to rooms and other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. The marking shall meet the requirements in 110.21(B).

Informational Note: For motors, see 430.232 and 430.233. For over 1000 volts, see 110.34.

110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls covered in 110.31) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway or unsealed openings.

Table 110.28 Enclosure Selection

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use									
	Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

Informational Note No. 3: Dusttight enclosures are suitable for use in hazardous locations in accordance with 502.10(B)(4), 503.10(A)(2), and 506.15(C)(9).

Informational Note No. 4: Dusttight enclosures are suitable for use in unclassified locations and in Class II, Division 2; Class III; and Zone 22 hazardous (classified) locations.

Part III. Over 1000 Volts, Nominal

110.30 General.

Conductors and equipment used on circuits over 1000 volts, nominal, shall comply with Part I of this article and with 110.30 through 110.41, which supplement or modify Part I. In no case shall this part apply to equipment on the supply side of the service point.

110.31 Enclosure for Electrical Installations.

Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Table 110.31 Minimum Distance from Fence to Live Parts

	Minimum Distance to Live Parts	
Nominal Voltage	m	ft
1001–13,799	3.05	10
13,800–230,000	4.57	15
Over 230,000	5.49	18

Note: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI/IEEE C2-2017, *National Electrical Safety Code.*

Informational Note: See Article 450 for construction requirements for transformer vaults.

(A) Electrical Vaults.

Where an electrical vault is required or specified for conductors and equipment 110.31(A)(1) to (A)(5) shall apply.

(1) Walls and Roof.

The walls and roof shall be constructed of materials that have adequate structural strength for the conditions, with a minimum fire rating of 3 hours. For the purpose of this section, studs and wallboard construction shall not be permitted.

(2) Floors.

The floors of vaults in contact with the earth shall be of concrete that is not less than 102 mm (4 in.) thick, but where the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the load imposed on it and a minimum fire resistance of 3 hours.

(3) Doors.

Each doorway leading into a vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of 3 hours. The authority having jurisdiction shall be permitted to require such a door for an exterior wall opening where conditions warrant.

Exception to (1), (2), and (3): Where the vault is protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction with a 1-hour rating shall be permitted.

(4) Locks.

Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

(5) Transformers.

Where a transformer is installed in a vault as required by Article 450, the vault shall be constructed in accordance with the requirements of Part III of Article 450.

Informational Note No. 1: For additional information, see ANSI/ASTM E119-2018a, *Method for Fire Tests of Building Construction and Materials*, and NFPA 80-2019, *Standard for Fire Doors and Other Opening Protectives*.

Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.

(B) Indoor Installations.

(1) In Places Accessible to Unqualified Persons.

Indoor electrical installations that are accessible to unqualified persons shall be made with metal-enclosed equipment. Switchgear, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs. Openings in ventilated dry-type transformers or similar openings in other equipment shall be designed so that foreign objects inserted through these openings are deflected from energized parts.

(2) In Places Accessible to Qualified Persons Only.

Indoor electrical installations considered accessible only to qualified persons in accordance with this section shall comply with 110.34, 110.36, and 490.24.

(C) Outdoor Installations.

(1) In Places Accessible to Unqualified Persons.

Outdoor electrical installations that are open to unqualified persons shall comply with Parts I, II, and III of Article 225.

(2) In Places Accessible to Qualified Persons Only.

Outdoor electrical installations that have exposed live parts shall be accessible to qualified persons only in accordance with the first paragraph of this section and shall comply with 110.34, 110.36, and 490.24.

(D) Enclosed Equipment Accessible to Unqualified Persons.

Ventilating or similar openings in equipment shall be designed such that foreign objects inserted through these openings are deflected from energized parts. Where exposed to physical damage from vehicular traffic, suitable guards shall be provided. Equipment located outdoors and accessible to unqualified persons shall be designed such that exposed nuts or bolts cannot be readily removed, permitting access to live parts. Where equipment is accessible to unqualified persons and the bottom of the enclosure is less than 2.5 m (8 ft) above the floor or grade level, the enclosure door or hinged cover shall be kept locked. Doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes shall be locked, bolted, or screwed on. Underground box covers that weigh over 45.4 kg (100 lb) shall be considered as meeting this requirement.

110.32 Work Space About Equipment.

Sufficient space shall be provided and maintained about electrical equipment to permit ready and safe operation and maintenance of such equipment. Where energized parts are exposed, the minimum clear work space shall be not less than 2.0 m (6½ ft) high (measured vertically from the floor or platform) and the width of the equipment or 914 mm (3 ft) wide (measured parallel to the equipment), whichever is greater. The depth shall be as required in 110.34(A). In all cases, the work space shall permit at least a 90-degree opening of doors or hinged panels. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

110.33 Entrance to Enclosures and Access to Working Space.

(A) Entrance.

At least one entrance to enclosures for electrical installations as described in 110.31 not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to the working space about electrical equipment.

(1) Large Equipment.

On switchgear and control panels exceeding 1.8 m (6 ft) in width, there shall be one entrance at each end of the equipment. A single entrance to the required working space shall be permitted where either of the conditions in 110.33(A)(1)(a) or (A)(1)(b) is met.

(a) *Unobstructed Exit.* Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.34(A), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.34(A) for equipment operating at that voltage and in that condition.

(2) Guarding.

Where bare energized parts at any voltage or insulated energized parts above 1000 volts, nominal, are located adjacent to such entrance, they shall be suitably guarded.

(3) Personnel Doors.

Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

(B) Access.

Permanent ladders or stairways shall be provided to give safe access to the working space around electrical equipment installed on platforms, balconies, or mezzanine floors or in attic or roof rooms or spaces.

110.34 Work Space and Guarding.

(A) Working Space.

Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
1001–2500 V	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501–9000 V	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9001–25,000 V	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001 V–75 kV	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75 kV	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:

(1) **Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

(2) **Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

(3) **Condition 3** — Exposed live parts on both sides of the working space.

(B) Separation from Low-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating at over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

Exception: Switches or other equipment operating at 1000 volts, nominal, or less and serving only equipment within the high-voltage vault, room, or enclosure shall be permitted to be installed in the high-voltage vault, room, or enclosure without a partition, fence, or screen if accessible to qualified persons only.

(C) Locked Rooms or Enclosures.

The entrance to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 1000 volts, nominal, shall be kept locked unless such entrances are under the observation of a qualified person at all times.

Permanent and conspicuous danger signs shall be provided. The danger sign shall meet the requirements in 110.21(B) and shall read as follows:

DANGER — HIGH VOLTAGE — KEEP OUT

(D) Illumination.

Illumination shall be provided for all working spaces about electrical equipment. Control by automatic means only shall not be permitted. The lighting outlets shall be arranged so that persons changing lamps or making repairs on the lighting system are not endangered by live parts or other equipment.

The points of control shall be located so that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.

(E) Elevation of Unguarded Live Parts.

Unguarded live parts above working space shall be maintained at elevations not less than required by Table 110.34(E).

Table 110.34(E) Elevation of Unguarded Live Parts Above Working Space

Nominal Voltage Between Phases	Elevation	
	m	ft
1001–7500 V	2.7	9
7501–35,000 V	2.9	9 ft 6 in.
Over 35 kV	Add 9.5 mm per kV above 35 kV	Add 0.37 in. per kV above 35 kV

(F) Protection of Service Equipment, Switchgear, and Industrial Control Assemblies.

Pipes or ducts foreign to the electrical installation and requiring periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located in the vicinity of the service equipment, switchgear, or industrial control assemblies. Protection shall be provided where necessary to avoid damage from condensation leaks and breaks in such foreign systems. Piping and other facilities shall not be considered foreign if provided for fire protection of the electrical installation.

110.36 Circuit Conductors.

Circuit conductors shall be permitted to be installed in raceways; in cable trays; as metal-clad cable Type MC; as bare wire, cable, and busbars; or as Type MV cables or conductors as provided in 300.37, 300.39, 300.40, and 300.50. Bare live conductors shall comply with 490.24.

Insulators, together with their mounting and conductor attachments, where used as supports for wires, single-conductor cables, or busbars, shall be capable of safely withstanding the maximum magnetic forces that would prevail if two or more conductors of a circuit were subjected to short-circuit current.

Exposed runs of insulated wires and cables that have a bare lead sheath or a braided outer covering shall be supported in a manner designed to prevent physical damage to the braid or sheath. Supports for lead-covered cables shall be designed to prevent electrolysis of the sheath.

110.40 Temperature Limitations at Terminations.

Conductors shall be permitted to be terminated based on the 90°C (194°F) temperature rating and ampacity as given in Table 311.60(C)(67) through Table 311.60(C)(86), unless otherwise identified.

110.41 Inspections and Tests.

(A) Pre-energization and Operating Tests.

Where required elsewhere in this *Code*, the complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction and shall be tested when first installed on-site.

(B) Test Report.

A test report covering the results of the tests required in 110.41(A) shall be available to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.

Part IV. Tunnel Installations over 1000 Volts, Nominal

110.51 General.

(A) Covered.

This part shall apply to the installation and use of high-voltage power distribution and utilization equipment that is portable, mobile, or both, such as substations, trailers, cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, underground excavators, and the like.

(B) Other Articles.

The requirements of this part shall be additional to, or amendatory of, those prescribed in Articles 100 through 490 of this *Code*.

(C) Protection Against Physical Damage.

Conductors and cables in tunnels shall be located above the tunnel floor and so placed or guarded to protect them from physical damage.

110.52 Overcurrent Protection.

Motor-operated equipment shall be protected from overcurrent in accordance with Parts III, IV, and V of Article 430. Transformers shall be protected from overcurrent in accordance with 450.3.

110.53 Conductors.

High-voltage conductors in tunnels shall be installed in metal conduit or other metal raceway, Type MC cable, or other approved multiconductor cable. Multiconductor portable cable shall be permitted to supply mobile equipment.

110.54 Bonding and Equipment Grounding Conductors.

(A) Grounded and Bonded.

All non–current-carrying metal parts of electrical equipment and all metal raceways and cable sheaths shall be solidly grounded and bonded to all metal pipes and rails at the portal and at intervals not exceeding 300 m (1000 ft) throughout the tunnel.

(B) Equipment Grounding Conductors.

An equipment grounding conductor shall be run with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor shall be permitted to be insulated or bare.

110.55 Transformers, Switches, and Electrical Equipment.

All transformers, switches, motor controllers, motors, rectifiers, and other equipment installed belowground shall be protected from physical damage by location or guarding.

110.56 Energized Parts.

Bare terminals of transformers, switches, motor controllers, and other equipment shall be enclosed to prevent accidental contact with energized parts.

110.57 Ventilation System Controls.

Electrical controls for the ventilation system shall be arranged so that the airflow can be reversed.

110.58 Disconnecting Means.

A switch or circuit breaker that simultaneously opens all ungrounded conductors of the circuit shall be installed within sight of each transformer or motor location for disconnecting the transformer or motor. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors. The switch or circuit breaker for a motor shall comply with the applicable requirements of Article 430.

110.59 Enclosures.

Enclosures for use in tunnels shall be dripproof, weatherproof, or submersible as required by the environmental conditions. Switch or contactor enclosures shall not be used as junction boxes or as raceways for conductors feeding through or tapping off to other switches, unless the enclosures comply with 312.8.

Part V. Manholes and Other Electrical Enclosures Intended for Personnel Entry

110.70 General.

Electrical enclosures intended for personnel entry and specifically fabricated for this purpose shall be of sufficient size to provide safe work space about electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized. Such enclosures shall have sufficient size to permit ready installation or withdrawal of the conductors employed without damage to the conductors or to their insulation. They shall comply with this part.

Exception: Where electrical enclosures covered by Part V of this article are part of an industrial wiring system operating under conditions of maintenance and supervision that ensure that only qualified persons monitor and supervise the system, they shall be permitted to be designed and installed in accordance with appropriate engineering practice. If required by the authority having jurisdiction, design documentation shall be provided.

110.71 Strength.

Manholes, vaults, and their means of access shall be designed under qualified engineering supervision and shall withstand all loads likely to be imposed on the structures.

Informational Note: See ANSI C2-2007, *National Electrical Safety Code,* for additional information on the loading that can be expected to bear on underground enclosures.

110.72 Cabling Work Space.

A clear work space not less than 900 mm (3 ft) wide shall be provided where cables are located on both sides, and not less than 750 mm (2½ ft) where cables are only on one side. The vertical headroom shall be not less than 1.8 m (6 ft) unless the opening is within 300 mm (1 ft), measured horizontally, of the adjacent interior side wall of the enclosure.

Exception: A manhole containing only one or more of the following shall be permitted to have one of the horizontal work space dimensions reduced to 600 mm (2 ft) where the other horizontal clear work space is increased so the sum of the two dimensions is not less than 1.8 m (6 ft):

(1) Optical fiber cables as covered in Article 770

(2) Power-limited fire alarm circuits supplied in accordance with 760.121

(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 725.121

110.73 Equipment Work Space.

Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 1000 volts or less. Where the installation is over 1000 volts, the work space and associated requirements in 110.34 shall be met. A manhole access cover that weighs over 45.4 kg (100 lb) shall be considered as meeting the requirements of 110.34(C).

110.74 Conductor Installation.

Conductors installed in manholes and other enclosures intended for personnel entry shall be cabled, racked up, or arranged in an approved manner that provides ready and safe access for persons to enter for installation and maintenance. The installation shall comply with 110.74(A) or 110.74(B), as applicable.

(A) 1000 Volts, Nominal, or Less.

Wire bending space for conductors operating at 1000 volts or less shall be provided in accordance with the requirements of 314.28.

(B) Over 1000 Volts, Nominal.

Conductors operating at over 1000 volts shall be provided with bending space in accordance with 314.71(A) and (B), as applicable.

Exception: Where 314.71(B) applies, each row or column of ducts on one wall of the enclosure shall be calculated individually, and the single row or column that provides the maximum distance shall be used.

110.75 Access to Manholes.

(A) Dimensions.

Rectangular access openings shall not be less than 650 mm × 550 mm (26 in. × 22 in.). Round access openings in a manhole shall be not less than 650 mm (26 in.) in diameter.

Exception: A manhole that has a fixed ladder that does not obstruct the opening or that contains only one or more of the following shall be permitted to reduce the minimum cover diameter to 600 mm (2 ft):

(1) Optical fiber cables as covered in Article 770

(2) Power-limited fire alarm circuits supplied in accordance with 760.121

(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 725.121

(B) Obstructions.

Manhole openings shall be free of protrusions that could injure personnel or prevent ready egress.

(C) Location.

Manhole openings for personnel shall be located where they are not directly above electrical equipment or conductors in the enclosure. Where this is not practicable, either a protective barrier or a fixed ladder shall be provided.

(D) Covers.

Covers shall be over 45 kg (100 lb) or otherwise designed to require the use of tools to open. They shall be designed or restrained so they cannot fall into the manhole or protrude sufficiently to contact electrical conductors or equipment within the manhole.

(E) Marking.

Manhole covers shall have an identifying mark or logo that prominently indicates their function, such as “electric.”

110.76 Access to Vaults and Tunnels.

(A) Location.

Access openings for personnel shall be located where they are not directly above electrical equipment or conductors in the enclosure. Other openings shall be permitted over equipment to facilitate installation, maintenance, or replacement of equipment.

(B) Locks.

In addition to compliance with the requirements of 110.34, if applicable, access openings for personnel shall be arranged such that a person on the inside can exit when the access door is locked from the outside, or in the case of normally locking by padlock, the locking arrangement shall be such that the padlock can be closed on the locking system to prevent locking from the outside.

110.77 Ventilation.

Where manholes, tunnels, and vaults have communicating openings into enclosed areas used by the public, ventilation to open air shall be provided wherever practicable.

110.78 Guarding.

Where conductors or equipment, or both, could be contacted by objects falling or being pushed through a ventilating grating, both conductors and live parts shall be protected in accordance with the requirements of 110.27(A)(2) or 110.31(B)(1), depending on the voltage.

110.79 Fixed Ladders.

Fixed ladders shall be corrosion resistant.

Statement of Problem and Substantiation for Public Input

Adding the word "General" to the title of the article adds clarity. Changing the title from "Requirements for Electrical Installations" to "General Requirements for Electrical Installations" makes the title consistent with the scope statement "This article covers general requirements...."

It also complies with the NEC Style Manual section 3.3.5 Parallel Construction. See Article 300 General

Requirements for wiring Methods and Materials, and Article 800 General Requirements for Communications Systems.

This PI simply adds one word to the title of the Article. Any other underlining was caused by TerraView.

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Committee: NEC-P01

Committee Statement

Resolution: FR-8494-NFPA 70-2021
Statement: The word “General” is added to the title of Article 110 to read “General Requirements for Electrical Installations” to correlate with the scope of Article 110 which, in part, states “This article covers general requirements….” Further, this revision clarifies that articles other than Article 110 contain requirements for electrical installations.

Public Input No. 2905-NFPA 70-2020 [Section No. 110.1]

110.1 Scope.

This article covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations.

Informational Note: See Informative Annex J for information regarding ADA accessibility design.

Informational Note 2: For additional information regarding electrical safety IEEE 3007.3 Recommended Practice for Electrical Safety in Industrial and Commercial Power Systems.

Statement of Problem and Substantiation for Public Input

The stronger the linkage between the NFPA and IEEE on electrical power technology the better. This document is one of several that replaces content in ANSI/IEEE 241 Recommended Practice for Electric Power Systems in Commercial Buildings -- the so-called “Gray Book”; and the ANSI/IEEE 141 Recommended Practice for Power Distribution for Industrial Plants -- the so-called “Red Book”; both of which are now being sunsetted and superseded by 3007.3.

IEEE 3000 Standards Collection™ is the trademarked name of the family of industrial and commercial power systems standards formerly known as IEEE Color Books. The IEEE 3000 Standards Collection overall includes the same content as the Color Books that have been referenced into previous editions of the NEC but is now organized into approximately 70 IEEE “dot” standards that cover specific technical topics. This method of development, of capturing and quickly conveying leading practice from transactions among academic experts and practitioners into our industry, supports the NFPA International mission of eliminating death, injury, property and economic loss due to fire, electrical and related hazards. Details about this document is available at the link below:

https://standards.ieee.org/findstds/standard/3007.3-2012.html

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Committee Statement

Resolution: The subject matter addressed in the recommended Informational Note is not related to the requirement it is being proposed for. See Section 3.1.3 of the NEC Style Manual which states that Informational Notes contain explanatory information and shall be located directly after the rule they apply to. Also, Section 3.1.3 states that Informational Notes shall only be used where necessary to support or improve usability of the associated requirement. This recommended informational note does not support or improve the usability of 110.1

Public Input No. 1048-NFPA 70-2020 [Section No. 110.2]

110.2 Approval.

The conductors and equipment required or permitted by this *Code* shall be acceptable only if approved. In order for conductors and/or equipment to be approved which do not meet the requirements of this *Code*, a written statement certifying the safety of the conductors and equipment to be approved must be provided by an electrical engineer who is licensed by an authority acceptable to the Authority Having Jurisdiction. The Authority Having Jurisdiction shall be permitted to approve conductors and/or equipment based on this written statement.

Informational Note: See 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, and Use of Equipment. See definitions of *Approved, Identified, Labeled,* and *Listed*.

Statement of Problem and Substantiation for Public Input

Not every possible electrical installation can be foreseen by the writers of the National Electric Code. It is conceivable that an electrical contractor could come up with a much more efficient method for installing electrical systems that is actually safe but may violate the National Electric Code because it has not been done before. This code change makes a way for specific installations to be approved if reviewed and approved of by both a licensed engineer and an electrical inspector. This way an innovative electrical contractor may not have to wait at least one code cycle to put his good idea into practice and gain a competitive advantage in the industry.

Submitter Information Verification

Submitter Full Name: Mitchell Cleaver
Organization: E Light Electric Services, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 12 21:28:21 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This proposed change is already covered in 90.4 with the following statement: “By special permission, the authority having jurisdiction may waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety”. Also, the submitter has not provided adequate technical substantiation detailing why “an electrical engineer who is licensed by an authority acceptable to the Authority Having Jurisdiction” is warranted.

Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]

(A) Examination.

In judging conductors, equipment or materials , considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with this *Code*

Informational Note No. 1: Equipment may be new or , ~~reconditioned, refurbished, or remanufactured~~ as permitted elsewhere in this Code, may be reconditioned .

Informational Note No. 2: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

(3) Wire-bending and connection space

(4) Electrical insulation

(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

(6) Arcing effects

(7) Classification by type, size, voltage, current capacity, and specific use

(8) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

Consideration of conductors, equipment or materials that are permitted elsewhere in this Code to be reconditioned shall not be based solely upon the original listings of the conductors, equipment or materials.

Informational Note No. 3: Industry standards are available for application of reconditioned and refurbished e quipment.

Informational Note No. 4: The term *reconditioned* may be interchangeable with the terms *rebuilt* , *refurbished* , or *remanufactured* .

Additional Proposed Changes

File Name	Description	Approved
Public_Input_No._1809-NFPA_70-2020_Section_110.3_A_.docx	Clean MSWord DOCX copy of this Public Input No. 1809 WITHOUT TerraView alteration of the Submitter's intent	

Statement of Problem and Substantiation for Public Input

See the uploaded attachment of a manual entry of this Public Input with text content that hasn't been Terrarized and is consequently readable.

.

The second sentence of the second paragraph of 110.21(A)(2) has nothing whatsoever to do with markings but does relate directly to examination for consideration of approval. Consequently, that requirement is deleted there (by related Public Input 1810) and relocated here as the new last paragraph of 110.3(A). Accordingly, Informational Note No. 1 of 110.21(A)(2) is deleted there and relocated here as new Informational Note No. 3 of 110.3(A). Further, Informational Note No. 2 of 110.21(A)(2) is duplicated here as

new Informational Note No. 4 of 110.3(A) avoid repetitions of “refurbished or remanufactured”.

.

“Conductors” is added to the charging text to correlate with 110.2. “Materials” is added explicitly to correlate as well for where materials (rather than equipment, et cetera) are specified in requirements of Chapters 3, 4, 8, et alibi. Informational Note No. 1 is revised to acknowledge that elsewhere within the Code reconditioning is restricted.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	Clarification of the definition "Reconditioned"
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	Correlated revisions
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	Affiliated revisions
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	Affiliated addition of new definition "Manufacturer"
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	Affiliated revisions
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jul 08 10:00:34 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The addition of “conductors” and “materials” is unnecessary as they are considered to be equipment per the phrase “and the like” in the Article 100 definition of equipment. The Panel was unclear how a conductor could be reconditioned. Additionally, the Informational Notes on reconditioning are already covered in 110.21(A)(2).

NFPA Public Input Form

NOTE: All Public Input must be received by 5:00 pm EST/EDST on the published Public Input Closing Date.

For further information on the standards-making process, please contact the Codes and Standards Administration at 617-984-7249 or visit www.nfpa.org/codes.

For technical assistance, please call NFPA at 1-800-344-3555

FOR OFFICE USE ONLY

Log #:

Date Rec'd:

Date 2020-July-04 **Name** Brian E. Rock **Tel. No.** [redacted]

Company Hubbell Incorporated **Email** [redacted]

Street Address 40 Waterview Drive **City** Shelton **State** CT **Zip** 06484

Please indicate organization represented (if any) Hubbell Incorporated

1. (a) Title of NFPA Standard National Electrical Code® **NFPA No. & Year** 70 - 2020

(b) Section/Paragraph 110.3(A)

2. Public Input Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposed Text of Public Input (include proposed new or revised wording, or identification of wording to be deleted):
[Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

110.3(A) Examination.

In judging conductors, equipment or materials for approval, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with this *Code*

Informational Note No. 1: Equipment may be new or, as permitted elsewhere in this *Code*, or may be reconditioned~~, refurbished, or remanufactured~~.
Informational Note No. 2: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided
(3) Wire-bending and connection space
(4) Electrical insulation
(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service
(6) Arcing effects
(7) Classification by type, size, voltage, current capacity, and specific use
(8) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

Consideration of conductors, equipment or materials that are permitted elsewhere in this *Code* to be reconditioned shall not be based solely upon the original listings of the conductors, equipment or materials.

Informational Note No. 3: Industry standards are available for application of reconditioned and refurbished equipment.
Informational Note No. 4: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

4. Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

The second sentence of the second paragraph of 110.21(A)(2) has nothing whatsoever to do with markings but does relate directly to examination for consideration of approval. Consequently, that requirement is deleted there (by related Public Input 1810) and relocated here as the new last paragraph of 110.3(A). Accordingly, Informational Note No. 1 of 110.21(A)(2) is deleted there and relocated here as new Informational Note No. 3 of 110.3(A). Further, Informational Note No. 2 of 110.21(A)(2) is duplicated here as new Informational Note No. 4 of 110.3(A) avoid repetitions of "refurbished or remanufactured".

"Conductors" is added to the charging text to correlate with 110.2. "Materials" is added explicitly to correlate as well for where materials (rather than equipment, et cetera) are specified in requirements of Chapters 3, 4, 8, et alibi. Informational Note No. 1 is revised to acknowledge that elsewhere within the *Code* reconditioning is restricted.

5. Copyright Assignment

(a) ☒ **I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.**

(b) ☐ **Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows:** (please identify which material and provide complete information on its source)

I hereby grant and assign to the NFPA all and full rights in copyright in this Public Input (including both the Proposed Text and the Statement of Problem and Substantiation). I understand that I acquire no rights in any publication of NFPA in which this Public Input in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this assignment.

Signature (Required) [redacted]

PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To: Secretary, Standards Council National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

9/16/2020

Public Input No. 4024-NFPA 70-2020 [Section No. 110.3(A)]

(A) Examination.

In judging equipment, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with this *Code*

Informational Note No. 1: Equipment may be new, reconditioned, refurbished, or remanufactured.

Informational Note No. 2: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

(3) Wire-bending and connection space

(4) Electrical insulation

(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

(6) Arcing effects

(7) Classification by type, size, voltage, current capacity, and specific use

(8) Cybersecurity for network-connected life-safety equipment, to address its ability to withstand unauthorized updates and malicious attacks while continuing to perform its intended safety functionality. ____

Informational Note No. 1: The IEC 62443 series of standards for Industrial Automation and Control Systems, the UL 2900 of standards for Software Cybersecurity for Network-Connectable Products, and UL 5500 the Standard for Remote Software Updates, are standards that provide frameworks to mitigate current and future security cybersecurity vulnerabilities and address software integrity in systems of electrical equipment.

(9) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

Statement of Problem and Substantiation for Public Input

Smart, connected devices are becoming widespread as the Internet of Things (IoT) grows at a rapid rate, especially with regard to industrial equipment and equipment performing protective or life-safety functions such as circuit breakers. Along with this technology comes the increased threat of cyberattacks. These attacks cost millions of dollars and can impair the ability of life-safety equipment and critical systems to operate in their essential roles. The purpose of the NEC is practical safeguarding from the hazards arising from the use of electricity, and addressing the risks of cyberattacks on life-safety equipment in our increasingly connected electrical infrastructure is necessary and appropriate. Cybersecurity for these types of devices should be implemented to ensure all critical system safety quality attributes, such as integrity and availability, are maintained. The concern addressed by this proposal is focused on the safety related security of these devices, and not issues of privacy or data protection.

Submitter Information Verification

Submitter Full Name: John Kovacik
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 17:59:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: While Panel 1 recognizes that protecting life-safety equipment connected to a communication network from cyber-attacks is very important, the Panel considers a proposed requirement in Article 110 overly broad. Public comments to specific articles would be more appropriate. Further, locating the recommendation in Article 110 would not apply to network communications systems covered by Chapter 8 except where the requirements are specifically referenced in Chapter 8.

Public Input No. 2044-NFPA 70-2020 [Section No. 110.3(B)]

(B) Installation and Use.

Equipment that is listed, labeled, or both shall be ~~installed and used in~~ installed in accordance with any instructions included in the listing or labeling.

Statement of Problem and Substantiation for Public Input

The scope of the NEC is the installation and removal of equipment and conductors. The scope of the Code does not include usage of equipment after the installation has received its final.

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 14:38:49 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: It is important that the authority having jurisdiction understand the equipment being installed and its use. Sometimes part of the Listing includes how a device is to be used. For example, certain accessories such as panelboard accessories, lighting kits, lugs/connectors are only for use with specific equipment. See practical safeguarding in Article 90.

Public Input No. 2045-NFPA 70-2020 [Section No. 110.3(B)]

(B) Installation and Use.

Equipment that is listed, labeled, or both shall be installed and used in accordance with any instructions included ~~in~~ with the ~~listing or labeling~~ product .

Statement of Problem and Substantiation for Public Input

The user usually does not have access to the instructions that are included with the listing or labelling. The user only has access to the owner's manual and any other information that is included with the product. For example, If a user buys a GFCI, the user is not going to download UL 943 to learn how to install and use it. Product standards, e.g. UL, contain within them information that the manufacturer is required to place in the owner's manual. This is sufficient for the user.

Much discussion takes place, in the field and in classrooms, as to what "included with the listing or labelling" actually means. Clarifying the wording in this section would help inspectors and AHJs navigate the meaning.

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 14:54:15 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Installation instructions and usage instructions, where applicable, are included with a listed and labeled product such as owner’s manual.

Public Input No. 2708-NFPA 70-2020 [Section No. 110.3(B)]

(B) Installation and Use.

Equipment ~~that is~~ shall be listed, labeled, or both and shall be installed and used in accordance with any instructions included in the listing or labeling.

Statement of Problem and Substantiation for Public Input

Equipment that is not designed and tested to a standard by a NTRL has a potential life safety hazard. Revising this language will have the effect of ensuring the equipment has gone through the proper testing to ensure that is safe for the user or occupant.

Submitter Information Verification

Submitter Full Name: Greg Chontow
Organization: Town of Dover
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 29 08:19:42 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Not all equipment is required to be listed and/or labeled. It is up to the individual Code Making Panels to determine whether or not equipment within their purview is required to be listed and/or labeled.

Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]

(B) Installation and Use.

Equipment ~~that is listed, labeled, or both~~ shall be installed and used in accordance with ~~any instructions included in the listing or labeling~~ all manufacturer ratings, guidance for suitable use, instructions, and other published documentation, in compliance to applicable industry standards, and the equipment's NRTL Listing and Labeling .

Statement of Problem and Substantiation for Public Input

Ironically, NEC 110.3(B) does state (by omission) that only the Listed or Labeled equipment that needs to be used in accordance with the equipment manufacturer's instructions. Because the NEC makes no similar requirement of equipment that is not Listed nor Labeled, this equipment category escapes the stipulation to comply with the manufacturer's terms of use. This however is recognizable as nonsense, and an intonation of NEC intent must be interpolated until text is corrected.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	similar topic
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	similar topic
Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]	similar topic
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	
Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]	
Public Input No. 4707-NFPA 70-2020 [Global Input]	

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 15:53:50 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Not all equipment is listed or labeled and may not include any instructions for installation and use. Common wire ties and mounting hardware are examples that do not include installation instructions but are acceptable and commonly used in the industry. Use of the term "NRTL" is a violation of the NEC Style Manual 3.2.5.3.

Public Input No. 564-NFPA 70-2020 [Section No. 110.3(B)]

(B) Installation and Use.

Equipment that is listed, labeled, or both shall be installed and used in accordance with any instructions included in the listing or labeling.

Informational Note: The installation sheet may be provided in the form of printed material, Quick Response (QR) code, or the address on the internet where users can download the required instructions.

Statement of Problem and Substantiation for Public Input

Listing standards such as UL1699 for Arc-Fault Circuit-Interrupters permit the use of printed materials, QR codes, and internet addresses for ways to obtain installation materials. The new informational note informs the user of the Code that these acceptable means to obtain instructional information are available.

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Feb 28 12:16:45 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8487-NFPA 70-2021

Statement: Listing standards such as UL1699 for Arc-Fault Circuit-Interrupters permit the use of printed materials, QR codes, and internet addresses for ways to obtain installation materials. The new Informational Note informs the user of the Code that these acceptable means to obtain instructional information are available.

Public Input No. 883-NFPA 70-2020 [Section No. 110.3(B)]

(B) Installation ~~and~~ , Maintenance and Use.

~~Equipment that is listed, labeled, or both shall be installed and used~~
Listed or labeled equipment shall be installed, ~~and~~ used, and maintained in accordance with any instructions included in the listing or labeling.

Statement of Problem and Substantiation for Public Input

Installation instructions for many types of listed electrical equipment and systems require periodic maintenance that is specified by the manufacturer in the installation and use instructions. It would seem that this section of the NEC is incomplete if it does not include maintenance required by manufacturers. If it is already required by the installation instructions, then incorporating the revision would just align with expectations of manufacturers of listed equipment that address required maintenance for safety.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 21 11:55:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The concerns of the submitter have been addressed as Service and Maintenance of equipment is being addressed in new Section 110.17.

Public Input No. 982-NFPA 70-2020 [New Section after 110.3(C)]

TITLE OF NEW CONTENT 110.3(D) Redundant Electrical Work.

Type your content here ...

Newly installed electrical work that exceeds prescribed NEC 70 electrical code minimum requirements shall also meet all applicable minimum code requirements.

Statement of Problem and Substantiation for Public Input

Examples:
1) A redundant ground rod electrode shall be driven flush with or below grade.
2) A wire type equipment grounding conductor installed in an EMT that already could serve as an equipment ground path per 250.118 shall be sized according to 250.122, at minimum.

This could go in Annex H but I'd like it in the 110s to make it mandatory.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 06 14:37:28 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The Code contains installation provisions for all electrical work. The Panel is unclear on the title “redundant electrical work” and how that relates to newly installed work that exceeds minimum requirements. The added content does not provide clarity.

Public Input No. 1586-NFPA 70-2020 [Section No. 110.3(C)]

(C) Listing.

Listed equipment shall have a certification or listing mark on the equipment or the smallest shipping container for the equipment. The listing or certification mark shall be applied only at the point of manufacture. Product testing, evaluation, and listing (product certification) shall be performed by recognized qualified electrical testing laboratories and shall be in accordance with applicable product standards recognized as achieving equivalent and effective safety for equipment installed to comply with this *Code*.

Informational Note: The Occupational Safety and Health Administration (OSHA) recognizes qualified electrical testing laboratories that perform evaluations, testing, and certification of certain products to ensure that they meet the requirements of both the construction and general industry OSHA electrical standards. If the listing (product certification) is done under a qualified electrical testing laboratory program, this listing mark signifies that the tested and certified product complies with the requirements of one or more appropriate product safety test standards.

Statement of Problem and Substantiation for Public Input

There are numerous places in the code equipment is required to be listed and labeled. By definition it appears that what is belng called for is labeled equipment. Yet everyone seems reluctant to use that term by itself because in common usage labeled could mean something that has nothing to do with product certification. Use of the two defined terms together is somewhat redundant.

The definitions of both listed and labeled are under the jurisdiction of the NFPA Standards Council, rather than the NEC. So trying to affect a change through a revision of the definitions would not be easy. In addition, both the NEC Style Manual and the NFPA Manual of Style prohibit requirements in definitions. Therefore, this requirement proposes requiring the certification mark or listing be placed on all products required to be listed or on the smallest shipping container for the product. The requirement for the marking to be applied when the product is manufactured is intended to prevent field marking of products that were manufactured before the listing was granted.

Submitter Information Verification

Submitter Full Name: Mark Earley
Organization: Alumni Code Consulting Group, LLC
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 13:42:24 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Products that are listed or certified to a standard already include a label or mark on the product or the smallest product container by the manufacturer. CMP-1 concludes that this action adequately addresses the issue.

Public Input No. 4624-NFPA 70-2020 [Section No. 110.3(C)]

(C) NRTL Listing .

Products shall be NRTL Listed, except as permitted otherwise in this Code.

Product testing, evaluation, and

~~listing (product certification)~~
NRTL Listing shall be performed by

~~recognized qualified electrical testing laboratories~~
one or more Nationally Recognized Testing Laboratories (NRTL), and shall be in accordance with industry accepted applicable product standards

~~recognized as achieving equivalent and effective safety for equipment installed to comply~~
for safe, effective product installation and function, in compliance with this Code .

Where an NRTL Label (or listing mark) is required in this Code, the product shall be NRTL Listed and shall have an NRTL Label. This listing mark enables field verification that the NRTL Listed product complies with the requirements of one or more product safety test standards. .

Informational Note: The Occupational Safety and Health Administration (OSHA) recognizes qualified electrical testing laboratories that perform evaluations, testing, and certification of certain products to ensure that they meet the requirements of both the construction and general industry OSHA electrical standards. If the listing (product certification) is done under a qualified electrical testing laboratory program, this listing mark signifies that the tested and certified product complies with the requirements of one or more appropriate product safety test standards.

Informational Note 2: Multiple Listings and Labels for multiple site conditions and overlapping applications may be warranted. For example; Listed for emergency use, Listed for outdoor use, Listed for service entrance use, etc. Superficial evidence of one or more product NRTL Listing(s) or Label(s) may not constitute validation that all of the appropriate conditions for use have been met by the corresponding Listing(s) required.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION:
A declarative statement that products generally shall be Listed is not ever stated. All that is stated is the terms for who will do an NRTL Listing as regards testing and evaluation. Multitudes of text in Code illustrates a presumption that an NRTL Listing is inferred, yet the combination of text in the General Requirements of 110, when juxtaposed with the other Code text for Listed, Listed, or Labeled throughout the rest of NEC, amount to gaps where a Listing is not technically being required in many cases.

In lieu of terms ‘listed’ and "labeled", apply more distinctive terms and apply them as proper nouns "NRTL Listed" and "NRTL Labeled". The applied capitalization, that comes with proper nouns, will clarify the context of "Listed" and "Labeled" terms so to make them readily recognizable apart from other similar word usage; namely the other context variations of Code usage of "list" and "label".

There is no formal terminology or definition for "recognized qualified electrical testing laboratories". OSHA makes no such "electrical" distinctions, so revision is warranted.

There is no such thing as general industry OSHA electrical standards for products

The use of the phrase "one or more appropriate product safety test standards" implies that any listing mark qualifies the product as appropriate to the application, which is technically contingent on criteria not in evidence. Hence, it is warranted to delete "appropriate" from this phrase.

NRTL "Product Certification" (or NRTL "certified product") has a different connotation from an NRTL Label or NRTL Listing. The Code phrasing employs the term "Product Certification" in a wrong context. It could apply if worded differently but need not be applied as it does not add any meaning, and its use could confuse intent. NRTL Certification is perhaps an alternate compliance path to NRTL Listing or NRTL Labeling, if the Code intent is for this to be the case.

The phrase "requirements of both the construction and general industry" may not be technically appropriate and best to avoid, as "requirements" can vary and may at times be construed to be "elective" at points.

The phrase " If the listing is done …, this listing mark" infers that an NRTL Listing mark always attends a NRTL Listing, which it does not. It is true for some NRTLs but not all.

The text fails to identify that multiple Listings may be required for a product, and that one Listing may not be adequate. An individual separate Listing for each specific category of use is required whenever such Listing categories apply to the conditions of the equipment use.

NEC 110.3, Part (C) also fails to identify NEC's own exemptions for its general requirement that everything be Listed, and whether there are terms for when these exceptions are permitted or disallowed. One category is custom fabricated equipment, of which certain field assemblies may qualify as hybrid sub-category. One other category is equipment that has been reconditioned, refurbished or remanufactured. One final category is non-Listed equipment where NEC has outlined the specific terms of permitted use based on application. The problems arising from potential distinctions of allowances for non-Listed equipment is much more pronounced when the inconsistencies of Listing requirements by specific application are attempted to be put into a proper context (examples of this in Chapter 8).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	similar topic
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	similar topic
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	similar topic
Public Input No. 4586-NFPA 70-2020 [Definition: Labeled.]	
Public Input No. 4591-NFPA 70-2020 [Definition: Listed.]	
Public Input No. 4619-NFPA 70-2020 [Section No. 110.3(B)]	
Public Input No. 4707-NFPA 70-2020 [Global Input]	

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 15:56:32 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The use of the acronym "NRTL" is a violation of the NEC Style Manual, Section 3.2.5.3. The preferred term is "Qualified Electrical Testing Laboratory" as used in the current text of 110.3(C).

Public Input No. 2011-NFPA 70-2020 [New Section after 110.4]

TITLE OF NEW CONTENT

Informational Note. Equipment with nameplate voltage markings of 115, 200, 230 and 480 volts are intended for use on nomial voltage systems rated 120, 208, 240 and 480 volts respectively.

Statement of Problem and Substantiation for Public Input

Equipment is most typically marked with a utilization voltage and not the nominal system voltage. The new informational note brings this to the attention of the code user, helping to reduce confusion.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jul 25 15:07:52 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The Panel understands that the proposed Informational Note in PI-2011 was intended for 110.4. Informational Note 1 in the definition for nominal voltage is clear and accounts for differences in the actual voltage of a circuit versus the nominal voltage. The submitters have not provided adequate technical substantiation that there is a problem with the present text of 110.4 that is remedied by the recommendation submitted in these Public Inputs.

Public Input No. 1394-NFPA 70-2020 [Section No. 110.4]

~~**110.4** Voltages.~~

~~Throughout this *Code* , the voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall not be less than the nominal voltage of a circuit to which it is connected.~~

Statement of Problem and Substantiation for Public Input

No. 1. The statement, "Throughout this Code," has no useful purpose in applying any NEC requirement. No. 2 Compliance with the statement, "The voltage rating of electrical equipment shall not be less than the nominal voltage of a circuit to which it is connected." can't be achieved for many applications because the “nameplate” voltage rating of equipment, like 115V, 230V, and 460V, will be less than the “nominal” voltage rating of 120V, 240V, and 460V. There should not be any concern that someone would place a 208V rated load on 240V nominal system because 110.3(B) requires equipment to be installed in accordance with manufacturer’s instructions. Equipment nameplates use utilization voltages and not nominal voltages. The utilization (nameplate) voltages of 115V, 200V, 230V, and 460V are intended to be used on systems with nominal voltages of 120V, 208V, 240V, and 480V respectively.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 02 10:54:13 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The Panel understands that the proposed Informational Note in PI-2011 was intended for 110.4. Informational Note 1 in the definition for nominal voltage is clear and accounts for differences in the actual voltage of a circuit versus the nominal voltage. The submitters have not provided adequate technical substantiation that there is a problem with the present text of 110.4 that is remedied by the recommendation submitted in these Public Inputs.

Public Input No. 754-NFPA 70-2020 [Section No. 110.4]

110.4 Voltages.

Throughout this *Code*, the voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall ~~not be~~ conform to either 110.4(A) or 110.4(B)

(A) Be not less than the nominal voltage of a circuit to which it is connected.

(B) Be identified for use at a different voltage.

Informational note: An example of equipment that has a different voltage rating than the circuit to which it is connected is a motor.

Statement of Problem and Substantiation for Public Input

As 110.4 is currently written, it is a Code violation to connect a 115 volt motor to a 120 volt circuit.

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Mar 22 19:26:55 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The Panel understands that the proposed Informational Note in PI-2011 was intended for 110.4. Informational Note 1 in the definition for nominal voltage is clear and accounts for differences in the actual voltage of a circuit versus the nominal voltage. The submitters have not provided adequate technical substantiation that there is a problem with the present text of 110.4 that is remedied by the recommendation submitted in these Public Inputs.

Public Input No. 869-NFPA 70-2020 [New Section after 110.5]

Aluminum Conductors

Aluminum Conductors shall have anti-oxidant compound applied to termination points.

Statement of Problem and Substantiation for Public Input

The use of Ani-oxidant on aluminum conductors is not a requirement by the NEC and should be.

Submitter Information Verification

Submitter Full Name: Rick Trujillo
Organization: Nustar Energy
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 14 10:28:16 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Aluminum conductors do not always require use of an anti-oxidant at terminations.

Public Input No. 1436-NFPA 70-2020 [Section No. 110.6]

110.6 Conductor Sizes.

Conductor sizes are expressed in American Wire ~~Gage~~ Gauge (AWG) or in circular mils.

Statement of Problem and Substantiation for Public Input

The problem is when I teach this section people wonder why there isn't a "u" in gauge. By adding it this would eliminate confusion.

Submitter Information Verification

Submitter Full Name: Alex Bergsma
Organization: Milestone Electrical Training
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 04 01:15:55 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8528-NFPA 70-2021
Statement: Per Annex A of the NEC Style Manual, the correct term is "gauge" not "gage".

Public Input No. 952-NFPA 70-2020 [New Section after 110.7]

TITLE OF NEW CONTENT

Type your content here ...

110.7(B) Incomplete and Abandoned Work

Incomplete or abandoned work, in the immediate vicinity of new electric work, shall be removed.

Exception: Incomplete or abandoned work may remain if all remaining work is properly secured and supported. Also, all ungrounded and grounded conductors, may remain in their existing or prior state, provided they are terminated in a manner that the installation is free from electrical faults if any of these conductors were inadvertently energized.

Statement of Problem and Substantiation for Public Input

Complete it or delete it. Several articles, such as 110.7, 110.12, and 300.18, come close but don't quite say it.

All electrical work should be free from faults.Incomplete or abandoned work that became inadvertently energized could present an unsafe condition.

I'm picturing 'in the immediate vicinity' of the proposal to mean work adjacent to new wiring. The electric work does not have to grow to include the whole premises.

The existing text of 110.7 would remain the same but become 110.7A.

This proposal is similar to the already existing 725.25 and 760.25.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 05 16:14:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Adding a requirement to remove work that is incomplete would be overly restrictive. Many installations are done in segments to accommodate ongoing construction.

Public Input No. 1159-NFPA 70-2020 [Section No. 110.7]

110.7 ~~Wiring Integrity~~ Insulation Integrity .

~~Completed~~ Incomplete wiring installations conductor insulation shall be free from short circuits, ground faults, or any connections to ~~ground~~ ground or grounded non-current-carrying parts of equipment, other than as required or permitted elsewhere in this *Code*.

Statement of Problem and Substantiation for Public Input

Revisions are to clarify the requirement. Wiring is a broad term that includes the conductors and wiring methods and so forth. The conductor insulation integrity sought by this rule is between conductors and conductive parts of equipment, which related to conductor insulation. Ground is defined as the earth. The wording “grounded non-current-carrying parts of equipment is more complete in the implied intent of this section. The other option would be to word it as follows: …any connections to ground or conductive body that extends the ground connection, other than as required or permitted elsewhere in this Code. The second option aligns with more recent language accepted by CMP-5.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 19 08:21:12 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This proposal does not enhance clarity and usability. Substituting “Complete” with “Incomplete” may imply that the wiring integrity of the installation only applies to the “incomplete installation”.

Public Input No. 3085-NFPA 70-2020 [Section No. 110.7]

110.7 Wiring Integrity.

Completed energized wiring installations shall be free from short circuits, ground faults, or any connections to ground other than as required or permitted elsewhere in this *Code*.

Statement of Problem and Substantiation for Public Input

There is no mention of the power being on to site the violation.

Submitter Information Verification

Submitter Full Name: Mark Rochon
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 04 14:21:41 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This proposal does not enhance clarity and usability. Wiring integrity can be verified by means other than energizing the circuit.

Public Input No. 966-NFPA 70-2020 [Section No. 110.7]

110.~~7~~ 7(A)_ Wiring Integrity.

Completed wiring installations shall be free from short circuits, ground faults, or any connections to ground other than as required or permitted elsewhere in this *Code*.

Statement of Problem and Substantiation for Public Input

110.7 becomes 110.7(A)
The text of the new 110.7(A) remains the same as the existing 110.7. This is to make room for the newly proposed 110.7(B) which I will submit.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 06 09:56:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed change is not needed as the submitter indicated that it was contingent on Public Input 952 that was resolved.

Public Input No. 954-NFPA 70-2020 [New Section after 110.8]

TITLE OF NEW CONTENT

Type your content here ...

110.8(B) New Construction Materials and Wiring Methods

Newly constructed job sites require electrical materials designed for new construction work. Wiring method installation at newly constructed job sites shall be performed as new construction according to their associated code article(s). Remodel type junction boxes, luminaires, and so forth shall not be permitted. Fished wiring methods described and allowed elsewhere in this code are reserved for finished buildings or structures; also remaining finished portions of existing buildings or structures that are under construction.

Statement of Problem and Substantiation for Public Input

Presently, there is nothing in NEC 70 that prevents a contractor from building and finishing a building then have the electrical work installed at a later date. Fished wiring methods are difficult to near impossible to inspect. Some core and shell portions wouldn't realistically or feasibly be done this way but busy interior walls and hard lids sure could.

Possibly, this could go in Annex H but I'd like it in the 110s to make it mandatory.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 05 16:38:18 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequately substantiated that there is an issue that is remedied by the recommendation. The recommendation is vague and unenforceable and not unique to new installations of new construction materials and wiring methods.

Public Input No. 1160-NFPA 70-2020 [Section No. 110.8]

110.8 Wiring Methods.

Only wiring methods ~~recognized as suitable are~~ recognized and included in this Code are suitable for use in electrical wiring that is covered by this *Code* . The recognized methods of wiring shall be required or permitted to be installed in any type of building or occupancy, ~~except~~ or premises wiring system, e xcept as otherwise provided in this *Code*.

Statement of Problem and Substantiation for Public Input

The revisions are editorial to improve clarity of the implied intent of this rule. The second sentence needed the revision to clarify that the wiring covered by this rule is not only in a building or occupancy, but any wiring on the premises that could be outside or inside a building or occupancy.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 19 08:26:20 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8532-NFPA 70-2021

Statement: The second sentence was revised to clarify that the wiring covered by this requirement is not only in a building or occupancy, but any wiring on the premises that could be outside or inside a building or occupancy.

No revisions were made to the first sentence as proposed by the submitter as there is no “implied intent” of this requirement. Also, there may be wiring methods approved by the AHJ.

Public Input No. 953-NFPA 70-2020 [Section No. 110.8]

110.8 ~~–~~ **8(A)_** Wiring Methods.

Only wiring methods recognized as suitable are included in this *Code*. The recognized methods of wiring shall be permitted to be installed in any type of building or occupancy, except as otherwise provided in this *Code*.

Statement of Problem and Substantiation for Public Input

110.8 is to become 110.8(A) to allow the proposed 110.8(B) which I will submit.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 05 16:35:59 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: A new first level subdivision 110.8(A) was not required as there was no First Revision requiring this change. See PI-954.

Public Input No. 249-NFPA 70-2020 [Section No. 110.9]

110.9 Interrupting Rating.

Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the available fault current ~~that is available~~ at the line terminals of the equipment.

Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that must be interrupted.

Statement of Problem and Substantiation for Public Input

Aligns with recent changes pertaining to fault current.

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jan 04 14:16:39 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8536-NFPA 70-2021
Statement: An editorial revision was made to the first sentence of 110.9 to clarify the type of current this requirement applies to.

Public Input No. 3143-NFPA 70-2020 [Section No. 110.9]

110.9 Interrupting Rating.

Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that is available at the line terminals of the equipment.

Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that must be interrupted.

Informational Note: Guidance for calculating fault current may be found in IEEE 3002.3-2018 - Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems

Statement of Problem and Substantiation for Public Input

This is another slice of updated content from the legacy "Red Book" IEEE 141 mapped into the new IEEE 3000 Standards Collection. From the project prospectus:
"Activities related to short-circuit analysis, including design considerations for new systems, analytical studies for existing systems, as well as operational and model validation considerations for industrial and commercial power systems are addressed. Fault current calculation and device duty evaluation is included in short-circuit analysis. Accuracy of calculation results primarily relies on system modeling assumptions and methods used. The use of computer-aided analysis software with a list of desirable capabilities recommended to conduct a modern short-circuit study is emphasized. Examples of system data requirements and result analysis techniques are presented."

https://standards.ieee.org/standard/3002_3-2018.html

This is one of two possible locations where this reference will improve the NEC.

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: Standards Michigan
Affiliation: IEEE Education & Healthcare Facilities Committee
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 05 15:29:21 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequately substantiated why the recommended Informational Note is necessary. Per 3.1.3 of the NEC Style Manual, if an Informational Note is needed to explain the text of the document, consideration should be given to rewriting the text of the document to make the rule clear. Code Panel 1 concludes that the text of the document is clear and accordingly the text neither needs to be rewritten nor requires and explanation via an Informational Note.

Public Input No. 357-NFPA 70-2020 [Section No. 110.9]

110.9 Interrupting Rating.

Equipment intended to interrupt fault current ~~at fault levels~~ shall have an interrupting rating at nominal circuit voltage at least equal to the available fault current ~~that is available~~ at the line terminals of the equipment.

Equipment intended to interrupt ~~current at~~ other than fault ~~levels~~ current shall have an interrupting rating at nominal circuit voltage at least equal to the current that must be interrupted.

Statement of Problem and Substantiation for Public Input

Suggested terminology edits to align better with the 2020 NEC cycle changes made as a result of the Fault Current Working Group inputs.

Submitter Information Verification

Submitter Full Name: Timothy Crnko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 23 12:09:24 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8536-NFPA 70-2021
Statement: An editorial revision was made to the first sentence of 110.9 to clarify the type of current this requirement applies to.

Public Input No. 4257-NFPA 70-2020 [Section No. 110.10]

110.10 Circuit Impedance, Short-Circuit Current Ratings, and Other Characteristics.

The overcurrent protective devices, the total impedance, the equipment short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit protective devices used to clear a fault to do so without extensive damage to the electrical equipment of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the equipment grounding conductor(s) permitted in 250.118. Listed equipment applied in accordance with their listing shall be considered to meet the requirements of this section.

Informational Note: Reliability is an essential characteristic of a power system. System grounding through an impedance that is now permitted in Section 250.36 will yield an early warning signal that a power delivery component is about to fail and thereby reduce the frequency of use of the second source. The impedance grounded system will, in most cases, permit the system to deliver power until a scheduled outage thereby reducing risk to occupants that depend upon a reliable power source. Impedance grounded systems reduce incident energy exposure by dramatically by diverting fault current through a resistor. With incident energy reduced, maintenance may be undertaken more safely reducing the risk of more forced outages.

Statement of Problem and Substantiation for Public Input

This proposal is a revision to a similar proposal last cycle to raise the visibility of system reliability as an essential characteristic of a power system. Everything we do is to assure safe and reliable power because lack of power -- the more frequent occurrence -- presents significant hazards to the public and to electricians who are put in harms way to remedy the cause of the outage. Reliability as an essential characteristic needs to be in the General Requirements of the NEC.

The new Informational Note in 250.36 is an improvement that recognizes the advantages of resistance grounding. The IEEE Education & Healthcare Facility Committee hosted an IEEE-TV presentation that is worth watching: Technical details about the University of California Berkeley power system are presented. It is a city-within-a-city and a near-perfect study unit for customer-owned premise wiring systems:

https://ieeetv.ieee.org/channels/ieee-ehfec

We cannot anticipate the hazards to which power systems in urban areas will be exposed in the near future. We do know the tools available to reduce city-wide electrical fires, however. For at least 3 NEC revision cycles -- starting in 2005 -- the University of Michigan devoted resources to "rightsizing" building premise wiring in the NEC. Three cycles after that, we now see other interest groups supporting that change. We hope that the NEC will evolve to fill the reliability gap at a faster pace; starting with the 2023 cycle.

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: Standards Michigan + Capstone Power Systems Engineering
Affiliation: IEEE Education & Healthcare Facilities Committee
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 08:40:39 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequately substantiated why the recommended Informational Note is necessary. Per 3.1.3 of the NEC Style Manual, if an Informational Note is needed to explain the text of the document, consideration should be given to rewriting the text of the document to make the rule clear. Code Panel 1 concludes that the text of the document is clear and accordingly the text neither needs to be rewritten nor requires and explanation via an Informational Note.

Public Input No. 3936-NFPA 70-2020 [Section No. 110.12]

110.12 Mechanical Execution of Work.

Electrical equipment shall be installed ~~in a neat and workmanlike manner~~ using electrically safe means .

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

(A) Unused Openings.

Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (¼ in.) from the outer surface of the enclosure.

(B) Integrity of Electrical Equipment and Connections.

Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

Statement of Problem and Substantiation for Public Input

Neat and workmanlike is a totally subjective term that is not enforceable. It also has no place in a book designed to provide information for a safe electrical installation. The revised wording specifies the installation would have to be installed as a safe system.

Submitter Information Verification

Submitter Full Name: Mitch Maulik
Organization: OHM Electric, LLC
Street Address:
City:

State:
Zip:
Submittal Date: Wed Sep 09 15:48:06 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8537-NFPA 70-2021
Statement: The revised text in the First Revision are made to remove the unenforceable and vague terms “neat” and “workmanlike” in 110.12 to comply with Section 3.2.1 and Table 3.2.1 in the NEC Style Manual and replace them with “professional” and “skillful” which are not identified in Table 3.2.1 and are therefore not prohibited terms.

Public Input No. 1605-NFPA 70-2020 [Section No. 110.12(A)]

(A) Unused Openings.

Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (¼ in.) from the outer surface of the enclosure.

I.N. Products and components intended to reduce air infiltration, including enclosure overmolds and overlays, do not necessarily provide protection substantially equivalent to the box wall.

Statement of Problem and Substantiation for Public Input

Neither the NEC nor UL 514C sets specifications for these items that are not part of the basic structure of the box. STP 514C is presently voting on a proposal regarding them. It is likely that if they are accepted within the standard, their RTI rating will not be required to match that of the enclosure.

Submitter Information Verification

Submitter Full Name: David Shapiro
Organization: Safety First Electrical
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 23 15:27:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequately substantiated why the recommended Informational Note is necessary. Per 3.1.3 of the NEC Style Manual, if an Informational Note is needed to explain the text of the document, consideration should be given to rewriting the text of the document to make the rule clear. Code Panel 1 concludes that the text of the document is clear and accordingly the text neither needs to be rewritten nor requires explanation via an Informational Note.

Public Input No. 1266-NFPA 70-2020 [Section No. 110.12(C)]

~~**(C)** Cables and Conductors.~~

~~Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11 . Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.~~

~~Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables* , and other ANSI-approved installation standards.~~

~~Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems* , for discrete combustible components installed in accordance with 300.22(C) .~~

~~Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.~~

Statement of Problem and Substantiation for Public Input

Delete 110.12(C). 110.12(C) has either requirements that are redundant to requirements that are currently stated in the Code which creates a correlation issue or language belongs elsewhere in the Code.
“Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use.” This portion of 110.12(C) addresses cables and conductors that are in areas of “damaged by normal building use”. “Damaged by normal building use” is an undefined term within the Code and should not be used. Areas of “physical damage” is more appropriate and is addressed in the individual sections such as 300.4 or 334.15(B).
“Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11.” This portion of 110.12(C) is found in 300.11 as stated or elsewhere such as 334.30.
“Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.” This portion of 110.12(C) is found in 300.22(C)(1).

“Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, Standard for Installing and Testing Fiber Optic Cables; and other ANSI-approved installation standards.” This portion 110.12(C) needs to be removed since Chapter 8 Articles are standalone Articles and this note wouldn’t be informative unless referenced by those Articles.
“Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, Standard for the Installation of Air-Conditioning and Ventilating Systems, for discrete combustible components installed in accordance with 300.22(C).” This portion of 110.12(C) This sounds like a requirement and would not be permitted in an informational note. In addition, the style manual prohibits the reference to other standards for requirements.

“Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.” This informational note should be located in Article 770 since it relates only to optical fiber cable properties.

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 09:35:24 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitters have not adequately substantiated that the current wording is an issue or creates correlation issues within the NEC. In addition, per 4.2, References to Other Standards of the NEC Style Manual, shall not be contained in mandatory requirements but shall be permitted in Informational Notes. This Section was added in the 2020 Code. See First Revision No. 8484-NFPA 70-2018 and associated Panel Statement which reads “This revision coordinates with potential actions to relocate the content of sections 760.24, 770.24, 725.24, 800.24, 820.24, 830.24, and 840.24 to a new Section 110.12(C). This is the recommendation of the Correlating Committee Usability task group to improve the usability of Chapters 7 and 8. This action would support consolidation of redundant requirements and relocating them into a new general rule.”

Public Input No. 2195-NFPA 70-2020 [Section No. 110.12(C)]

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

~~Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.~~

Statement of Problem and Substantiation for Public Input

Informational Note No. 3 should be deleted because:
1) Information about deteriorating agents is redundant and out of place. Section 110.11 covers deteriorating agents.
2) Requirements for the installation of optical fiber cables are outside the scope of Article 110, Requirements for Electrical Conductors.
3) Informational Note No. 3 in 110.12(C) is redundant; it is identical to Informational Note No. 3 in 770.24. Article 770, Optical Fiber Cables, is the appropriate place for requirements and informational notes dealing with the installation of optical fiber cables.

Submitter Information Verification

Submitter Full Name: David Kiddoo
Organization: CCCA
Affiliation: Communications Cable & Connectivity Association (CCCA)
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 08 02:19:30 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8552-NFPA 70-2021
Statement: The edition date of NFPA 90A is revised from 2018 to 2021. Panel 1 notes that this Informational Note is now renumbered as No. 1.

Informational Note 1 is deleted as it pertains to optical fiber cable which is better suited for Chapter 7 as it is more generic and already addressed in 770.24.

Public Input No. 300-NFPA 70-2020 [Section No. 110.12(C)]

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: ~~Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables* , and other ANSI-approved installation standards.~~

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

Statement of Problem and Substantiation for Public Input

The inclusion of optical fiber cables in 110.12(C) is inappropriate as Article 110 deals with electrical installations and optical fiber cable installations are not electrical. Delete Informational Note No. 1, renumber Informational Note Nos. 2 and 3 as Nos. 1 and 2, respectively.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 305-NFPA 70-2020 [Section No. 800.24]	
Public Input No. 306-NFPA 70-2020 [Section No. 830.24]	
Public Input No. 308-NFPA 70-2020 [Section No. 840.24]	

Submitter Information Verification

Submitter Full Name: James Brunssen
Organization: Telcordia Technologies (ericss
Affiliation: Alliance for Telecommunications Industry Solutions (ATIS)
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 16 10:11:52 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8552-NFPA 70-2021

Statement: The edition date of NFPA 90A is revised from 2018 to 2021. Panel 1 notes that this Informational Note is now renumbered as No. 1.

Informational Note 1 is deleted as it pertains to optical fiber cable which is better suited for Chapter 7 as it is more generic and already addressed in 770.24.

Public Input No. 3949-NFPA 70-2020 [Section No. 110.12(C)]

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: ~~Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables* , and other ANSI-approved installation standards.~~

~~Informational Note No. 2:~~ See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. ~~3~~ 2 : Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

Statement of Problem and Substantiation for Public Input

Rationale: Optical fiber cables are outside the scope listed in Article 110.1. If information for optical fiber cables is required, this same guidance is contained within Article 770.

Submitter Information Verification

Submitter Full Name: Jeff Silveira
Organization: BICSI
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 16:12:04 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8552-NFPA 70-2021

Statement: The edition date of NFPA 90A is revised from 2018 to 2021. Panel 1 notes that this Informational Note is now renumbered as No. 1.

Informational Note 1 is deleted as it pertains to optical fiber cable which is better suited for Chapter 7 as it is more generic and already addressed in 770.24.

Public Input No. 3953-NFPA 70-2020 [Section No. 110.12(C)]

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration ~~of optical fiber cable~~ of cable properties.

Statement of Problem and Substantiation for Public Input

Optical fiber cables are outside the scope listed in Article 110.1. Keeping the specificity to optical fiber cables eliminates guidance for all other cable types, including conductive communication and control cables.

Submitter Information Verification

Submitter Full Name: Jeff Silveira
Organization: BICSI
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 16:14:30 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The need to revise the Informational Note is unnecessary as it has been deleted by FR-8552.

Public Input No. 517-NFPA 70-2020 [Section No. 110.12(C)]

~~**(C)** Cables and Conductors.~~

~~Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11 . Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.~~

~~Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables* , and other ANSI-approved installation standards.~~

~~Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems* , for discrete combustible components installed in accordance with 300.22(C) .~~

~~Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.~~

Statement of Problem and Substantiation for Public Input

This section does not add anything, other than confusion. Had the proposed changes to 90.3 that were submitted in 2020 passed it would be a different story, but as written it applies to to every cable outside of Chapter 8, including those in Chapter 3. If I am installing MC cable, why would I read this, and what value is there in referring to only certain sections of Article 300 when all of it applies?

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Fri Feb 21 12:21:04 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitters have not adequately substantiated that the current wording is an issue or creates correlation issues within the NEC. In addition, per 4.2, References to Other Standards of the NEC Style Manual, shall not be contained in mandatory requirements but shall be permitted in informational notes. This Section was added in the 2020 Code. See First Revision No. 8484-NFPA 70-2018 and associated Panel Statement which reads “This revision coordinates with potential actions to relocate the content of sections 760.24, 770.24, 725.24, 800.24, 820.24, 830.24, and 840.24 to a new Section 110.12(C). This is the recommendation of the Correlating Committee Usability task group to improve the usability of Chapters 7 and 8. This action would support consolidation of redundant requirements and relocating them into a new general rule.”

Public Input No. 675-NFPA 70-2020 [Section No. 110.12(C)]

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-2009, *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-~~2018~~ 2021 , *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

Statement of Problem and Substantiation for Public Input

Update issue date of NFPA 90A.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 674-NFPA 70-2020 [Section No. 640.3(B)]	Update issue date of NFPA 90A.
Public Input No. 676-NFPA 70-2020 [Section No. 424.66]	Update issue date of NFPA 90A.
Public Input No. 674-NFPA 70-2020 [Section No. 640.3(B)]	
Public Input No. 676-NFPA 70-2020 [Section No. 424.66]	

Submitter Information Verification

Submitter Full Name: Stanley Kaufman
Organization: CableSafe, Inc./OFS
Affiliation: PLASTICS Industry Association (PLASTICS)
Street Address:
City:
State:
Zip:
Submittal Date: Tue Mar 17 14:13:45 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8552-NFPA 70-2021
Statement: The edition date of NFPA 90A is revised from 2018 to 2021. Panel 1 notes that this Informational Note is now renumbered as No. 1.

Informational Note 1 is deleted as it pertains to optical fiber cable which is better suited for Chapter 7 as it is more generic and already addressed in 770.24.

Public Input No. 886-NFPA 70-2020 [Section No. 110.12(C)]

(C) Cables and Conductors.

Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure in such a manner that the cables and conductors will not be damaged by normal building use. Such cables and conductors shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties.

Informational Note No. 1: Accepted industry practices are described in ANSI/ NECA/FOA 301-~~2009~~ 2016 , *Standard for Installing and Testing Fiber Optic Cables*, and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants may result in an undetermined alteration of optical fiber cable properties.

Statement of Problem and Substantiation for Public Input

The latest edition of this National Electrical Installation Standard (NEIS) is 2016 rather than 2009.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 21 12:13:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The content of existing Informational Note No. 1 is deleted as its content is not germane to the requirement where it is located.

Public Input No. 2110-NFPA 70-2020 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and ~~workmanlike~~ skillful manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

This Public Input is intended as an editorial revision to replace the gender-specific word "workmanlike" with the synonymous word "skillful" as the need for compliance with this requirement is not gender or gender identity based. See "https://www.merriam-webster.com/dictionary/workmanlike" which both defines "workmanlike" as well as provides synonyms which includes "skillful." Further, per the current NEC Style Manual when this Public Input is being submitted on July 31, 2020, "workmanlike" is listed in Table 3.2.1, Possible Unenforceable or Vague Terms, and "... the term shall not be used."

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 31 09:20:16 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8537-NFPA 70-2021

Statement: The revised text in the First Revision are made to remove the unenforceable and vague terms “neat” and “workmanlike” in 110.12 to comply with Section 3.2.1 and Table 3.2.1 in the NEC Style Manual and replace them with “professional” and “skillful” which are not identified in Table 3.2.1 and are therefore not prohibited terms.

Public Input No. 2111-NFPA 70-2020 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and workmanlike manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for ~~Good Workmanship~~ Skillful Installations in Electrical Construction,* and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

This Public Input to revise this informational note is both intended to editorially correlate with any First Revision to "workmanlike" in 110.12 and remove a possibly vague and unenforceable term(s). This proposed revision to replace the gender-specific word "workmanship" with the synonymous word "skillful" as the need for informational note guidance to the requirement in 110.12 should not be gender or gender identity based. Further, per the current NEC Style Manual when this Public Input is being submitted on July 31, 2020, "good" is listed in Table 3.2.1, Possible Unenforceable or Vague Terms, and "... the term shall not be used." I am mindful that this Public Input cannot require another ANSI standard to change its title. However, at a minimum, introducing this concept will allow a title change to occur without being considered new information and allow for a Public Comment in the event this is not addressed as a First Revision.

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 31 09:47:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: While the Code Panel recommends that ANSI/NECA 1, Standard for Good Workmanship in Electrical Construction be retitled to correlate with the First Revision that removes the unenforceable and vague terms "neat" and "workmanlike" in 110.12 to comply with Section 3.2.1 and Table 3.2.1 in the NE Style Manual, the Code Panel also recognizes it does not have purview over the title of this standard. The Code Panel notes that "good" is used in the title for this standard and is likewise listed in Table 3.2.1 and that "workmanship" is similar to the term "workmanlike" which has been removed in accordance with Section 3.2.1 and Table 3.2.1 in the NEC Style Manual. Accordingly, the Code Panel recommends that these terms be reviewed and correlated with the text in 110.12.

Public Input No. 3086-NFPA 70-2020 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and workmanlike manner and be energized at the completion of the installation .

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

There is no mention of the power being on to site the violation. At many final inspections there is no power at the equipment, lighting outlet, or receptacle outlet.

Submitter Information Verification

Submitter Full Name: Mark Rochon
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 04 14:24:17 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The NEC does not have purview related to when an electrical installation must be energized to comply with 110.12. Accordingly, the NEC cannot require that an electrical installation "be energized at the completion of the installation" for compliance with 110.12 as the recommendation would require. Further, whether the installation is energized or de-energized has no bearing on compliance with 110.12.

Public Input No. 4319-NFPA 70-2020 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and ~~workmanlike~~ skillful manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

This change substitutes an inclusive and more demonstrative term, while otherwise having no impact on meaning or intent. As commonly defined, skillful is a synonym, and suitable replacement, for workmanlike.

The existing reference to ANSI/NECA 1-2015 in the Informational Note remains, as it is one of several suitable standards detailing neat and skillful methods.

According to the U.S. Bureau of Labor Statistics, the need for electricians1 generally, as well as in speciality sectors such as solar photovoltaic installation2 is expected to grow “much faster than average” through at least 2029. Addressing this demand for quality jobs that cannot be sent offshore requires an inclusive and welcoming working environment, with expectations of employee output that can be described in a way that does not make the expectations seemingly unattainable for some segment of the workforce.

Definitions, from the Merriam-Webster Dictionary:

Workmanlike
Characterized by the skill and efficiency typical of a good workman
Competent and skillful but not outstanding or original
Synonyms include deft, practiced, and skillful

Skillful
Possessed of or displaying skill
Accomplished with skill

Skill
The ability to use one's knowledge effectively and readily in execution or performance
Dexterity or coordination especially in the execution of learned physical tasks
A learned power of doing something competently : a developed aptitude or ability

While not part of this PI, it is suggested that the usage of “workmanlike” (all uses outside of Section 110.12, which are in the form “in a neat and workmanlike manner,” are detailed below) is unnecessary as, with the exception of Section 800.24, 110.12 already applies, meaning the references in the particular Articles below is redundant.

All other uses of workmanlike in this Code:
ARTICLE 300 Low-Voltage Suspended Ceiling Power Distribution Systems: 393.14(A)
ARTICLE 600 Electric Signs and Outline Lighting: 600.33(B)(1)
ARTICLE 720 Circuits and Equipment Operating at Less Than 50 Volts: 720.11
ARTICLE 725 Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power-Limited Circuits: 725.24
ARTICLE 760 Fire Alarm Systems:760.24(A)
ARTICLE 770 Optical Fiber Cables: 770.24
ARTICLE 800 General Requirements for Communications Systems: 800.24

1https://www.bls.gov/ooh/construction-and-extraction/solar-photovoltaic-installers.htm
2https://www.bls.gov/ooh/construction-and-extraction/electricians.htm

This PI is submitted on behalf of:
Solar Energy International (SEI)

North American Board of Certified Energy Practicioners (NABCEP)
Swinerton Renewable Energy
Amicus O&M Cooperative
GRID Alternatives
BayWa re
Third Sun Solar
StraightUp Solar
Nextracker

Submitter Information Verification

Submitter Full Name: Brian Mehalic
Organization: Solar Energy International
Affiliation: Solar Energy International
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 10:01:39 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8537-NFPA 70-2021

Statement: The revised text in the First Revision are made to remove the unenforceable and vague terms “neat” and “workmanlike” in 110.12 to comply with Section 3.2.1 and Table 3.2.1 in the NEC Style Manual and replace them with “professional” and “skillful” which are not identified in Table 3.2.1 and are therefore not prohibited terms.

Public Input No. 4595-NFPA 70-2020 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and ~~workmanlike~~ skillful manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-2015, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

This change substitutes an inclusive and more demonstrative term, while otherwise having no impact on meaning or intent. As commonly defined, skillful is a synonym, and suitable replacement, for workmanlike.

The existing reference to ANSI/NECA 1-2015 in the Informational Note remains, as it is one of several suitable standards detailing neat and skillful methods.

According to the U.S. Bureau of Labor Statistics, the need for electricians generally, as well as in specialty sectors such as solar photovoltaic installation is expected to grow “much faster than average” through at least 2029. Addressing this demand for quality jobs that cannot be sent offshore requires an inclusive and welcoming working environment, with expectations of employee output that can be described in a way that does not make the expectations seemingly unattainable for some segment of the workforce.

Definitions, from the Merriam-Webster Dictionary:
Workmanlike
- Characterized by the skill and efficiency typical of a good workman
- Competent and skillful but not outstanding or original
- Synonyms include deft, practiced, and skillful

Skillful
- Possessed of or displaying skill
- Accomplished with skill

Skill
- The ability to use one's knowledge effectively and readily in execution or performance
- Dexterity or coordination especially in the execution of learned physical tasks
- A learned power of doing something competently : a developed aptitude or ability

While not part of this PI, it is suggested that the usage of “workmanlike” (all uses outside of Section 110.12, which are in the form “in a neat and workmanlike manner,” are detailed below) is unnecessary as, with the exception of Section 800.24, 110.12 already applies, meaning the references in the particular Articles below is redundant.

All other uses of workmanlike in this Code:
- ARTICLE 300 Low-Voltage Suspended Ceiling Power Distribution Systems: 393.14(A)
- ARTICLE 600 Electric Signs and Outline Lighting: 600.33(B)(1)
- ARTICLE 720 Circuits and Equipment Operating at Less Than 50 Volts: 720.11
- ARTICLE 725 Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power-Limited Circuits: 725.24
- ARTICLE 760 Fire Alarm Systems:760.24(A)
- ARTICLE 770 Optical Fiber Cables: 770.24
- ARTICLE 800 General Requirements for Communications Systems: 800.24

1https://www.bls.gov/ooh/construction-and-extraction/solar-photovoltaic-installers.htm
2https://www.bls.gov/ooh/construction-and-extraction/electricians.htm

The Solar Energy Industries Association® (SEIA) is leading the transformation to a clean energy economy, creating the framework for solar to achieve 20% of U.S. electricity generation by 2030. SEIA works with its

1,000 member companies and other strategic partners to fight for policies that create jobs in every community and shape fair market rules that promote competition and the growth of reliable, low-cost solar power. Founded in 1974, SEIA is a national trade association building a comprehensive vision for the Solar+ Decade through research, education and advocacy. Visit SEIA online at www.seia.org.

Submitter Information Verification

Submitter Full Name: Evelyn Butler
Organization: Solar Energy Industries Assn
Affiliation: Solar Energy Industries Association (SEIA)
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 15:35:19 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8537-NFPA 70-2021
Statement: The revised text in the First Revision are made to remove the unenforceable and vague terms “neat” and “workmanlike” in 110.12 to comply with Section 3.2.1 and Table 3.2.1 in the NEC Style Manual and replace them with “professional” and “skillful” which are not identified in Table 3.2.1 and are therefore not prohibited terms.

Public Input No. 885-NFPA 70-2020 [Section No. 110.12 [Excluding any Sub-Sections]]

Electrical equipment shall be installed in a neat and workmanlike manner.

Informational Note: Accepted industry practices are described in ANSI/NECA 1-~~2015~~ 2020 , *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards.

Statement of Problem and Substantiation for Public Input

The latest edition of this National Electrical Installation Standard (NEIS) is 2020 rather than 2015.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 21 12:11:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: CMP-1 does not change the date as the document it is not yet published and available.

Public Input No. 1304-NFPA 70-2020 [Section No. 110.13(A)]

(A) Mounting.

Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials shall not be used. Where electrical equipment is mounted to lumber exposed to outdoor conditions, the lumber shall be preserved by either being chemically treated or primered and painted.

Statement of Problem and Substantiation for Public Input

No installation will last forever but raw wood outdoors deteriorates unacceptably rapid. Besides the boards or sheets splintering and warping the screws and lags mounting the equipment do come free. The holes expand where the screws or lags can fall into the equipment, possible across busbars, or the equipment is no longer securely mounted.

300.6 could be a home for this but looks like it belongs at 110.13(A).

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 29 08:09:15 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The NEC does not have purview over the age or resiliency of structures. The need for additional text has not been adequately substantiated.

Public Input No. 2562-NFPA 70-2020 [Section No. 110.13(A)]

(A) Mounting.

Electrical equipment shall be ~~firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials shall not be used.~~ securely fastened in place and mounted on a building or other surface that provides rigid support. If the surface does not provide rigid support, additional support means shall be provided. Means to attach electrical equipment to the surface shall be identified for the application or use.

Statement of Problem and Substantiation for Public Input

This input is being submitted on behalf of the Minnesota Department of Labor and Industry. The Department's 15 office/field staff, and 65 plus contract electrical inspectors complete over 150,000 electrical inspections annually and are involved in the daily enforcement and interpretation of the National Electrical Code.
The proposed language addresses the further need to have rigid support for electrical equipment. The current code text allows for panels or enclosures to be mounted to a single post or piling that does not provide rigid support. For instance, many solar sites provide a piling for mounting of electrical equipment. However, due severe weather conditions, such as wind. The movement of electrical equipment can compromise and damage electrical equipment and wiring methods. The new proposed language was borrowed and modified from 314.23. Whether you are mounting electrical equipment or junction boxes, similar rules and code language need to apply to both installations. Wooden plugs are no longer used in the electrical industry and that language needs to be updated as well.

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 17:35:36 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The equipment must be firmly secured to the structure that supports it. Requirements for expansion, expansion-deflection or deflection fittings due to weather conditions, are found in Article 300.

Public Input No. 4649-NFPA 70-2020 [Section No. 110.13(A)]

(A) Mounting.

Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials shall not be used.

Informational Note: For foundations, buildings, and structures to which equipment are mounted, minimum structural provisions are provided in NFPA 5000-2015 Building Construction and Safety Code, the International Building Code (IBC), and the International Residential One- and Two-Family Dwellings (IRC).

Statement of Problem and Substantiation for Public Input

The proposed Informational Note provides direction as to which codes contain the structural provisions for foundations, buildings, and structures to which electrical equipment is mounted and attached. Considering the growing number of energy storage systems and large-scale ground-mounted PV installations, these additional requirements may be overlooked. It is important for safe electrical installations that these structural provisions be addressed so that the electrical equipment is sufficiently secured to prevent mechanical damage. If the foundation, building, or structure is not able to properly support the electrical equipment, strain on electrical equipment or connections could lead to electric shock or fire hazard. Section 300.4 addresses some structural concerns, but is only applicable to wiring methods, which does not cover electrical equipment.

This proposed Informational Note has the same purpose and intent as the action taken by the Committee in the First Revision No. 35-NFPA 70-2015 for Section No. 110.11. The purpose of adding this new Informational Note to Section 110.13 (A) is to “refer users to other codes that contain provisions dealing with” foundations, buildings, and structures, “which can be mandatory requirements”.

Submitter Information Verification

Submitter Full Name: John Taecker
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 16:16:33 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequately substantiated why the recommended Informational Note is necessary. Per 3.1.3 of the NEC Style Manual, if an Informational Note is needed to explain the text of the document, consideration should be given to rewriting the text of the document to make the rule clear. Code Panel 1 concludes that the text of the document is clear and accordingly the text neither needs to be rewritten nor requires explanation via an Informational Note.

Public Input No. 4282-NFPA 70-2020 [Section No. 110.13(B)]

(B) Cooling.

Electrical equipment that depends on the natural circulation of air and convection principles for cooling of exposed surfaces shall be installed so that room airflow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, clearance between top surfaces and adjacent surfaces shall be provided to dissipate rising warm air.

Electrical equipment provided with ventilating openings shall be installed so that walls, ceilings, or other obstructions do not prevent the free circulation of air through the equipment.

Statement of Problem and Substantiation for Public Input

Required clearances need to be maintained on the top as well as on the sides of electrical equipment.

Submitter Information Verification

Submitter Full Name: Frederic Hartwell
Organization: Hartwell Electrical Services, Inc.
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 09:22:04 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate substantiation. Refer to the manufacturer's instructions for mounting and clearances.

Public Input No. 1510-NFPA 70-2020 [Section No. 110.14(A)]

(A) Terminals.

Connection of conductors to terminal parts shall ensure a thoroughly good physically secured connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors. Connections shall not be energized by friction, magnetic, or spring contact with live components.

Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

Statement of Problem and Substantiation for Public Input

The purpose of this Public Input is for CMP-1 to have an open discussion pertaining to the safety of products that are currently available on the market today that utilize "Spring Loaded" or "Spring Tension" contacts to energize their wall plates for luminaries and/or USB ports. The connection of these products rely on "touching" the terminals of the existing receptacles. For more product information on a single manufacturer please see the following link:

https://www.snappower.com/

The Public Input clarifies that only pressure, solder lugs, and splices to flexible leads are permitted at terminals. If the Panel decides that "Spring Contacts" are acceptable then the language could be rewritten to the positive and limiting it to LED lighting and/or Class 2 circuits.

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jun 12 11:43:34 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8556-NFPA 70-2021

Statement: The term “thoroughly good” is vague and unenforceable and is changed for clarity to “mechanically secure”. Currently, there are no product standard requirements for friction type connections or spring contact connections to a live set screw or wire binding screw, like you would see in a duplex receptacle. The efficacy of this type of connection over time in a Class 1 circuit and the potential for misalignment with the set screw or wire-binding screw is uncertain, especially with the lack of existing safety standard requirements.

Terminals are already required to be marked with the number of conductors and type(s) of conductors that can be used.

Public Input No. 4639-NFPA 70-2020 [Section No. 110.14(A)]

(A) Terminals.

Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. ~~Connection~~ Terminal connections shall not be made to the drive sufaces of either wire-binding screws or set-screw-type pressure connectors. Terminal connections shall not rely soley upon friction, magnetic or cantileverd-spring contact with wire-binding screws or set-screw-type pressure connectors. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor ~~and terminals~~ shall be so identified and shall be identified as to the number and sizes of conductors. A terminal used to connect an aluminum conductor shall be so identified. Terminals used to connect aluminum conductor intermixed with copper conductors, with copper-clad aluminum conducots, or with both conductor materials, shall be so identified.

Additional Proposed Changes

File Name	Description	Approved
Public_Input_No._4639-NFPA_70-2020_Section_110.14_A_.docx	Clean MSWord DOCX copy of this Public Input No.4639 WITHOUT TerraView alteration of the Submitter's intent	

Statement of Problem and Substantiation for Public Input

See the uploaded attachment of a manual entry of this Public Input with text content that hasn't been Terrarized and is consequently readable.

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This Public Input addresses some recent, disturbing design misapplications of connections to terminals, often by electrical equipment fully ancillary to other equipment having terminals intended for connection in accordance with the National Electrical Code®.

.

Let's first deal with the issues in the second paragraph of 110.14(A); these are most easily rectified simply as matters of correlation and readability. Presently, this single-sentence paragraph combines two very distinct issues: (1) termination more than one conductor, regardless of conductor material, and (2) distinguishing terminals intended for aluminum conductors from terminals intended solely for other conductor materials.

.

It is not only essential to identify if a terminal can accommodate more than one conductor but, if so, also HOW MANY CONDUCTORS MORE THAN ONE CONDUCTOR. The standards used to evaluate such terminals, UL 486A-486B, Wire Connectors, and UL 486E, Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, explicitly include many evaluation considerations throughout for terminals that accommodate more than one conductor. Nonetheless, Section 10 (Marking requirements) of each standard and their associated informative Annexes E and D, respectively, for Marking Locations presently do not require explicit identification or marking of the NUMBER of conductors. In each of these Annexes, footnote "a" nonetheless does state that "these are a brief summary of marking requirements" and to "see the specific clause" "for complete details". Further, any identification of suitability for a number of conductors need not be a marking per se but can be identified in the listing itself. Consequently, stating explicitly in 110.14(A) that the NUMBER OF CONDUCTORS already in fact identified in the listings by certification bodies (CBs) imposes no further burden but does clarify to the installer and to the inspector that this SUITABLITY FOR THE NUMBER OF CONDUCTORS is an enforcement criterion.

.

Some recent ANCILLARY equipment, rather than being supplied by its own DIRECT TERMINATION to the branch circuit, is being connected per the ANCILLARY equipment's OWN DESIGN OR INSTRUCTIONS instead to the TERMINALS of other equipment, terminals that have NOT BEEN EVALUATED OR CAPABLE FOR THAT MANY CONDUCTORS. Effectively, the 110.3(B) instructions of the ANCILLARY equipment are being misapplied to SUPERSEDE the PRIMARY equipment's OWN 110.3(B) instructions that purposely and

correctly OMIT any instructions or markings that would identify otherwise suitability for more than one conductor of the PRIMARY equipment. The revised first sentence of the second 110.14(A) paragraph remedies that shortcoming and will provide clarity to the installer and the inspector.

.

The “new” second sentence of the second paragraph is merely the second half of the present first sentence broken off as its own fully distinct requirement without change. This existing requirement to identify TERMINALS evaluated as suitable for aluminum conductors nonetheless still ignores the 110.14 “parent”-text requirement regarding intermixing copper or cooper-clad aluminum with aluminum doesn’t address the “companion” IDENTIFICATION requirement in 110.14(A). Section 10 (Marking requirements) of standards UL 486A-486B and UL 486E already include explicit marking mandates for terminals evaluated as suitable for INTERMIXED conductor materials. Consequently, this Public Input adds a new third sentence to the second 110.14(A) paragraph remedies this NEC® MARKING deficiency but imposes no incremental marking burden that is not already required by the UL standards. This Public Input remedy does clarify to the installer and to the inspector that TERMINAL SUITABLITY FOR INTERMIXING OF DISSIMILAR CONDUCTOR MATERIALS is an enforcement criterion.

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The additions to the first 110.14(A) paragraph deal with more troubling issues that have arisen. Crowd-sourced financing has funded many innovative product-feature concepts. Some of these novel products, however well they may address those novel concepts, often come from those inexperienced in the design and field history of other essential features or attributes for that equipment. As a result, and incidental to the primary innovative concept, some of this equipment have included poor approaches that anyone “trained in the art” would ask “How can anyone design that [given routine feature] so stupidly?” As a consequence, specific product standards that have been developed by a balanced consensus of those genuinely “trained in the art” often may not have explicit requirements prohibiting constructions that are so obviously unsafe to be most unlikely to ever be considered.

.

With regard to terminals, some of these innovative electrical products not only are terminated improperly to another equipment’s own terminals to circuit wiring [violating 110.14(A)’s limitation of the NUMBER of conductors to an UNIDENTIFIED terminal], but also employ SOLE connection METHODS such as magnetic, friction or cantilevered-spring contact to the DRIVER surface of terminal screws. These improper connection methods do NOT comply with the somewhat nebulous 110.14 “parent”-text requirement that connections “be properly installed and used”. These improper connection methods are based upon the newbies’ MISPERCEPTIONS that all terminal screws are uniformly steel (i.e., magnetic) or that the LOCATION of terminals are standardized (friction or cantilevered-spring).

.

Consequently, these connection methods are NOT stable over time, and are likely to result in poor electrical connections, arcing and overheating. A magnet subjected to heat will have reduced magnetic strength. Also, “connections” established solely by magnetic attachment are likely to slide laterally across (and off?) that contact surface when any mechanical forces are applied to those magnetically-attached conductors or terminals. A “connection” attached solely by frictional or cantilevered-spring forces is dependent upon the other equipment’s terminals being located in a KNOWN AND REPEATABLE POSITION relative to the mounting of the innovative product’s mounting; that repeatability inherently cannot be assured due to the complete absence of any terminal location standardization whatsoever.

As such, there’s no predictability to the contact-force load of those deficient “connections”. There’s also the risk that such unpredictable “connections” may bridge or reduce spacings (electrical creepage and clearance) distances between adjacent terminals on the primary electrical equipment. Also, such “connections’ may compromise the dielectric separation between these extended terminals and any close conductive enclosure that otherwise would be fully compliant. Further, with this unpredictability OVER TIME, the materials used in these frictional or cantilevered-spring “connection” methods may deform (cold flow); and mechanical fatigue and material creep can lessen connection forces of the innovative products’ terminals to the terminals of the primary equipment to the circuit.

.

Consequently, these Public Input additions to the first paragraph of 110.14(A) will preclude such improper terminal “connections” via indirect connections to the branch circuits via terminals of primary electrical equipment.

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:

City:
State:
Zip:
Submittal Date: Thu Sep 10 16:07:36 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8556-NFPA 70-2021

Statement: The term “thoroughly good” is vague and unenforceable and is changed for clarity to “mechanically secure”. Currently, there are no product standard requirements for friction type connections or spring contact connections to a live set screw or wire binding screw, like you would see in a duplex receptacle. The efficacy of this type of connection over time in a Class 1 circuit and the potential for misalignment with the set screw or wire-binding screw is uncertain, especially with the lack of existing safety standard requirements.

Terminals are already required to be marked with the number of conductors and type(s) of conductors that can be used.

NFPA Public Input Form

NOTE: All Public Input must be received by 5:00 pm EST/EDST on the published Public Input Closing Date.

For further information on the standards-making process, please contact the Codes and Standards Administration at 617-984-7249 or visit www.nfpa.org/codes.

For technical assistance, please call NFPA at 1-800-344-3555

FOR OFFICE USE ONLY

Log #:

Date Rec'd:

Date 2020-Sept-09 **Name** Brian E. Rock **Tel. No.** [redacted]

Company Hubbell Incorporated **Email** [redacted]

Street Address 40 Waterview Drive **City** Shelton **State** CT **Zip** 06484

Please indicate organization represented (if any) Hubbell Incorporated

1. (a) Title of NFPA Standard National Electrical Code® **NFPA No. & Year** 70 - 2023

(b) Section/Paragraph 110.14(A)

2. Public Input Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposed Text of Public Input (include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

110.14(A) Terminals.

Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Terminal connections shall not be made to the drive surfaces of either wire-binding screws or set-screw-type pressure connectors. Terminal connections shall not rely solely upon friction, magnetic or cantilevered-spring contact with wire-binding screws or set-screw-type pressure connectors. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor ~~and terminals used to connect aluminum~~ shall be so identified and shall be identified as to the number and sizes of conductors. A terminal used to connect an aluminum conductor shall be so identified. Terminals used to connect aluminum conductors intermixed with copper conductors, with copper-clad aluminum conductors, or with both conductor materials, shall be so identified.

4. Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

This Public Input addresses some recent, disturbing design misapplications of connections to terminals, often by electrical equipment fully ancillary to other equipment having terminals intended for connection in accordance with the National Electrical Code®.

Let's first deal with the issues in the second paragraph of 110.14(A); these are most easily rectified simply as matters of correlation and readability. Presently, this single-sentence paragraph combines two very distinct issues: (1) termination more than one conductor, regardless of conductor material, and (2) distinguishing terminals intended for aluminum conductors from terminals intended solely for other conductor materials.

It is not only essential to identify if a terminal can accommodate more than one conductor but, if so, also HOW MANY CONDUCTORS MORE THAN ONE CONDUCTOR. The standards used to evaluate such terminals, UL 486A-486B, Wire Connectors, and UL 486E, Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, explicitly include many evaluation considerations throughout for terminals that accommodate more than one conductor. Nonetheless, Section 10 (Marking requirements) of each standard and their associated informative Annexes E and D, respectively, for Marking Locations presently do not require explicit identification or marking of the NUMBER of conductors. In each of these Annexes, footnote "a" nonetheless does state that "these are a brief summary of marking requirements" and to "see the specific clause" "for complete details". Further, any identification of suitability for a number of conductors need not be a marking per se but can be identified in the listing itself. Consequently, stating explicitly in 110.14(A) that the NUMBER OF CONDUCTORS already in fact identified in the listings by certification bodies (CBs) imposes no further burden but does clarify to the installer and to the inspector that this SUITABLITY FOR THE NUMBER OF CONDUCTORS is an enforcement criterion.

Some recent ANCILLARY equipment, rather than being supplied by its own DIRECT TERMINATION to the branch circuit, is being connected per the ANCILLARY equipment's OWN DESIGN OR INSTRUCTIONS instead to the TERMINALS of other equipment, terminals that have NOT BEEN EVALUATED OR CAPABLE FOR THAT MANY CONDUCTORS. Effectively, the 110.3(B)

instructions of the ANCILLARY equipment are being misapplied to SUPERSEDE the PRIMARY equipment's OWN 110.3(B) instructions that purposely and correctly OMIT any instructions or markings that would identify otherwise suitability for more than one conductor of the PRIMARY equipment. The revised first sentence of the second 110.14(A) paragraph remedies that shortcoming and will provide clarity to the installer and the inspector.

The "new" second sentence of the second paragraph is merely the second half of the present first sentence broken off as its own fully distinct requirement without change. This existing requirement to identify TERMINALS evaluated as suitable for aluminum conductors nonetheless still ignores the 110.14 "parent"-text requirement regarding intermixing copper or cooper-clad aluminum with aluminum doesn't address the "companion" IDENTIFICATION requirement in 110.14(A). Section 10 (Marking requirements) of standards UL 486A-486B and UL 486E already include explicit marking mandates for terminals evaluated as suitable for INTERMIXED conductor materials. Consequently, this Public Input adds a new third sentence to the second 110.14(A) paragraph remedies this NEC® MARKING deficiency but imposes no incremental marking burden that is not already required by the UL standards. This Public Input remedy does clarify to the installer and to the inspector that TERMINAL SUITABLITY FOR INTERMIXING OF DISSIMILAR CONDUCTOR MATERIALS is an enforcement criterion.

The additions to the first 110.14(A) paragraph deal with more troubling issues that have arisen. Crowd-sourced financing has funded many innovative product-feature concepts. Some of these novel products, however well they may address those novel concepts, often come from those inexperienced in the design and field history of other essential features or attributes for that equipment. As a result, and incidental to the primary innovative concept, some of this equipment have included poor approaches that anyone "trained in the art" would ask "How can anyone design that [given routine feature] so stupidly?" As a consequence, specific product standards that have been developed by a balanced consensus of those genuinely "trained in the art" often may not have explicit requirements prohibiting constructions that are so obviously unsafe to be most unlikely to ever be considered.

With regard to terminals, some of these innovative electrical products not only are terminated improperly to another equipment's own terminals to circuit wiring [violating 110.14(A)'s limitation of the NUMBER of conductors to an UNIDENTIFIED terminal], but also employ SOLE connection METHODS such as magnetic, friction or cantilevered-spring contact to the DRIVER surface of terminal screws. These improper connection methods do NOT comply with the somewhat nebulous 110.14 "parent"-text requirement that connections "be properly installed and used". These improper connection methods are based upon the newbies' MISPERCEPTIONS that all terminal screws are uniformly steel (i.e., magnetic) or that the LOCATION of terminals are standardized (friction or cantilevered-spring).

Consequently, these connection methods are NOT stable over time, and are likely to result in poor electrical connections, arcing and overheating. A magnet subjected to heat will have reduced magnetic strength. Also, "connections" established solely by magnetic attachment are likely to slide laterally across (and off?) that contact surface when any mechanical forces are applied to those magnetically-attached conductors or terminals. A "connection" attached solely by frictional or cantilevered-spring forces is dependent upon the other equipment's terminals being located in a KNOWN AND REPEATABLE POSITION relative to the mounting of the innovative product's mounting; that repeatability inherently cannot be assured due to the complete absence of any terminal location standardization whatsoever. As such, there's no predictability to the contact-force load of those deficient "connections". There's also the risk that such unpredictable "connections" may bridge or reduce spacings (electrical creepage and clearance) distances between adjacent terminals on the primary electrical equipment. Also, such "connections' may compromise the dielectric separation between these extended terminals and any close conductive enclosure that otherwise would be fully compliant. Further, with this unpredictability OVER TIME, the materials used in these frictional or cantilevered-spring "connection" methods may deform (cold flow); and mechanical fatigue and material creep can lessen connection forces of the innovative products' terminals to the terminals of the primary equipment to the circuit.

Consequently, these Public Input additions to the first paragraph of 110.14(A) will preclude such improper terminal "connections" via indirect connections to the branch circuits via terminals of primary electrical equipment.

5. Copyright Assignment

(a) ☒ **I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.**

(b) ☐ **Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows:** (please identify which material and provide complete information on its source)

I hereby grant and assign to the NFPA all and full rights in copyright in this Public Input (including both the Proposed Text and the Statement of Problem and Substantiation). I understand that I acquire no rights in any publication of NFPA in which this Public Input in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this assignment.

Signature (Required) [redacted]

PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To: Secretary, Standards Council National Fire Protection Association

1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

9/15/2020

Public Input No. 955-NFPA 70-2020 [Section No. 110.14(A)]

(A) Terminals.

Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

Where stranded conductors are terminated by wire binding screws, without the aid of crimp-on terminals and the manufacturer doesn't prohibit it, the strands shall be twisted in a counter-clockwise direction as the installer faces the end of the conductor to be terminated to prevent strands from being squeezed out from under the screw.

Statement of Problem and Substantiation for Public Input

110.14A does mandate 'a thoroughly good connection' but does not prohibit the direct connection of stranded conductors under a wire binding screw unless a manufacturer prohibited it in the product installation instructions. Implementing this proposal could prevent poor connections being made in the field, knowing splices and terminals are where faults occur due to an improper or flawed connection.

It should be permissible to land conductors this way provided a 'thoroughly good connection' is made. If however, the code making panel determines a stranded conductor under a wire binding screw is unacceptable, language in this code should be added saying this so the practice could be more easily enforced as prohibited.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 05 16:56:50 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The method of termination is covered in the product standard and the proposed technique does not have proper substantiation to modify the allowable practice per the product standard. There is also no prohibition in the NEC to allow the technique described in the Proposal.

Public Input No. 1815-NFPA 70-2020 [Section No. 110.14(B)]

(B) Splices.

Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding ~~, or soldering~~ with a fusible metal or alloy. ~~Soldered splices~~ Solder shall ~~first be spliced or joined~~ be permitted to be applied to splices that are first joined so as to be mechanically and electrically secure without solder ~~and then be soldered~~ . All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Statement of Problem and Substantiation for Public Input

The editorial revisions proposed in this section correct a problem that has existed for years. The first sentence of this section literally recognized solder, in addition to brazing and welding, as a means to “splice or join” conductors together. That is not correct. Then the second sentence contradicted the first sentence. The proposed revisions to the second sentence are for clarifying that solder can be applied after a proper connection between conductors is made. Probably just due to all the revisions over the years.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 09 09:12:26 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The current language is clear and identifies the correct method of using solder on a splice. CMP-1 does not see a contradiction in the requirement.

Public Input No. 533-NFPA 70-2020 [Section No. 110.14(B)]

(B) Splices.

Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors ~~for~~ or cables for direct burial shall be listed for such use.

Statement of Problem and Substantiation for Public Input

This section is not clear on what is required for splicing multi-conductor cables underground. Is a “listed” splice kit required? Or is the splice kit only required to be “identified” for this purpose? When splicing individual conductors it is very clear that “ listed” splicing means be used for direct burial installations. But, what about splicing UF cables? When we read Section 300.15(G) for making direct buried splices, it covers conductors and cables. Section 300.5(E) also covers splices in direct buried conductors and cables. Section 110.14(B) presently only covers direct buried splices for conductors. My proposed revision to section 110.14(B) will help correlate with these other Sections covering direct buried splices for both conductors and cables.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 26 08:33:27 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: This section is related to the electrical splicing of individual conductors and not cables.

Public Input No. 956-NFPA 70-2020 [Section No. 110.14(B)]

(B) Splices.

Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Outdoor above grade terminations and splices made within 450mm (18") of earth shall be wet location rated.

Statement of Problem and Substantiation for Public Input

My experience has shown connections made within 18" of earth are vulnerable and will deteriorate at a rate greater than outdoor terminations made 18" or greater above grade.

Factors such as sprinkler systems, climate, or some soils being more corrosive than others does corrode splices made in junction boxes or enclosures more so than splices made in less harsh conditions. Outlets for wall mount luminaires at a 7' elevation, for example, would not be subject to this new code text and rightfully so. If a luminaire was installed correctly per 410.10A, the terminals I generally witness are fine. It is when opening low mount outdoor junction boxes that an electrician is more likely to observe deteriorating terminations and splices, even if the installation met 314.15.

These wet location splices and terminations follow the reasoning of 250.64A, 250.120B, and 406.9 in that these connections are vulnerable. I find it necessary for these splices and terminations are rated for wet locations for the same reasoning as they are necessary in 314.30C.

This new code entry would prevent disconnects, panelboards, etc from being installed within 18" of earth in many cases; the enclosures themselves being 3R and such rated but the terminals themselves may not.

Submitter Information Verification

Submitter Full Name: Norman Feck
Organization: State of Colorado
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 05 17:13:54 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: A splice is required to meet the equivalent insulation rating. If a grounding splice is open and exposed it must meet the requirements of Article 250 and the termination is not required to be wet rated. It is only required to be rated as Direct Burial, to meet the corrosion aspect of the installation. The interior of luminaires and enclosures are considered damp or dry, respectively, and methods to keep moisture out of these enclosures are already addressed in the Code. The proposed change has not been adequately substantiated.

Public Input No. 1747-NFPA 70-2020 [Section No. 110.14(C)]

(C) Temperature Limitations.

The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both in accordance with 310 .15(A).

(1) Equipment Provisions.

The determination of termination provisions of equipment shall be based on 110.14(C)(1)(a) or (C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.16 as appropriately modified by 310.12.

(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(2) Conductors rated 60°C (140°F).

(3) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.

(4) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.

(5) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(f) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(7) Conductors rated 75°C (167°F)

(8) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

(2) Separate Connector Provisions.

Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector.

Informational Note: With respect to 110.14(C)(1) and (C)(2), equipment markings or listing information may additionally restrict the sizing and temperature ratings of connected conductors.

Statement of Problem and Substantiation for Public Input

The reference to 310.15(A) was added to explain how to determine the ampacity of a conductor as adjusted or corrected.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc

Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 25 19:53:23 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This section has requirements for the temperature limits of the conductor. The use of the term “ampacity” is not the determining factor of temperature rating, it is the temperature that the conductor operates at a specific ampacity.

Public Input No. 173-NFPA 70-2019 [Section No. 110.14(C)(1)]

(1) Equipment Provisions.

The determination of termination provisions of equipment shall be based on 110.14(C)(1)(a) or (C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.16 as appropriately modified by 310.12.

(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(2) Conductors rated 60°C (140°F).

(3) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.

(4) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.

(5) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(6) For equipment listed for use with 75 degree C (167 degree F) conductors, conductors having an insulation rating of 75 degree C (167 degree F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75 degree C (167 degree F) ampacity.

(g) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(8) Conductors rated 75°C (167°F)

(9) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

Additional Proposed Changes

File Name	Description	Approved
IMG_1197.JPG	30amp receptacle rated for 75 degree C conductors	
DSCN3131.JPG	50amp receptacle rated for 75 degree C conductors	

Statement of Problem and Substantiation for Public Input

There is presently no rule that allows us to use 90 degree C rated conductors, sized to the 75 degree C ampacity on equipment other than motors,with terminals rated for use with 75 degree C conductors! Section 110.14(C)(1)(a)(1) requires 60 degree C conductors.. Section 110.14(C)(1)(a)(2) requires sizing to the 60 degree C ampacity. Section 110.14(C)(1)(a)(3) would permit 75 degree C conductors, but does not permit 90 degree C conductors sized to the 75 degree C ampacity! Section 110.14(C)(1)(a)(4) only applies to motors, but does not apply to receptacles, switches or other equipment! See photos I submitted showing a 30-amp receptacle, and a 50-amp receptacle, both of which are rated and marked for use with 75 degree C conductors. Can we use THHN with these receptacles if we determine their ampacity from 75 degree C rating? No. There is no wording that permits use of THHN conductors (or other 90 degree C conductors) in this manner with these receptacles. This revision is needed to allow provisions similar to what Section 110.14(C)(1)(a)(4) allows for motors. This same conductor ampacity determination should be able to be used

for equipment other than motors. Note: TerraView would not allow me to insert a "degree" symbol so I was forced to spell the word "degree" instead.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sat Dec 07 09:48:13 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: Note that, per 110.14(C), conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.

30A- 125/250V

NEMA 14-30R

c UL us

LEVITON

75°C RATING


AL CU
75° C RATING
NEMA 10-50
LEVITON
50A 125/250V
TIGHTEN TERM. SCREW TO 25 IN-LBS
WIRE RANGE A.W.G. #10 - #4
REPLACE ONLY WITH AL-CU 75° C RECEPTACLE

Public Input No. 2122-NFPA 70-2020 [Section No. 110.14(C)(1)]

(1) Equipment Provisions.

The determination of termination provisions of equipment shall be based on 110.14(C)(1)(a) or (C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.16 as appropriately modified by 310.12. The ampacity of listed terminals, or terminals which are part of listed equipment, shall not be subject to ambient temperature correction factors other than that which the equipment is subject to.

(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(2) Conductors rated 60°C (140°F).

(3) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.

(4) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.

(5) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(f) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(7) Conductors rated 75°C (167°F)

(8) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

Statement of Problem and Substantiation for Public Input

There is equipment, such as circuit breakers, that are rated at 50 deg. C. The addition of this text would clarify terminals themselves, which are conductors, are not subject to ambient temperature correction factors if they are part of listed equipment that has a higher ambient temperature rating than shown in the parameters of Table 310.16 and modified by Table 310.15(B)(1). Conversely, if a piece of equipment is installed in an environment such as arctic conditions, the ampacity of the terminals may not be increased due to the cooler ambient temperature, unless the listed equipment also has a higher ampacity.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 95-NFPA 70-2019 [Section No. 110.40]	Terminal temperature ampacities

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Enterprises, Inc.
Affiliation: Associated Builders and Contractors

Street Address:
City:
State:
Zip:
Submittal Date: Sun Aug 02 06:49:53 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Although the NEC does not define a conductor, the Panel concludes that equipment terminals are not bare conductors as defined in the Article 100 definition of “Conductor, Bare.” Field wiring terminals are rated for a specific sized conductor or range of conductor sizes and an “ampacity level rating”, which is based on the ampacity ratings of the NEC. Equipment markings are independent of any on the individual terminal connectors, and are covered in general requirements as specified in 110.14. Terminal temperatures are addressed in end-product standards and are part of the rating of the overall end-product equipment. This is determined using the appropriately sized conductor (based on the NEC and the marking on the equipment) and its rated ampacity. “Ambient temperature correction factors” apply to conductors (Chapter 3) and not the equipment. While the size of conductor terminated may be impacted by the correction factor, the result of this adjustment does not impact the rating of the end-product or its associated terminal.

Public Input No. 973-NFPA 70-2020 [Section No. 110.14(C)(1)]

(1) Equipment ~~Provisions~~ Requirements .

The determination of termination ~~provisions~~ requirements of equipment shall be based on 110.14(C)(1)(a) or (C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination ~~provisions~~ requirements shall be based on Table 310.16 as appropriately modified by 310.12.

(a) Termination ~~provisions~~ requirements of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(2) Conductors rated 60°C (140°F).

(3) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.

(4) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.

(5) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(f) Termination ~~provisions of~~ requirements of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(7) Conductors rated 75°C (167°F)

(8) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

Statement of Problem and Substantiation for Public Input

The word “provisions” indicates something that is provided. The word “requirements” is more appropriate for this text.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 06 11:35:57 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The equipment does provide the termination points and may also provide the conductors for termination. Therefore, the word “provision” is appropriate here.

Public Input No. 3618-NFPA 70-2020 [Section No. 110.14 [Excluding any Sub-Sections]]

Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Copper and Copper-clad aluminum are similar metals, therefore devices and equipment terminals require no additional identification. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10, shall be identified for the specific conductor class or classes.

Additional Proposed Changes

File Name	Description	Approved
110.14_PC_1361_SR_8059.pdf	Committee Statement Public Comment 2020 NEC PC 1361	

Statement of Problem and Substantiation for Public Input

Copper-clad aluminum and copper are similar metals. During the 2020 NEC® cycle, section 110.14 was amended to better reflect that fact. However, the resulting revised text is not direct enough. The intention of the current language in section 110.14 is to give guidance that Copper-clad aluminum and copper are similar metals (see the committee statement attached to this Public Input), but the text does not directly say that. The reader is still left to INFER that Copper-clad aluminum and copper are similar metals. The inference is strong, but not strong enough. Further, the text gives no guidance on how Copper-clad aluminum should be terminated if the reader infers incorrectly. The suggested text in this Public Input would would give clear guidance without inference or assumption on the reader's part. As a similar metal to copper, Copper-clad aluminum can be terminated with Copper-clad aluminum, copper and terminals & connectors identified for termination with copper wire. The text should be direct and clear.

Submitter Information Verification

Submitter Full Name: Peter Graser
Organization: Copperweld
Affiliation: American Bimetallic Association
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 09:23:23 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Although the two metals may be similar, the submitter's statement is incorrect. UL 486A-B, the Standard for Wire Connectors and UL 486-C, the Standard for Splicing Wire Connectors requires connectors to be marked with "CU" (copper only), "AL" (aluminum only), "CU-AL", or "AL-CU".

Second Revision No. 8059-NFPA 70-2018 [Section No. 110.14 [Excluding any Sub-Sections]]

Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum,~~- copper and copper-clad aluminum, or aluminum~~ or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9, Table 10, shall be identified for the specific conductor class or classes.

Submitter Information Verification

Committee: NEC-P01
Submittal Date: Tue Oct 30 14:02:54 EDT 2018

Committee Statement

Committee Statement: Copper and copper-clad aluminum has been deleted from the dissimilar metal list for the application of this requirement.

Response Message: SR-8059-NFPA 70-2018

Public Comment No. 1361-NFPA 70-2018 [Section No. 110.14 [Excluding any Sub-Sections]]

Public Input No. 4415-NFPA 70-2020 [Section No. 110.15]

110.15 High-Leg Marking.

On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded, only the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is orange in color or by other effective means. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present. Use of the color orange shall be limited to high-leg identification.

Exception #1: Conductors with orange insulation with one or more stripes installed in accordance with Section 517.160(A)(5) shall be permitted.

Exception #2: Communication circuits and low-voltage circuits operating at less than 50-volts to ground shall be permitted to utilize orange insulation.

Statement of Problem and Substantiation for Public Input

In general, the NEC has avoided requiring the use of specific color coding for circuits, with three main exceptions:

1) Orange - high legs
2) White or gray - grounded/neutral conductors
3) Green or green with a yellow stripe - equipment grounding conductors

Section 200.7 then goes on to restrict the use of white or gray insulation for other purposes. Section 250.119 limits green to grounding purposes only (a change adopted not too many cycles ago...) This way, when opening an enclosure, we know that white is the neutral and green is the ground. Use of the color orange is not restricted however. And,unfortunately, individuals get crossed up with high-legs quite a bit.

There are areas where the long standing practice of Brown-Orange-Yellow has given way to Brown-Purple-Yellow for this very reason when installing 480-volt circuits. Although it will take time, defining the use of the color orange will lead to increased safety and clarity for the individuals performing this work in the field.

Submitter Information Verification

Submitter Full Name: Jebediah Novak
Organization: Cedar Rapids Electrical JATC
Affiliation: IBEW Local #405
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 12:30:27 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: There are indicators and labels required for high leg Delta Systems, whether it is terminations or switchboards and Panelboards. The color is only one of the identifiers of such systems and it is not limited to orange although that is a common practice.

Public Input No. 2844-NFPA 70-2020 [New Section after 110.16]

110.1X Commissioning.

If electrical devices, equipment, or systems are required to be commissioned elsewhere in this Code, the commissioning activities shall be conducted by a qualified person(s) in accordance with manufacturer instructions. The commissioning results shall be available for the authority having jurisdiction and retained for operation, service and maintenance activities. The report shall be prepared by the installer or commissioning agent and include the following as applicable:

(1) Summary of the commissioning process and the device, equipment, or system operation

(2) As-installed system drawings, plans and documentation

(3) A description of any issues identified during the commissioning and the measures taken to resolve them.

Type your content here ...

Statement of Problem and Substantiation for Public Input

Commissioning of the electrical system prior to being placed into service is key to ensuring a complete installation that will function safely. Including a common clause for this activity within Article 110 will provide a base set of requirements that can be referenced within the code and eliminate having similar language repeated throughout as the term is used.
The commissioning actions should be performed by a qualified person(s) who follows the device and system instructions provided and issues a report that includes the issues found and how they were addressed. The availability of this information along with as installed documentation will be invaluable to those who operate, maintain, and service this system in the future.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2887-NFPA 70-2020 [Definition: Commissioning.]	
Public Input No. 2873-NFPA 70-2020 [Section No. 230.95(C)]	
Public Input No. 2875-NFPA 70-2020 [Section No. 240.87(C)]	
Public Input No. 2876-NFPA 70-2020 [Section No. 240.67(C)]	
Public Input No. 2877-NFPA 70-2020 [New Section after 517.26]	
Public Input No. 2879-NFPA 70-2020 [Section No. 517.17(D)]	
Public Input No. 2880-NFPA 70-2020 [Section No. 700.3]	
Public Input No. 2882-NFPA 70-2020 [Section No. 701.3]	
Public Input No. 2884-NFPA 70-2020 [New Section after 705.50]	
Public Input No. 2885-NFPA 70-2020 [Section No. 706.7]	
Public Input No. 2887-NFPA 70-2020 [Definition: Commissioning.]	
Public Input No. 2888-NFPA 70-2020 [Section No. 708.8(A)]	
Public Input No. 2894-NFPA 70-2020 [New Section after 712.4]	

Submitter Information Verification

Submitter Full Name: Chad Kennedy
Organization: Schneider Electric

Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 02 13:44:57 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Adequate technical substantiation has not been provided as to why this should be a general requirement. Per 110.3, the AHJ can request any of the documents proposed by the submitter.

Public Input No. 2966-NFPA 70-2020 [New Section after 110.16]

110.17 Servicing and Maintenance of Equipment

Servicing and electrical maintenance shall be performed by qualified persons trained in servicing and maintenance of equipment. The servicing and electrical maintenance shall be performed in accordance with the original manufacturer's product instructions and information included in the listing information, using identified replacements parts that are verified under applicable product standards, or as approved by the authority having jurisdiction.

Statement of Problem and Substantiation for Public Input

The term normal servicing is included in the definition of reconditioned, but the NEC does not define this term or provide guidance on the performance of servicing or electrical maintenance of equipment. This has created confusion in the field. Without such guidance, servicing and electrical maintenance could be performed by other than qualified persons, leading to a safety issue. Additionally, performing servicing or maintenance of equipment contrary to the original manufacturer's product instructions and information included in the listing information could lead to improper servicing or maintenance and put worker safety at risk. Finally, the use of parts that are not identified replacement parts that are verified under applicable product standards could impact equipment reliability, performance and safety. NEMA CS 100-2020, NEMA Technical Position on Reconditioned Electrical Equipment, provides clarification on the proper application of rules related to reconditioning versus normal servicing and maintenance.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
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Submittal Date: Thu Sep 03 15:05:55 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8625-NFPA 70-2021

Statement: This new section correlates with the definition of "Reconditioned" and provides clarity by distinguishing between reconditioning and servicing activities and maintenance activities.

This FR addresses the use of replacement parts during servicing and maintenance activities. The Informational Note provides additional guidance on approving parts where equipment isn't listed or when parts aren't available from the OEM.

Public Input No. 3354-NFPA 70-2020 [New Section after 110.16]

New Section 110.17:

110.17 Servicing and Maintenance of Equipment. Servicing and electrical preventive maintenance shall be performed by qualified persons trained in servicing and maintenance of equipment and shall comply with (1) and (2).

(1) The servicing and electrical preventive maintenance shall be performed in accordance with the original equipment manufacturer's instructions and information included in the listing information, or as approved by the authority having jurisdiction.

(2) The servicing and electrical preventive maintenance shall be performed using identified replacement parts that are verified under applicable product standards. The replacement parts shall comply with at least one of the following:

a. Be provided by the original equipment manufacturer

b. Be designed by an engineer experienced in the design of replacement parts for the type of equipment being serviced or maintained

c. Be approved by the authority having jurisdiction .

Informational Note: For equipment that is not listed or field labeled, or for which components are no longer available from the original equipment manufacturer, one way to determine suitability is to review the documentation that accompanies the replacement parts.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of the task group formed in accordance with the direction of the NFPA Standards Council in Decision D#19-11. This task group was appointed to identify potential proposed changes to the 2020 edition of the NEC in the form of proposed Tentative Interim Amendments (TIAs) or to the 2023 edition of the NEC in the form of Public Inputs (PIs) that are within the Task Group's scope of activity as specified by the Standards Council.

These proposed Public Inputs relate to requirements covering the use of reconditioned electrical equipment throughout the NEC as a coordinated set of new or revised requirements. These Public Inputs should not be misconstrued by the CMPs as precluding equal consideration of other Public Inputs, with supporting information, submitted now or in the future by individuals.
The task group members are: G. Scott Harding (Chair), Tom Bishop, Casey Blevins, John Catlett, Dave Dagenais, James Dollard, Robert Fahey, Paul Grein, Howard Herndon, David Hittinger, Christel Hunter, Bob Jordan, David Kendall, Dave King, Jack Lyons, Ryan McClarnon, Robert Osborne, Chris Paxton, David Rosenfield, Michael Savage, Bill Schofield and Ron Widup. This task group of balanced interests provided the expertise to develop these public inputs. Multiple sub task groups were set up during the process with the results of the sub task group work shared with and voted on by the full task group.

Public Inputs are being submitted as follows:
- Revised to Article 100 definition of Reconditioned
- Revisions to Sections 110.21(A)(2), 240.88 and 210.15(3)
- New requirements/Sections 110.17, 110.20, 430.3 and 445.3

Section 110.17 Servicing and Maintenance of Equipment:

New Section 110.17 limits service and maintenance activities to qualified persons that are specifically trained to perform those functions. Terminology is also used to align with the Recommended Practice for Electrical Equipment Maintenance, NFPA 70B, which includes a definition for "Electrical Preventive Maintenance" (referred to simply as "maintenance" in this substantiation).

This new Section acknowledges the importance of using the manufacturer's instructions and information

included in the listing when performing service and maintenance, but the text also acknowledges that this information is not always available (i.e, the manufacturer of the equipment may no longer be in business), and provides a path whereby the AHJ can provide approval.

The new Section addresses the use of replacement parts during servicing and maintenance activities, requiring the use of “identified replacement parts that are verified under applicable product standards”. A list of options are provided for approval of replacement parts, which require parts to be provided by the original equipment manufacturer (OEM), designed by an engineer with applicable experience, or as approved by the AHJ. An informational note provides additional guidance with approving parts where the equipment isn’t listed, or in cases where parts are no longer available from the OEM

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3152-NFPA 70-2020 [Definition: Reconditioned.]	Requirements to tie into proposed new definition of Reconditioned
Public Input No. 3159-NFPA 70-2020 [New Section after 110.18]	Requirements to tie into proposed new definition of Reconditioned
Public Input No. 3152-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 3159-NFPA 70-2020 [New Section after 110.18]	

Submitter Information Verification

Submitter Full Name: G. Scott Harding
Organization: F. B. Harding, Inc.
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 10:17:49 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8625-NFPA 70-2021

Statement: This new section correlates with the definition of “Reconditioned” and provides clarity by distinguishing between reconditioning and servicing activities and maintenance activities.

This FR addresses the use of replacement parts during servicing and maintenance activities. The Informational Note provides additional guidance on approving parts where equipment isn’t listed or when parts aren’t available from the OEM.

Public Input No. 3228-NFPA 70-2020 [Section No. 110.16]

110.16 Arc-Flash Hazard ~~Warning~~ .

(A) General.

Electrical equipment, such as switchboards, switchgear, panelboards, disconnect switches, industrial control panels, ~~meter~~ variable speed drive enclosures, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall not exceed 40 cal/cm2 at the working distance. Equipment shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

(B) ~~Service Equipment~~ Marking .

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to ~~service~~ equipment ~~rated 1200 amps or more~~ . The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment

(4) The date the label was applied

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Statement of Problem and Substantiation for Public Input

New installations continue to be designed and installed that expose workers to extremely high arc flash energies. Traditional design methods do not consider arc flash safety by design, they only consider short-circuit currents for equipment withstand. There is a much great hazard not being addressed in the arc flash blast energies. In addition to the exposures for electrical workers attempting to maintain the equipment, ordinary (unqualified) persons may also be exposed due to high energy arc flash blasts that cannot be contained by the equipment. New installations can be easily designed for safety, as has been proven by many engineers over the past 20 years, and the CODE should require it rather than allow the continued installation of unsafe systems. This is supported through professional papers and presentations such as: • "Leveraging Prevention Through Design Principles in Electrical Installations," H. Landis Floyd & Marcelo Valdes, 2020 IEEE IAS Electrical Safety Workshop, March 2020.
• "Electrical Safety by Design and Maintenance," Dennis K. Neitzel, 2016 IEEE Pulp, Paper, and Forest Industries Conference, June 2016.
• "Electrical Safety by Design," D. Mohla, L.B. McClung, and N.R. Rafferty, Industry Applications Society 46th Annual Petroleum and Chemical Technical Conference, September 1999.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 08:49:55 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: There is not adequate substantiation to modify the requirement.

Public Input No. 3370-NFPA 70-2020 [Section No. 110.16]

110.16 Arc-Flash Hazard Warning.

(A) General.

Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

The warning sign (s) shall carry the following wording:

WARNING—ARC-FLASH HAZARD—KEEP OUT

The WARNING text shall be a minimum of 6-mm (1⁄4-in.) high letters, and body text shall be a minimum of 3-mm (1⁄8-in.) high letters on a contrasting background.

(B) Service Equipment.

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment

(4) The date the label was applied

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Statement of Problem and Substantiation for Public Input

There are many requirements for warning signs. Some articles understand that some installers may have difficulty reading small print. Giving a minimum size (extracted from Article 690), is very important for the safety of the electrical installer.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 11:31:05 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The standards referenced in the Informational Notes prescribe the Label format (Fonts, Color, etc.). These are just some of the alternatives that an entity can use. The submitter has not provided substantiation that text height and letter size is an issue in the field.

Public Input No. 399-NFPA 70-2020 [Section No. 110.16(A)]

(A) General.

Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

Informational note: The list of equipment specified in this section is not an all inclusive list. There may be other equipment similiar to the types specified here that are likely to be worked on while energized and can pose similar arc flash hazards.

Statement of Problem and Substantiation for Public Input

Many installers label only the equipment specified in this section. There are many instances however where equipment not specifically mentioned in 110.16(A) can pose a greater arc flash hazard. For instance, a 3-phase, 480-volt, 400-amp fused disconnect switch is not mentioned in 110.16(A), but could absolutely pose a much greater arc flash hazard than a single-phase 100-amp 120/240-volt branch circuit panelboard. And yet, the fused disconnect switch is ignored by the installer when it comes to arc flash label requirements since it is not specifically mentioned. This note is merely a reminder to the installer and the AHJ that these labels may be need on other equipment too! These labels may be appropriate for power transformers, VFD's and other high energy equipment too.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sun Feb 02 08:32:09 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposal does not add clarity or value to the Code. It is understood that the term “such as” followed by the equipment specified, is not an all-inclusive list. Other equipment, as determined by the Authority Having Jurisdiction (AHJ), may be included under this Section.

Public Input No. 2781-NFPA 70-2020 [Section No. 110.16(B)]

(B) Service Equipment.

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The ~~label~~ labels shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment. These labels shall reflect clearing times when arc energy reduction mode is applied & the values without arc energy values being applied

(4) The date the label was applied

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Statement of Problem and Substantiation for Public Input

Not sure on whether both are needed but the code should direct you to what mode the clearing times reflect. i recently did an inspection where only the normal clearing time was used. On another project the clearing time was established with the arc energy reduction mode. Direction by this article is well needed

Submitter Information Verification

Submitter Full Name: James Dorsey
Organization: Douglas County Electrical Insp
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 31 18:29:01 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8772-NFPA 70-2021
Statement: Panel 1 notes that First Revision No. 8772-NFPA 70-2021 has modified the Informational Notes to update the edition dates and comply with the 2020 NEC Style Manual.

"Feeder supplied equipment" was added to the title and requirements of 110.16(B) as the panel concludes that the requirements in 110.16(B) must apply to both service equipment and feeder supplied equipment in other than dwelling units.

The phrase "arc flash" was added to clarify the type of permanent label required.

The revision from 1200 amps to 1000 amps increases worker safety.

List items (1)-(4) and the exception were deleted with the concepts from these list items and Exception relocated into the text of 110.16(B) in sentence and paragraph, rather than list, format.

The concepts of "clearing times when arc energy reduction mode is applied with and the values without arc energy values being applied" and "arc flash incident energy level or clearing time in accordance with acceptable industry practice" were incorporated into the revised requirements of 110.16(B) through the words "the arc flash label shall be in accordance with acceptable industry practice…".

Editorial revisions were made to the Informational Notes to both comply with the 2020 NEC Style Manual and to reflect current edition dates.

The existing Informational Note No. 1 was deleted as it was considered redundant to the information contained in the remaining Informational Notes.

The recommended Informational Note related to arcing current and IEEE 1584 was not accepted as that information was not specifically incorporated into the revised requirements in this First Revision.

Public Input No. 2868-NFPA 70-2020 [Section No. 110.16(B)]

(B) Service and Feeder Supplied Equipment.

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service and feeder supplied equipment rated 1200 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment

(4) The date the label was applied

Exception: Service and feeder supplied equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-~~2018~~ 2021 , *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Statement of Problem and Substantiation for Public Input

The requirements of 110.16(B) have been in places for two cycles. The industry has come to realize that applying arc flash labels is not a burden. Initially, there was push back as some said this would be too difficult or too expensive. Neither of those assumptions were correct. This requirement is not retroactive. When installing feeders the information to calculate an arc flash label is at our fingertips and we do not label feeder supplied equipment only because it is not a requirement. If we did not have laws requiring the use of seat belts, most drivers would not wear them.
This proposed revision is easily complied with and will be the first giant step towards labeling all equipment that is likely to require examination, adjustment, servicing or maintenance while energized.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2870-NFPA 70-2020 [Section No. 110.16(B)]	

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 06:50:20 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: FR-8772-NFPA 70-2021

Statement: Panel 1 notes that First Revision No. 8772-NFPA 70-2021 has modified the Informational Notes to update the edition dates and comply with the 2020 NEC Style Manual.

"Feeder supplied equipment" was added to the title and requirements of 110.16(B) as the panel concludes that the requirements in 110.16(B) must apply to both service equipment and feeder supplied equipment in other than dwelling units.

The phrase "arc flash" was added to clarify the type of permanent label required.

The revision from 1200 amps to 1000 amps increases worker safety.

List items (1)-(4) and the exception were deleted with the concepts from these list items and Exception relocated into the text of 110.16(B) in sentence and paragraph, rather than list, format.

The concepts of "clearing times when arc energy reduction mode is applied with and the values without arc energy values being applied" and "arc flash incident energy level or clearing time in accordance with acceptable industry practice" were incorporated into the revised requirements of 110.16(B) through the words "the arc flash label shall be in accordance with acceptable industry practice…".

Editorial revisions were made to the Informational Notes to both comply with the 2020 NEC Style Manual and to reflect current edition dates.

The existing Informational Note No. 1 was deleted as it was considered redundant to the information contained in the remaining Informational Notes.

The recommended Informational Note related to arcing current and IEEE 1584 was not accepted as that information was not specifically incorporated into the revised requirements in this First Revision.

Public Input No. 2870-NFPA 70-2020 [Section No. 110.16(B)]

(B) Service Equipment.

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service equipment rated ~~1200 amps~~ 1000 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment

(4) The date the label was applied

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Statement of Problem and Substantiation for Public Input

The requirements of 110.16(B) have been in places for two cycles. The industry has come to realize that applying arc flash labels is not a burden. Initially, there was push back as some said this would be too difficult or too expensive. Neither of those assumptions were correct. This requirement is not retroactive. There is no practical reason to not expand this requirement to include equipment rated 1000 amps or more.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2868-NFPA 70-2020 [Section No. 110.16(B)]	

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 07:01:41 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8772-NFPA 70-2021

Statement: Panel 1 notes that First Revision No. 8772-NFPA 70-2021 has modified the Informational Notes to update the edition dates and comply with the 2020 NEC Style Manual.

"Feeder supplied equipment" was added to the title and requirements of 110.16(B) as the panel concludes that the requirements in 110.16(B) must apply to both service equipment and feeder supplied equipment in other than dwelling units.

The phrase "arc flash" was added to clarify the type of permanent label required.

The revision from 1200 amps to 1000 amps increases worker safety.

List items (1)-(4) and the exception were deleted with the concepts from these list items and Exception relocated into the text of 110.16(B) in sentence and paragraph, rather than list, format.

The concepts of "clearing times when arc energy reduction mode is applied with and the values without arc energy values being applied" and "arc flash incident energy level or clearing time in accordance with acceptable industry practice" were incorporated into the revised requirements of 110.16(B) through the words "the arc flash label shall be in accordance with acceptable industry practice…".

Editorial revisions were made to the Informational Notes to both comply with the 2020 NEC Style Manual and to reflect current edition dates.

The existing Informational Note No. 1 was deleted as it was considered redundant to the information contained in the remaining Informational Notes.

The recommended Informational Note related to arcing current and IEEE 1584 was not accepted as that information was not specifically incorporated into the revised requirements in this First Revision.

Public Input No. 439-NFPA 70-2020 [Section No. 110.16(B)]

(B) Service Equipment.

In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage

(2) Available fault current at the service overcurrent protective devices

(3) The ~~clearing time of service overcurrent protective devices based on the available fault current at the service equipment~~ arc flash incident energy level or clearing time in accordance with acceptable industry practice.

(4) The date the label was applied

~~*Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.*~~

Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Statement of Problem and Substantiation for Public Input

Leaving the clearing time in positive text in section 110.16 is confusing and is difficult to apply in the field. The user does not know what to do with the clearing time. It would be more appropriate to allow either the clearing time or incident energy level to be placed on the label. The incident energy level is more useful in this case.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: IEC
Affiliation: IEC
Street Address:
City:
State:
Zip:
Submittal Date: Sat Feb 08 07:03:18 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8772-NFPA 70-2021

Statement: Panel 1 notes that First Revision No. 8772-NFPA 70-2021 has modified the Informational Notes to update the edition dates and comply with the 2020 NEC Style Manual.

"Feeder supplied equipment" was added to the title and requirements of 110.16(B) as the panel concludes that the requirements in 110.16(B) must apply to both service equipment and feeder supplied equipment in other than dwelling units.

The phrase "arc flash" was added to clarify the type of permanent label required.

The revision from 1200 amps to 1000 amps increases worker safety.

List items (1)-(4) and the exception were deleted with the concepts from these list items and Exception relocated into the text of 110.16(B) in sentence and paragraph, rather than list, format.

The concepts of "clearing times when arc energy reduction mode is applied with and the values without arc energy values being applied" and "arc flash incident energy level or clearing time in accordance with acceptable industry practice" were incorporated into the revised requirements of 110.16(B) through the words "the arc flash label shall be in accordance with acceptable industry practice…".

Editorial revisions were made to the Informational Notes to both comply with the 2020 NEC Style Manual and to reflect current edition dates.

The existing Informational Note No. 1 was deleted as it was considered redundant to the information contained in the remaining Informational Notes.

The recommended Informational Note related to arcing current and IEEE 1584 was not accepted as that information was not specifically incorporated into the revised requirements in this First Revision.

Public Input No. 3159-NFPA 70-2020 [New Section after 110.18]

New Section 110.20:

110.20 Reconditioned Equipment. Reconditioned equipment shall be permitted except where prohibited elsewhere in this *Code*. Equipment that is restored to operating condition shall be reconditioned with identified replacement parts, verified under applicable standards, that are either provided by the original equipment manufacturer or that are designed by an engineer experienced in the design of replacement parts for the type of equipment being reconditioned.

(A) Equipment Required to be Listed. Equipment that is reconditioned, and required by this *Code* to be listed, shall be listed or field labeled as reconditioned using available instructions from the original equipment manufacturer.

(B) Equipment Not Required to be Listed. Equipment that is reconditioned, and not required by this *Code* to be listed shall:

(1) Be listed or field labeled as reconditioned, or

(2) Have the reconditioning performed in accordance with the original equipment manufacturer instructions.

(C) Approved Equipment. If the options specified in (A) or (B) are not available, the authority having jurisdiction shall be permitted to approve reconditioned equipment, and the reconditioner shall provide the authority having jurisdiction with documentation of the changes to the product.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of the task group formed in accordance with the direction of the NFPA Standards Council in Decision D#19-11. This task group was appointed to identify potential proposed changes to the 2020 edition of the NEC in the form of proposed Tentative Interim Amendments (TIAs) or to the 2023 edition of the NEC in the form of Public Inputs (PIs) that are within the Task Group's scope of activity as specified by the Standards Council.

These proposed Public Inputs relate to requirements covering the use of reconditioned electrical equipment throughout the NEC as a coordinated set of new or revised requirements. These Public Inputs should not be misconstrued by the CMPs as precluding equal consideration of other Public Inputs, with supporting information, submitted now or in the future by individuals.

The task group members are: G. Scott Harding (Chair), Tom Bishop, Casey Blevins, John Catlett, Dave Dagenais, James Dollard, Robert Fahey, Paul Grein, Howard Herndon, David Hittinger, Christel Hunter, Bob Jordan, David Kendall, Dave King, Jack Lyons, Ryan McClarnon, Robert Osborne, Chris Paxton, David Rosenfield, Michael Savage, Bill Schofield and Ron Widup. This task group of balanced interests provided the expertise to develop these public inputs. Multiple sub task groups were set up during the process with the results of the sub task group work shared with and voted on by the full task group.

Public Inputs are being submitted as follows:
- Revised to Article 100 definition of Reconditioned
- Revisions to Sections 110.21(A)(2), 240.88 and 210.15(3)
- New requirements/Sections 110.17, 110.20, 430.3 and 445.3

Section 110.20 Reconditioned Equipment:

New Section 110.20 is created to establish general requirements that will apply to all equipment that is reconditioned. With the introduction of “reconditioned equipment” in the 2017 NEC® as a basic concept, then expanded to address additional requirements and specific equipment in the 2020 NEC®, users of the Code have asked if specific types of equipment can or cannot be reconditioned. While the 2020 NEC® did introduce requirements for some specific types of equipment, more often the Code remained silent on the use of reconditioned equipment. The first sentence to this proposed Section addresses the question as to whether or not reconditioned equipment is permitted by the Code when the Code does not specifically address the equipment in question.

The parent language requires the use of “identified replacement parts, verified under applicable standards”, that are either provided by the OEM or designed by an engineer with applicable experience. This is consistent with requirements for parts used during the servicing and maintenance process.

The Section is then sub-divided into 3 first level subdivisions, with (A) and (B) addressing “Equipment Required to be Listed”, and “Equipment Not Required to be Listed”, respectively. Where the Code requires equipment to be listed, reconditioned equipment shall be listed or field labeled as “reconditioned” using available instructions from the OEM (noting that instructions may not always be available). Where the Code does not require equipment to be listed, two options exists: 1) the equipment can be listed or field labeled as reconditioned; or 2) the equipment may be reconditioned in accordance with instructions from the OEM.

Section 110.20 includes a 3rd option that is permitted when “options specified in (A) or (B) are not available”. In those situations, in (C), the AHJ is permitted to approve reconditioned equipment. This provision acknowledges that listing, field labeling, and OEM guidance are not always available, and provides the AHJ with the authority to review required documentation as to the changes made to the product and approve the equipment.

Lastly, as existing Sections 110.18 (Arcing Parts) and 110.19 (Light and Power from Railway Conductors) are unrelated to servicing, maintenance, and reconditioning, it is recommended that CMP 1 renumber those Sections in order to allow these two newly proposed Sections to appear consecutively in Article 110.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3354-NFPA 70-2020 [New Section after 110.16]	Requirements to tie into proposed new definition of Reconditioned
Public Input No. 3152-NFPA 70-2020 [Definition: Reconditioned.]	Requirements to tie into proposed new definition of Reconditioned
Public Input No. 3152-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 3354-NFPA 70-2020 [New Section after 110.16]	

Submitter Information Verification

Submitter Full Name: G. Scott Harding
Organization: F. B. Harding, Inc.
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 05 21:09:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8663-NFPA 70-2021

Statement: These requirements will provide clarity to the Code on specific types of equipment that can and cannot be reconditioned and the process for approval by an AHJ.

Public Input No. 3672-NFPA 70-2020 [Section No. 110.18]

110.18 Arcing Parts.

Parts of electrical equipment that in ordinary operation produce arcs, sparks, flames, or molten metal shall be enclosed or separated and isolated from all combustible material.

Informational Note: For ~~hazardous (classified) locations, see Articles 500 through 517 . For~~ motors, see 430.14.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed that we delete the reference to the entire Hazloc articles.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 10:36:06 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8565-NFPA 70-2021
Statement: The reference to Articles 500 through 517 is in violation of the NEC Style Manual. The Informational Note is not needed as the articles on hazardous locations are clearly identified as well as the section on motors.

Public Input No. 1743-NFPA 70-2020 [New Section after 110.19]

110.20 Ground-Fault Circuit Interrupters (GFCI) and Arc-Fault Circuit Interrupters (AFCI).

Ground-fault circuit interrupters and arc-fault circuit interrupters shall be located at a readily accessible location , except as permitted by other sections of this *Code* .

Statement of Problem and Substantiation for Public Input

GFCIs and AFCIs are required to be readily accessible in a few rules of the NEC, but not every GFCI and/or AFCI rule requires them to be located at a readily accessible location. Placing this requirement in Article 110 permits this placement to be a general requirement and apply to all GFCI and AFCI applications. An example of a GFCI required to be in a location that is not readily accessible is found in 620.6.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 25 19:14:26 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: AFCI's and GFCI's are already required to be readily accessible in 210.8 and 210.12. Modifications can be made to the general rules as per Section 90.3.

Public Input No. 2839-NFPA 70-2020 [New Section after 110.19]

In Sight From (Within Sight From, Within Sight).

Where this *Code* specifies that one equipment shall be "in sight from," "within sight from," or "within sight of," and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other. (CMP-1)

Statement of Problem and Substantiation for Public Input

As stated in related PI 2387, the In sight from rule has been positioned as a definition in Article 100 since NEC 1981; however, it is not a definition, it is a requirement. The NFPA Manual of Style prohibits mandatory language in a definition (see 2.3.1.4) or requirements' being contained in definitions (see 2.3.2.3). The in sight from rule functions the same way as do 110.21(B) and 110.25. It belongs in Article 110, not 100. Granted, people have looked in Article 100 for 39 years to find what "in sight from means," but that doesn't make it the right thing to do. Panel 1 can and should move this requirement disguised as a definition in NEC 2023 and keep it there.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2837-NFPA 70-2020 [Definition: In Sight From (Within Sight From, Within Sight).]	

Submitter Information Verification

Submitter Full Name: William Fiske
Organization: Intertek Testing Services
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 02 09:51:54 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The term “in sight from” appears many times throughout the Code. The existing Article 100 definition adds clarity and consistency to the Code wherever the term is used.

Public Input No. 3235-NFPA 70-2020 [New Section after 110.19]

110.20 Inspections and Acceptance Tests

(A) Pre-energization and Operating Tests. The complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction. They shall be tested when first installed on site. Equipment ground impedance and insulation resistance tests shall be performed on all equipment and cables prior to energization.

(B) Test Report. A test report covering the results of the tests required in 110.20(A) shall be available to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.

Statement of Problem and Substantiation for Public Input

There continues to be many injury and equipment damaging incidents due to a lack of proper acceptance testing. This input is similar to 110.41 for high voltage systems. The same hazards exist in low voltage systems. Systems that have errors in the installation work or in the new equipment that create short circuit conditions pose a significant hazard to those energizing through switching as well as those in the vicinity of the fault. Proper acceptance testing prior to energization, especially equipment ground impedance and insulation resistance tests, are key to preventing these incidents.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 09:14:34 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter's proposed changes are already covered in 110.3 and 110.7.

Public Input No. 1777-NFPA 70-2020 [Section No. 110.21(A)(1)]

(1) General.

The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this *Code*. The marking or label shall be of sufficient durability to withstand the environment involved.

Informational Note: For additional information, see UL *Recommended Practice for Nameplates Used in Electrical Installations.*

Statement of Problem and Substantiation for Public Input

The Code nor product standards provide uniform recommendations for information required on equipment nameplates. They also do not include guidance for determining what sufficient durability is for markings or labels for harsh environments. The recommended practice will provide additional guidance for nameplate markings required by the Code and product standards. The UL Recommended Practice for Nameplates Used in Electrical Installations is under development with completion anticipated before the publication of the 2023 NEC.

Submitter Information Verification

Submitter Full Name: Charles Mercier
Organization: Underwriters Laboratories Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 30 16:19:27 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Certification standards provide the required markings for each product and in many instances specify label requirements. Any changes to product markings should be addressed with the specific product standard, including any special label materials that may be needed due to the environment.

Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]

(1) General.

The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the factory fabrication, factory assembly, and commercial availiability for field installation of the new product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be ~~provided as~~ applied or affixed onto electrical equipment as specified elsewhere in this *Code*. The marking or label shall be of sufficient durability to withstand the environment involved.

Additional Proposed Changes

File Name	Description	Approved
Public_Input_No._1940-NFPA_70-2020_Section_110.21_A_1_.docx	Clean MSWord DOCX copy of this Public Input No. 1940 WITHOUT TerraView alteration of the Submitter's intent	

Statement of Problem and Substantiation for Public Input

See the uploaded attachment of a manual entry of this Public Input with text content that hasn't been Terrarized and is consequently readable.

.

In accordance with NFPA Standards Council Decision D#11-7 (specifically March 2010 Standards Council Minute Item 10-3-21), the NEC® serves as "a specification of the material and process associated with putting equipment in place and making it ready for use in accordance with performance requirements".

.

This Public Input seeks to associate the manufacturer as being the organization SPECIFICALLY responsible for FACTORY-FABRICATION, FACTORY-ASSEMBLY, and the COMMERCIAL AVAILABILITY of safe electrical products that are ready-for-use once properly installed. As presently worded in 110.21(A)(1) and in the context of 110.21(A)(2)'s wording for possible future reconditioning, however, the manufacturer now is implied as having unspecified, everlasting, all-encompassing omnipotence over products, until "world without end. Amen."

.

Until the 2017 addition of 110.21(A)(2) to address marking responsibilities of equipment reconditioners, there was really no implicit timeline beyond NEWLY INSTALLED in the 110.21(A)(1) phrase "organization responsible for the product". With that 2017 addition of 110.21(A)(2)'s phrase "organization responsible for reconditioning", however, there is now an implicit timeline imposed that could be misconstrued to mean that manufacturers have a MANDATED de facto responsibility overall UNTIL some future reconditioning MIGHT occur. For those CONSENSUS product safety standards that DO impose some minimum number of operational cycles, this implicit timeline extending to some nebulous FUTURE reconditioning could be misconstrued to argue that those standards' minimum operational cycles are effectively negated and extended to some expectation or misinterpretation to some extrapolated number of operational cycles or years of life.

.

Once a product is installed in accordance with requirements of the NEC® and with the original manufacturer's instructions and effectively transferred in ownership to the facility, the Code does not address whatsoever (NOR SHOULD IT) the manufacturer's warranty or other discretionary commercial considerations, or non-Code-related manufacturers' contractual, litigation or legislated responsibilities associated with new products ready-to-be-installed.

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If related Public Input No. 1942 is accepted, the first sentence can be shortened to read as: "The name, trademark, of other descriptive mark of the new product's manufacturer shall be placed on all electrical equipment "

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	Affiliated revisions
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	Affiliated revisions
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	Affiliated revisions
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	Affiliated addition of new definition "Manufacturer"
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	Affiliated revisions
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	
Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]	
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 19 08:52:17 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequately substantiated that there is a problem to necessitate this change. This section covers general requirements. If additional markings are needed, this should be addressed in the individual articles and sections throughout the Code. In many instances, products are manufactured by one company for another company, known as brand labeling. Adding two company names would cause unnecessary confusion.

NFPA Public Input Form

NOTE: All Public Input must be received by 5:00 pm EST/EDST on the published Public Input Closing Date.

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For technical assistance, please call NFPA at 1-800-344-3555

FOR OFFICE USE ONLY

Log #:

Date Rec'd:

Date 2020-July-14 **Name** Brian E. Rock **Tel. No.** [redacted]

Company Hubbell Incorporated **Email** [redacted]

Street Address 40 Waterview Drive **City** Shelton **State** CT **Zip** 06484

Please indicate organization represented (if any) Hubbell Incorporated

1. (a) Title of NFPA Standard National Electrical Code® **NFPA No. & Year** 70 - 2020

(b) Section/Paragraph 110.21(A)(1)

2. Public Input Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposed Text of Public Input (include proposed new or revised wording, or identification of wording to be deleted):
[Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

110.21(A)(1) General.

The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the factory fabrication, factory assembly, and commercial availability for field installation of the new product can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall ~~provided~~ applied or affixed onto electrical equipment as specified elsewhere in this *Code*. The marking or label shall be of sufficient durability to withstand the environment involved.

4. Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

In accordance with NFPA Standards Council Decision D#11-7 (specifically March 2010 Standards Council Minute Item 10-3-21), the NEC® serves as "a specification of the material and process associated with putting equipment in place and making it ready for use in accordance with performance requirements".

This Public Input seeks to associate the manufacturer as being the organization SPECIFICALLY responsible for FACTORY-FABRICATION, FACTORY-ASSEMBLY, and the COMMERCIAL AVAILABILITY of safe electrical products that are ready-for-use once properly installed. As presently worded in 110.21(A)(1) and in the context of 110.21(A)(2)'s wording for possible future reconditioning, however, the manufacturer now is implied as having unspecified, everlasting, all-encompassing omnipotence over products, until "world without end. Amen."

Until the 2017 addition of 110.21(A)(2) to address marking responsibilities of equipment reconditioners, there was really no implicit timeline beyond NEWLY INSTALLED in the 110.21(A)(1) phrase "organization responsible for the product". With that 2017 addition of 110.21(A)(2)'s phrase "organization responsible for reconditioning", however, there is now an implicit timeline imposed that could be misconstrued to mean that manufacturers have a MANDATED de facto responsibility overall UNTIL some future reconditioning MIGHT occur. For those CONSENSUS product safety standards that DO impose some minimum number of operational cycles, this implicit timeline extending to some nebulous FUTURE reconditioning could be misconstrued to argue that those standards' minimum operational cycles are effectively negated and extended to some expectation or misinterpretation to some extrapolated number of operational cycles or years of life.

Once a product is installed in accordance with requirements of the NEC® and with the original manufacturer's instructions and effectively transferred in ownership to the facility, the Code does not address whatsoever (NOR SHOULD IT) the manufacturer's warranty or other discretionary commercial considerations, or non-Code-related manufacturers' contractual, litigation or legislated responsibilities associated with new products ready-to-be-installed.

If related Public Input No. 1942 is accepted, the first sentence can be shortened to read as: “The name, trademark, of other descriptive mark of the new product’s manufacturer shall be placed on all electrical equipment “

5. Copyright Assignment

(a) ☒ **I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.**

(b) ☐ **Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows:** (please identify which material and provide complete information on its source)

I hereby grant and assign to the NFPA all and full rights in copyright in this Public Input (including both the Proposed Text and the Statement of Problem and Substantiation). I understand that I acquire no rights in any publication of NFPA in which this Public Input in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this assignment.

Signature (Required) [redacted]

PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To: Secretary, Standards Council National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

9/17/2020

Public Input No. 4028-NFPA 70-2020 [Section No. 110.21(A)(1)]

(1) General.

The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electrical equipment. ~~Other markings that indicate~~

Electrical ratings, as applicable to individual equipment, devices and materials, including but not limited to; voltage, current, wattage, interrupt rating, etc., shall be permanently attached as a nameplate, tag or other

~~ratings shall be provided as~~

permanent marking, unless exempted otherwise as specified elsewhere in this Code. Power distribution equipment rated for amperage or interrupting duty shall have the ratings (nameplate or other markings) in such a manner so as to be visible after installation; or if impracticable, visible in such a manner to minimize hazardous exposure to energized components.

Specific electrical ratings, manufacturer model criteria, or other distinctive special characteristics may be required where specified elsewhere in this Code . Model criteria and distinctive special characteristics, which informs to the application of use, may be included as an optional marking, unless specified otherwise in Code. The legibility permanence of the marking , label or

~~label~~

tag shall be of sufficient durability to withstand the environment involved , appropriate to the design life intended for the equipment, device or material .

Informational Note 1: refer to definition for "identified" for associated requirements pertaining to the terms and conditions of equipment, devices and materials to be suitable to the use.

Informational Note 2: specific ratings may be disallowed in Code, such as the cable voltage rating for select communication cables in Chapter 800.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION: 110.21(A)(1) only requires the manufacturer's name/trademark to be on electrical equipment categorically. However, manufacturer equipment ratings are not categorically required for electrical equipment. It is only a requirement where specified elsewhere in this code. Yet such requirements for a nameplate or other ratings are not present in many unexpected applications.

Some may argue a potential explanation for this apparent set of omissions, that the requirement is covered by other means of code text. For certain applications or equipment categories, the code has at times made requirements for equipment and materials to be "identified" for the use, either generally, or for an aspect of specific use. But the intent of the term "identified" has latitude and can be qualified by any manner of published documentation about the item. Hence this approach to dismiss whether there are omissions of nameplate requirements, because of "identification" requirements, fails to appreciate that at best, "identification" requirements only manifest compliance as nameplates or markings intermittently, and not because code mandates it.

Where is the 'identification' documentation to be readily located when the topic of electrical ratings for a specific item of existing electrical equipment is to be revisited for integrity duties? How is such documentation to be relied upon to inform tasks with existing distribution equipment that may include re-design with load changes, or electrical studies necessary to qualify fault bracing equipment duty, or arc flash calculations. If this method is to be relied upon as adequate for the on-going safety and reliability of power distribution equipment, would it not be prudent to treat such documentation, at least in certain cases or importance factors, with special considerations as regards NEC's general requirements? For example, nowhere in code is generator paralleling gear required to have a nameplate. Alternatively, to reliance upon 'identification' means, such electrical ratings criteria can instead be assuredly required by code, even

generally, to be marked onto the equipment as a default premise. This base premise requirement for ratings nameplates (or markings) can then be modified otherwise, as warranted for specific applications.

NEC citations for equipment that specifically requires a ratings nameplate or other ratings marking include: Plug Fuses And Fuse Holders 240.50(B); Plug Fuses And Fuse Holders <15A 240.50(C); Cartridge Fuses 240.60(C); Circuit Breakers 240.83; Conductors 310.8(A)&(B); MV Cable 311.16(A); Busway (368.120); Cablebus (370.120); Flex Cord And Cable 400.6(A); 1-Pole Locking Connector 406.13 (A-D); Panelboards 408.58; Industrial Control Panels 409.110; Luminaires 410.74(A); Luminaire power supply components 410.74(B); Appliances 422.60(A)&(B); Cables of Space Heating Systems 424.35; Electrode Boiler MCA 424.82; Electrode/Fixed-Resistance Heating elements 425.29; Electrode Boiler 424.86; Electric Heating Panels 424.92; Fixed Industrial Electrode Boiler 425.86; Fixed Snow Melt Heating Elements 426.25; Pipe & Vessel Heating Elements 427.20; Motors and Multimotor Equipment 430.7; Motor Controller 430.8; ACR Hermetic Motor-Compressor 440.4(A); Generators 445.44; Transformers 450.11; Capacitors 450.12; Equipment Over 1000 Volts 490.21(A)(3); Hazardous Location Equipment 500.8; Zone 0, 1, 2; Equipment Suitability 505.9; Zone 0, 1, 2; Extra Safe Motor & Controller 505.22; Motion Picture Projection Room Equipment 540.21; Sign Lighting And Outline Systems 600.4(A); Cranes And Hoists 610.14(G); Elevator Motor Controller; Short Circuit 620.16(A); Electric Welder 630.14; I.T. Equipment 645.16; Modular Data Center Equipment 646.5; Induction/Dielectric Heating Equipment 665.27; Industrial Machinery; 670.3(A); Irrigation Machine Control Panel 675.6; Electric Pool Lift; 680.85; Fuel Cell Power Source 692.53; Energy Storage System 706.4; Class 1,2 & 3 PLTC Elec Circuit Protection System 725.179; ITC Cable; 727.7; and Fire Rated Cable Grounding Conductor 728.60.

There are no Code requirements yet identified for a ratings nameplate or other ratings marking for the following applications of electrical equipment.

- Disconnecting means must be marked for purpose, and readily indicate open or closed status, and show series ratings if any, but no requirement for general manufacturer ratings such as for voltage, current, or interrupt rating; this includes bus disconnects.

- Meter-mounted transfer switches must have certain ratings, must be listed and must even have certain text markings, but there is not a requirement for a ratings nameplate.

- Aside from medium voltage which has a nameplate requirement categorically, per 490.21(A)(3), service equipment must be marked that it is service equipment, but has no requirement for a ratings nameplate.

- A surge protective device must be listed and have a short circuit rating but has no requirement for a ratings nameplate.

- Listed cord-and-plug double-insulated tools and equipment shall be marked that they're double insulated but have no nameplate requirement, except where categorized as an appliance; because appliances categorically require a nameplate.

SIDEBAR: if you perceive that a nameplate requirement is inferred from a listing requirement, it isn't; even a marking that tells of merely the listing itself (apart from ratings) is not required to be marked onto equipment unless specifically required in Code.

- Instrument transformers have no requirement for a marking of ratings.

- Outdoor auxiliary gutters must be listed for sun and weather exposure, and for ambient temperature, yet the only marking required is for the temperature rating of the conductors installed within.

- Cellular concrete floor raceways have no requirement for a marking of ratings. The application does make it difficult after install, unless it was able to be observed from the access point(s).

- Cellular metal floor raceways (Article 374) and other metal wireways (Article 376) have no requirement for a marking of ratings.

- Nonmetallic raceways (Article 378) must only be marked for cross-sectional area and limited smoke.

- Nonmetallic raceway extensions (Article 382) must be marked for all the conductor marking requirements of 310.8(A), plus: material of conductors maximum temperature rating, and ampacity.

- Strut-type channel raceway (Article 384), Surface Metal Raceways (Article 386), Surface Nonmetallic Raceways (Article 388), Underfloor Raceways (Article 390), Cable Trays (Article 392), and Low-Voltage

Suspended Ceiling Power Distribution Systems (Article 394), all have no requirement for a marking of ratings.

- Switchboards, Switchgear, and Panelboards are encompassed together in Article 384, but only panelboards have a requirement for a marking of ratings (408.58). Switchboards and Switchgear have no requirement for a nameplate marking of ratings. With the caveat that medium voltage switchgear applications do have a requirement for a nameplate marking of ratings.

- Low-Voltage Lighting (Article 411), Phase Converters (Article 455), and Resistors and Reactors (Article 470), all have no requirement for a marking of ratings.

- Storage Batteries (Article 480) have no requirement for a marking of ratings on the battery equipment itself. However, the battery voltage must be field marked close by the battery.

- Electrical equipment associated specifically to Commercial Garages, Repair and Storage (Article 511), Aircraft Hangars (Article 513), Motor Fuel Dispensing Facilities (Article 514), Bulk Storage Plants (Article 515), and Spray Applications (Article 516), that is not already encompassed by the requirements for hazardous applications or other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings. Similarly, for Health Care Facilities (Article 517), Assembly Occupancies (Article), Theater type Occupancies (Article 520), Amusement Facilities (Article 522), Carnival type facilities (Article 525), TV Studio type facilities, along with the applications of Articles; 545, 547, 550, 551, 552, 555, and 590.

- Manufactured Wiring Systems (Article 604) are to mark the type of cable, flexible cord, or conduit per 604.100(B); but no other ratings nameplate or markings are required.

- Electrical equipment associated specifically to Office Furnishings (Article 605), Elevator and Escalator class of equipment (Article 620), Electric Vehicle Power Transfer System (Article 625), Electrified Truck Parking Spaces (Article 626), Audio processing (Article 640), Sensitive Electronic Equipment (Article 647), Pipe Organs (Article 605), X-ray Equipment (Article 660), Electrolytic Cells (Article 668), Electroplating (Article 669), Body of Water applications (Article 682), Integrated Electrical Systems (Article 685), Solar Photovoltaic Systems (Article 690), Large-Scale Photovoltaic Electric Supply Stations (Article 691), and Wind Electric Systems (Article 694), that is not already encompassed by the other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings.

- Electrical equipment associated specifically to Emergency Systems (Article 700), Legally Required Standby Systems (Article 701), Optional Standby Systems (Article 702), Interconnected Electric Power Production Sources (Article 705), Critical Operations Power Systems (Article 708), Stand-Alone Systems (Article 710), Direct Current Microgrids (Article 712), Circuits and Equipment Operating at Less Than 50 Volts (Article 720), Energy Management Systems (Article 750), and Fire Alarm Systems (Article 760), that is not already encompassed by the other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings.

- Electrical equipment associated specifically to General Requirements for Communications Systems (Article 800), Communications Circuits (Article 805), Radio and Television Equipment (Article 810), Community Antenna Television and Radio Distribution Systems (Article 820), Network-Powered Broadband Communications Systems (Article 830), and Premises-Powered Broadband Communications Systems (Article 840), that is not already encompassed by the other NEC nameplate requirements identified above, has no requirement for a nameplate marking of the equipment ratings.

SIDEBAR: the above bulleted list of applications, of equipment that has no Code requirement for a nameplate marking of the equipment ratings, is not an all-inclusive list.

Where agreed that there are electrical rating nameplates that are not yet required in code text as appropriate for select equipment, code revision is warranted to resolve the disparity. One simple and functional way is to accomplish the revision is a general requirement for ratings, where appropriate to generalization. This achieves a base standard for nameplate requirements. Distinctive variations may be amended to the base requirements by including a caveat that gives opportunity for "other code text" to outline the terms for exemptions, exclusions, and supplemental required information. Other code text will still remain suitable for when non-standard electrical ratings for a nameplate or marking are to be identified specifically. One example of benefit is that interrupt ratings are often required but are not as often attended by a requirement for that rating to be marked onto the equipment.

Durability, permanence, and legibility of labels, signs, nameplates, marks and tags are dealt with

inconsistently throughout the code case-by-case. Oftentimes such considerations are reserved for "warning" signs and such, such as all code text that 110.16 is referenced. What is to stop a manufacturer from claiming code compliance by deploying a paper nameplate label whose glue may fail half way through the equipment's projected life cycle, so that the label easily separates from the equipment, attributed perhaps to a modestly humid environment? Generalized consistency in code for all such kinds of applications may provide improvement of standardizations on the topic. Requirements may best be addressed generally for all equipment, devices and materials associated with electrical applications, not just for 'warning' signs. Aren't most all labels, signs, nameplates, marks and tags, that the code makes a point to require, also worthy of permanence, legibility, and durability?

Another consideration related to this topic of rating nameplates is reconditioned equipment. The advance of Code changes regarding reconditioned equipment is perhaps due a backcheck. The question to consider is whether or not the reconditioned equipment is to have had a ratings nameplate prior to reconditioning. Where there exists an original nameplate from when the equipment was manufactured new. Such a nameplate requirement could, or perhaps should, play a factor in safe practices; as regards the boundaries of such guidance yet to be outlined in Code permitting reconditioning.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4035-NFPA 70-2020 [Global Input]	similar topic
Public Input No. 4035-NFPA 70-2020 [Global Input]	
Public Input No. 4276-NFPA 70-2020 [Section No. 110.21(A)(2)]	

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
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City:
State:
Zip:
Submittal Date: Wed Sep 09 18:13:07 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Section 110.21(A)(1) covers general markings for equipment. As stated “other markings shall be provided as specified elsewhere in the Code”. Marking for specific equipment should be addressed in product standards and applicable Articles and Sections in the Code.

Public Input No. 1810-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning. Other markings that indicate voltage, current, wattage, or other ratings shall be maintained from the original equipment label required by 110.21(A)(1), or the reconditioner shall newly remark, re-apply or re-affix identical ratings onto the reconditioned electrical equipment. The reconditioner's marking or label shall be of sufficient durability to withstand the environment involved.

Reconditioned equipment shall be identified as “reconditioned” and the original listing mark ~~removed. Approval of the reconditioned equipment~~ shall ~~not be based solely on the equipment's original listing.~~ be removed.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: ~~Industry standards are available for application of reconditioned and refurbished equipment.~~ ~~Informational Note No. 2:~~ The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 2: If reconditioning is conducted by other than the original manufacturer or by other than an agent authorized by the organization originally responsible for the product, the organization responsible for the reconditioning is considered to be responsible for the product regardless of whether the original manufacturer's name, trademark, or other descriptive marking specified in 110.21(A)(1) remains.

Informational Note No. 3: The removal of the original listing mark may ~~include the~~ entail solely the mark of the certifying body and not removal of the entire equipment label.

Additional Proposed Changes

File Name	Description	Approved
Public_Input_No._1810-NFPA_70-2020_Section_110.21_A_2_.docx	Clean MSWord DOCX copy of this Public Input No. 1810 WITHOUT TerraView alteration of the Submitter's intent	

Statement of Problem and Substantiation for Public Input

See the uploaded attachment of a manual entry of this Public Input with text content that hasn't been Terrarized and is consequently readable.

.

The second sentence of the second paragraph of 110.21(A)(2) has nothing whatsoever to do with markings but does relate directly to examination for consideration of approval. Consequently, this requirement is deleted here and relocated (by related Public Input 1809) as the new last paragraph of 110.3(A). Accordingly, Informational Note No. 1 of 110.21(A)(2) is deleted here and relocated as new Informational Note No. 3 of 110.3(A).

.

The original 110.21(A)(1) ratings mandated to appear on the original equipment label or markings are presently overlooked in 110.21(A)(2). This Public Input mandates that those ratings be maintained identically on the original label or marking or be restored identically by the reconditioner.

.

Informational Note No. 3 of 110.21(A)(2) as worded is ambiguous. The use of “may include” can be misinterpreted that the ORIGINAL LISTING MARK permissively can be encompassed as part of an entire equipment label and, consequently, as the NEGATION of the mandatory “removed” requirement.

Accordingly, the Note is reworded in this Public Input to differentiate between the original listing mark versus its removal, and to clarify the Note's intent.

.

New Informational Note No. 2 of 110.21(A)(2) is added to mitigate the all-encompassing phrase in 110.21(A)(1) "the organization responsible for the product". Once an independent reconditioner modifies that product in any way, shape or form, the original manufacturer cannot be held responsible for that product, as expressed in 110.21(A)(1).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	Related clarification of the definition "Reconditioned"
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	Correlated revisions
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	Affiliated revisions
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	Affiliated addition of new definition "Manufacturer"
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	Affiliated revisions
Public Input No. 1790-NFPA 70-2020 [Definition: Reconditioned.]	
Public Input No. 1809-NFPA 70-2020 [Section No. 110.3(A)]	
Public Input No. 1940-NFPA 70-2020 [Section No. 110.21(A)(1)]	
Public Input No. 1941-NFPA 70-2020 [Section No. 90.7]	
Public Input No. 1942-NFPA 70-2020 [New Definition after Definition: Luminaire.]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jul 08 10:13:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8577-NFPA 70-2021

Statement: The first sentence is reorganized in a list including the equipment to be identified as "reconditioned". The second paragraph clarifies that the original listing mark may either be removed or made "permanently illegible".

The term "equipment is not needed, and is removed from the statement.

These proposed changes provide clarity and usability with regards to marking requirements by including the organization that performed the reconditioning and providing clarification on the removal of the original listing mark. Informational Note No. 3 was deleted as it was no longer necessary.

NFPA Public Input Form

NOTE: All Public Input must be received by 5:00 pm EST/EDST on the published Public Input Closing Date.

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For technical assistance, please call NFPA at 1-800-344-3555

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Log #:

Date Rec'd:

Date 2020-July-04 **Name** Brian E. Rock **Tel. No.** [redacted]

Company Hubbell Incorporated **Email** [redacted]

Street Address 40 Waterview Drive **City** Shelton **State** CT **Zip** 06484

Please indicate organization represented (if any) Hubbell Incorporated

1. (a) Title of NFPA Standard National Electrical Code® **NFPA No. & Year** 70 - 2020

(b) Section/Paragraph 110.21(A)(2)

2. Public Input Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposed Text of Public Input (include proposed new or revised wording, or identification of wording to be deleted):
[Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

110.21(A)(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning. Other markings that indicate voltage, current, wattage, or other ratings shall be maintained from the original equipment label required by 110.21(A)(1), or the reconditioner shall newly remark, re-apply or re-affix identical ratings onto the reconditioned electrical equipment. The reconditioner's marking or label shall be of sufficient durability to withstand the environment involved.

Reconditioned equipment shall be identified as "reconditioned" and the original listing mark shall be removed. ~~Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.~~

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

~~Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.~~

Informational Note No. ~~2~~ 1: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 2: If reconditioning is conducted by other than the original manufacturer or by other than an agent authorized by the organization originally responsible for the product, the organization responsible for reconditioning the electrical equipment is considered to be responsible for the product regardless of whether the original manufacturer's name, trademark, or other descriptive marking specified in 110.21(A)(1) remains visible.

Informational Note No. 3: The removal of the original listing mark may ~~include~~ entail solely the mark of the certifying body and not removal of the entire equipment label.

4. Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

The second sentence of the second paragraph of 110.21(A)(2) has nothing whatsoever to do with markings but does relate directly to examination for consideration of approval. Consequently, this requirement is deleted here and relocated (by related Public Input 1809) as the new last paragraph of 110.3(A). Accordingly, Informational Note No. 1 of 110.21(A)(2) is deleted here and relocated as new Informational Note No. 3 of 110.3(A).

The original 110.21(A)(1) ratings mandated to appear on the original equipment label or markings are presently overlooked in 110.21(A)(2). This Public Input mandates that those ratings be maintained identically on the original label or marking or be restored identically by the reconditioner.

Informational Note No. 3 of 110.21(A)(2) as worded is ambiguous. The use of “may include” can be misinterpreted that the ORIGINAL LISTING MARK permissively can be encompassed as part of an entire equipment label and, consequently, as the NEGATION of the mandatory “removed” requirement. Accordingly, the Note is reworded in this Public Input to differentiate between the original listing mark versus its removal, and to clarify the Note’s intent.

New Informational Note No. 2 of 110.21(A)(2) is added to mitigate the all-encompassing phrase in 110.21(A)(1) “the organization responsible for the product”. Once an independent reconditioner modifies that product in any way, shape or form, the original manufacturer cannot be held responsible for that product, as expressed in 110.21(A)(1).

5. Copyright Assignment

(a) ☒ I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.

(b) ☐ Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

I hereby grant and assign to the NFPA all and full rights in copyright in this Public Input (including both the Proposed Text and the Statement of Problem and Substantiation). I understand that I acquire no rights in any publication of NFPA in which this Public Input in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this assignment.

Signature (Required) 

PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To: Secretary, Standards Council National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

9/16/2020

Public Input No. 2047-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Reconditioned equipment shall be identified as “reconditioned” and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment’s original listing.

Exception: In ~~industrial occupancies~~ controlled access locations , where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

Statement of Problem and Substantiation for Public Input

This exception shouldn't be limited to industrial locations. It should apply to any location that has controlled access where only trained workers are able to service the installation. The Department of Energy facilities, for example, are not necessarily "industrial" but have extremely strict rules for working on the premises. The contractors must undergo extensive training, work packages must be created, means and methods must all be approved. This is part of a series of proposals to change "industrial locations/premises/occupancies /wiring-systems/..." to "controlled access locations."

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2048-NFPA 70-2020 [Section No. 110.24(B)]	
Public Input No. 2049-NFPA 70-2020 [Section No. 110.70]	
Public Input No. 2050-NFPA 70-2020 [Section No. 210.8(B)]	
Public Input No. 2051-NFPA 70-2020 [Section No. 210.8(B)]	
Public Input No. 2052-NFPA 70-2020 [Section No. 210.9]	
Public Input No. 2053-NFPA 70-2020 [Section No. 210.18]	
Public Input No. 2054-NFPA 70-2020 [Section No. 215.11]	
Public Input No. 2087-NFPA 70-2020 [Section No. 225.37]	
Public Input No. 2088-NFPA 70-2020 [Section No. 225.52(A)]	
Public Input No. 2090-NFPA 70-2020 [Section No. 230.205(C)]	
Public Input No. 2091-NFPA 70-2020 [Section No. 240.21(C)(3)]	
Public Input No. 2092-NFPA 70-2020 [Section No. 300.50(A) [Excluding any Sub-Sections]]	
Public Input No. 2093-NFPA 70-2020 [Section No. 336.10]	
Public Input No. 2094-NFPA 70-2020 [Section No. 368.56(B)]	

Submitter Information Verification

Submitter Full Name: Eric Stromberg
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Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 17:41:36 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate substantiation to justify the change. The term “controlled access locations” is too broad and unclear.

Public Input No. 3169-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the ~~name~~ following:

a) Name , trademark, or other descriptive marking ~~by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date~~ of the organization that performed the reconditioning.

b) The date of the reconditioning.~~Reconditioned equipment shall be identified as "reconditioned" and the~~

c) The term "reconditioned" or other approved wording or symbol indicating that the equipment has been reconditioned.

The original listing mark shall be removed ~~. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing~~ or made permanently illegible. The equipment nameplate shall not be required to be removed or made permanently illegible, only the part of the nameplate that includes the listing mark, if applicable .

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: ~~Industry standards~~ ANSI approved S tandards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured* even though these are sometimes different processes .

Informational Note No. 3: ~~The original listing mark may include the mark~~ Approval of the ~~certifying body and not the entire equipment label~~ reconditioned equipment may not be based solely on the original listing .

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of the task group formed in accordance with the direction of the NFPA Standards Council in Decision D#19-11. This task group was appointed to identify potential proposed changes to the 2020 edition of the NEC in the form of proposed Tentative Interim Amendments (TIAs) or to the 2023 edition of the NEC in the form of Public Inputs (PIs) that are within the Task Group's scope of activity as specified by the Standards Council.

These proposed Public Inputs relate to requirements covering the use of reconditioned electrical equipment throughout the NEC as a coordinated set of new or revised requirements. These Public Inputs should not be misconstrued by the CMPs as precluding equal consideration of other Public Inputs, with supporting information, submitted now or in the future by individuals.

The task group members are: G. Scott Harding (Chair), Tom Bishop, Casey Blevins, John Catlett, Dave Dagenais, James Dollard, Robert Fahey, Paul Grein, Howard Herndon, David Hittinger, Christel Hunter, Bob Jordan, David Kendall, Dave King, Jack Lyons, Ryan McClarnon, Robert Osborne, Chris Paxton, David Rosenfield, Michael Savage, Bill Schofield and Ron Widup. This task group of balanced interests provided the expertise to develop these public inputs. Multiple sub task groups were set up during the process with the results of the sub task group work shared with and voted on by the full task group.
Public Inputs are being submitted as follows:

- Revised to Article 100 definition of Reconditioned
- Revisions to Sections 110.21(A)(2), 240.88 and 210.15(3)
- New requirements/Sections 110.17, 110.20, 430.3 and 445.3

Section 110.21(A)(2)

The first sentence is restructured into a list, and the requirement that the equipment be identified as "reconditioned" is relocated from the second sentence to this list as part of the required markings (intentionally avoiding the term "identified", as it is a defined term that does not apply in this application as defined in Article 100).

The second paragraph is revised to provide an option that the original listing mark shall either be 1) removed (existing requirement), or 2) "made permanently illegible" (new option).

Recognizing that the original listing mark is removed, the statement that the "Approval of the reconditioned equipment shall not be based solely on the equipment's original listing" is no longer needed; however, the concept is still considered sufficiently important and should not be overlooked. To ensure this concept is understood, the statement is relocated to Informational Note No. 3. The term "equipment's" is not needed, and is removed from the statement.

The information from Informational Note No. 3 (2020 Edition) has been deemed sufficiently important to have that information relocated to the second paragraph of 110.21(A)(2) and written in the form of a requirement. The wording is modified to refer to the "listing mark" rather than the "mark of the certifying body", keeping the wording consistent with the rest of the Section and not introducing the phrase "certifying body".

Rather than referring to a broad term of "Industry Standards", Informational Note. No. 1 now acknowledges that "ANSI approved" standards are available. This is consistent with other references in the NEC® to "ANSI approved standards," and has the benefit of identifying "ANSI" consensus status, while not limiting the standard to a specific document or specific Standard Development Organization (SDO).

Informational Note. No. 2 is expanded to include additional text that has been recommended by the Task Group for the definition of "Reconditioned".

Submitter Information Verification

Submitter Full Name: G. Scott Harding
Organization: F. B. Harding, Inc.
Affiliation: Independent Electrical Contractors
Street Address:
City:
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Zip:
Submittal Date: Sun Sep 06 14:03:02 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8577-NFPA 70-2021

Statement: The first sentence is reorganized in a list including the equipment to be identified as "reconditioned". The second paragraph clarifies that the original listing mark may either be removed or made "permanently illegible".

The term "equipment is not needed, and is removed from the statement.

These proposed changes provide clarity and usability with regards to marking requirements by including the organization that performed the reconditioning and providing clarification on the removal of the original listing mark. Informational Note No. 3 was deleted as it was no longer necessary.

Public Input No. 3559-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Reconditioned equipment shall be identified as "reconditioned"~~ and the original listing mark removed .~~ ~~Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.~~

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

~~Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.~~

Statement of Problem and Substantiation for Public Input

The requirement to remove the original listing mark from "reconditioned equipment" was a controversial change introduced in the last cycle. As stated in my negative ballot comments, preserving the original listing mark along with the additional reconditioning markings preserve important history of the equipment - for the life of the equipment. Often the listing mark is on an equipment tag or label that includes original manufacturer's information, conditions of use and equipment ratings. This information is vital to maintain for the life of the equipment. The addition of Note 3 does not prevent the removal of the entire label, which includes this important original information.

The new phrase "Approval of the reconditioned equipment shall not be based solely on the equipment's original listing" is written as a negative and is impossible for the user to understand what the approval shall be based on. This phrase should be deleted because it presently adds no value to the section, or re-written as positive language to help the user of the Code understand the intended requirement.

Submitter Information Verification

Submitter Full Name: Louis Barrios
Organization: Shell Global Solutions
Affiliation: American Chemistry Council (ACC)
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 22:40:39 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: When the manufacturer places a listing or certification mark on the equipment at the factory, it

is their attestation that the equipment complies with the applicable requirements. When equipment is reconditioned, and the manufacturer cannot ascertain that the equipment continues to comply with applicable product standards, then further oversight or review/inspection (field evaluation) is needed.

Public Input No. 4276-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Prior listing mark(s) shall be removed, except when the reconditioning is in full compliance to the terms of the original listings' requirements. Reconditioned equipment shall be identified as "reconditioned" and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.

A ratings nameplate shall be provided on equipment where required by Code for non-reconditioned equipment. Published equipment ratings of the original equipment manufacturer shall be reviewed for validity as part of the recondition process. If any ratings criteria represented on a prior nameplate, which was on the equipment prior to being reconditioned, is invalid or otherwise changed as part of the reconditioning, or for other reason(s), then a new nameplate shall be installed at or near the location of the prior nameplate. When a ratings nameplate is provided with the recondition, it shall include the identification of the original manufacturer, where known, and shall include the identification of the reconditioning organization(s), along with the date of reconditioning.

The legibility permanence of the marking, label or tag shall be of sufficient durability to withstand the environment involved, appropriate to the design life intended for the equipment.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

Statement of Problem and Substantiation for Public Input

BASIS FOR CODE REVISION: 110.21(A)(2) only requires the reconditioning organization's name/trademark on the equipment. A manufacturer equipment ratings nameplate is not categorically required for reconditioned electrical equipment. And if it already had a nameplate on the equipment prior to reconditioning, there is no requirement to validate, nor a requirement to remove the pre-existing nameplate if now invalid, except for the application of 708.8(B) which says prior NRTL Listing marks shall be removed. There is no requirement for any reconditioning labels or other markings to be legible, durable, or permanent.

The Code text "…approval of the reconditioned equipment shall not be based solely on the equipment's original listing" infers that all equipment that may be allowed to be reconditioned must first have been listed. If this is the intent, then such a requirement should be stated more clearly, or else the Code text revised to clarify some alternate intent.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4028-NFPA 70-2020 [Section No. 110.21(A)(1)]	similar topic
Public Input No. 4035-NFPA 70-2020 [Global Input]	similar topic

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 09:06:16 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The PI is confusing in that it allows the listing mark to remain on the equipment, provided the equipment is in compliance with the original listing requirements, yet the second sentence requires the listing mark to be removed for all reconditioned equipment. It is also unclear as to who will make the determination on compliance with the requirements of the original listing mark. Compliance with listing mark requirements is the responsibility of the Qualified Testing Laboratory, not the organization that reconditioned the equipment or the AHJ.

Public Input No. 4496-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Reconditioned equipment shall be identified as “reconditioned” and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment’s original listing.

Exception 1 : In industrial, healthcare, and ambulatory healthcare occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Exception 2: Where the installed refurbished equipment meets the minimum testing requirements of other ANSI certified reconditioning standards, the original listing mark shall not be required to be removed.

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

Statement of Problem and Substantiation for Public Input

Healthcare facilities are critical. There are numerous circumstances when new equipment/parts can't be purchased. Several healthcare facilities operate with internal licensed electricians performing the work.

There are other ASNI accredited standards that handle reconditioning of electrical equipment. Several of reconditioning requirements inserted into the 2020 edition of NFPA 70 conflicted other standards. This needs reconciliation.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 228-NFPA 70-2019 [Section No. 408.8(B)]	
Public Input No. 4508-NFPA 70-2020 [Section No. 240.88 [Excluding any Sub-Sections]]	
Public Input No. 4513-NFPA 70-2020 [Section No. 408.8(A)]	
Public Input No. 4517-NFPA 70-2020 [Section No. 490.49]	
Public Input No. 4518-NFPA 70-2020 [New Section after 517.1]	
Public Input No. 4524-NFPA 70-2020 [Section No. 695.10]	
Public Input No. 4526-NFPA 70-2020 [Section No. 700.5(C)]	
Public Input No. 4528-NFPA 70-2020 [Section No. 701.5(C)]	
Public Input No. 4529-NFPA 70-2020 [Section No. 702.5(A)]	
Public Input No. 4531-NFPA 70-2020 [Section No. 708.24(A)]	

Submitter Information Verification

Submitter Full Name: Joshua Brackett

Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 14:15:10 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This proposed change to add Exception 1 may be better addressed by CMP-15, who is responsible for Article 517. The recommended Exception 2 is resolved because compliance with listing mark requirements is the responsibility of the Qualified Testing Laboratory, not the organization that reconditioned the equipment or the AHJ.

Public Input No. 843-NFPA 70-2020 [Section No. 110.21(A)(2)]

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning.

Reconditioned equipment shall be identified as “reconditioned” and the original listing mark removed. Approval of the reconditioned equipment shall not be based solely on the equipment’s original listing.

~~*Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.*~~

Informational Note No. 1: Industry standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

Statement of Problem and Substantiation for Public Input

Regular maintenance is not reconditioning, as defined in Article 100. This exception "removes" a requirement that does not exist, because marking is not required for equipment that has been "maintained."

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Wed Apr 08 12:26:03 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Industrial occupancies may regularly maintain, including reconditioning equipment, as part of a regular maintenance cycle for safety and reliability. Providing company name and trademark labels on equipment that is regularly maintained and/or reconditioned by the owner/operator as part of a regular maintenance program does not enhance the traceability of the work or improve the safety of the installation. The Exception provides clarity and is needed for industrial occupancies.

Public Input No. 1878-NFPA 70-2020 [Section No. 110.21(B)]

(B) Field-Applied Hazard Markings.

Where caution, warning, or danger signs or labels are required by this *Code*, the labels shall meet the following requirements:

(1) The marking shall warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

(2) The label shall be permanently affixed to the equipment or wiring method and shall not be handwritten.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

(3) The label shall be of sufficient durability to withstand the environment involved.

(4) The markings shall be legible and permanent. The title text shall be a minimum of 6-mm (1⁄4-in.) high letters and body text shall be a minimum of 3-mm (1⁄8-in.) high letters on a contrasting background.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

Statement of Problem and Substantiation for Public Input

There are many requirements for warning signs. Some articles understand that some installers may have difficulty reading small print. Giving a minimum size (extracted from Article 690), is very important for the safety of the electrical installer.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
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City:
State:
Zip:
Submittal Date: Mon Jul 13 11:23:08 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter hasn't adequately substantiated that there is an issue with the letter height on Field Applied Hazard Markings. This PI proposes to specify minimum height of letters to ¼" (6mm) and body text to a minimum of 1/8" (3mm) for safety labels. ANSI Z535.4-2011(R2017) already specifies heights at 'Minimum Safe Viewing Distances' under favorable and unfavorable conditions (1-8 ft) e.g. 0.08" (2.032mm) from 1 foot.

Public Input No. 2401-NFPA 70-2020 [Section No. 110.21(B)]

(B) Field-~~Applied Hazard Markings~~ Applied Markings .

Where ~~caution, warning, or danger~~ signs or labels are required by this *Code*, the labels shall meet the following requirements:

(1) ~~The~~ Where caution, warning, or danger signs or labels are required by this Code, t he marking shall warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

(2) The label shall be permanently affixed to the equipment or wiring method and shall not be handwritten.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to ~~changes~~ change , shall be permitted to be handwritten using block script, not cursive, and shall be legible.

Informational Note: ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for the legibility of signs and labels for suitable font sizes and font styles.

(3) The label shall be of sufficient durability to withstand the environment involved.

Informational Note: ANSI Z535.4-2011, *Product Safety Signs and Labels*, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment.

Statement of Problem and Substantiation for Public Input

1) this paragraph 110.21(B) is cited by other parts of NEC, and sometimes only 110.21(B)(3) is cited; yet the label types are not necessarily a "Hazard Marking" but are only informational. At times code text describes required signage as a "warning" when it does not qualify as a "warning" per ANSI Z535.4-2011. For examples, refer to: 310.6(C), 311.14, 314.16(C)(2), 408.3(F)(1), 408.3(F)(2), 408.3(F)(3), 408.3(F)(4), 408.3(F)(5), 422.60(A)(2) and 430.102(A) among others.
2) The NEC invokes, by informational note, an abiding by the ANSI standard Z535.4 Sign and Label Requirements as in 110.16(B), 110.21(B). This standard reserves the use of the term "warning" to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury. Similarly, other terms in this standard have specific boundaries for use; danger, caution, notice, instruction. For consistency of code text, the word "warning" should be used only as appropriate.
3) The requirements of 110.21(B) for legibility, durability, and permanence should be applied to many other applications of labels and signs beyond those used for hazards. It may be applied generally, for good practice, as none of the requirements for labels and signs are meant to allow illegibility, or degradation due to the environment. Even when signage is meant to be temporary, there is usually an importance factor and a need to survive its environment for perhaps 6 months.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2356-NFPA 70-2020 [Section No. 430.102(A)]	related topic
Public Input No. 2341-NFPA 70-2020 [Section No. 430.113]	related topic
Public Input No. 2400-NFPA 70-2020 [Section No. 600.6(A)(2)]	related topic
Public Input No. 2356-NFPA 70-2020 [Section No. 430.102(A)]	
Public Input No. 2400-NFPA 70-2020 [Section No. 600.6(A)(2)]	

Submitter Information Verification

Submitter Full Name: John Blissett
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City:
State:
Zip:
Submittal Date: Wed Aug 19 09:49:37 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: ANSI Z535.4-2011(R2017) already clearly provides guidance for danger signs or labels using effective words, colors, symbols or any combination thereof. The sections referenced in the substantiation do not match the proposed changes.

Public Input No. 2962-NFPA 70-2020 [Section No. 110.21(B)]

(B) Field-Applied Hazard Markings.

Where caution, warning, or danger signs or labels are required by this *Code*, the sign or labels shall meet the following requirements:

(1) The ~~marking~~ sign or label shall warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note: ANSI Z535.4-2011 (R2017) , *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.

~~The label shall be permanently~~

(2)

ANSI Z535.2-2011 (R2017), *Environmental Facility and Safety Signs* , provides guidelines for the design, application, and use of safety signs in facilities and in the environment through consistent visual layout.

(3) Signs shall be permanently posted as required elsewhere in this Code. Labels shall be permanently affixed to the equipment or wiring method ~~and shall~~ . Signs or labels shall not be handwritten.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

(4) The sign or label shall be of sufficient durability to withstand the environment involved.

Informational Note: ANSI Z535.4-2011 (R2017) , *Product Safety Signs and Labels*, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment. ANSI 535.2-2011 (R2017), Environmental Facility and Safety Signs, provides guidelines for the design, application, and use of safety signs in facilities and in the environment through consistent visual layout.

Additional Proposed Changes

File Name	Description	Approved
110.21_B_rev_Holland_Aug.doc	NEMA 110.21(B)	

Statement of Problem and Substantiation for Public Input

The Informational Notes to this Section should also include a reference to ANSI Z535.2-2011 (R2017), Environmental Facility and Safety Signs where the Code references 110.21(B) for caution, warning, or danger signs required at facilities and in the environment and not necessarily on products which are covered under ANSI Z535.4-2011 (R2017), Product Safety Signs and Labels. Examples include 110.27(C), 110.34(C), and 555.10. These warning signs are intended to be posted at the entrances to rooms or on the facility premises.
The term “sign” has been added ahead the term “labels” in (B) and List Item #3 to indicate the rules apply to both signs and labels as intended by the section.
List Item #2 has been revised to address the different way signs and labels are installed. Signs are posted at entrances or on premises required by other sections of the code, as noted above, and labels are affixed to equipment or wiring methods. Both signs and labels should not be handwritten.
The reference to ANSI Z535.4-2011 has been revised to the most current edition which is (R2017).

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 14:16:40 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8580-NFPA 70-2021

Statement: The phrase “markings such as labels or signs” was added to recognize that labels and signs are ways to meet the marking requirements in 110.21 and reorganized for consistency.

The text of the existing Informational Note was removed as it appears twice and new Informational Note 1 was added with the reference to ANSI Z535.2-2011 (R2017), which describes the design, application and use of safety signs in facilities and in the environment.

The term “provides guidelines” was removed from the Informational Note and replaced with “details” since the Style Manual does not allow requirements in an Informational Note.

The changes better organize and provide more clarity to the section.

NFPA Public Input Form

NOTE: All Public Input must be received by 5:00 pm EST/EDST on the published Public Input Closing Date.

For further information on the standards-making process, please contact the Codes and Standards Administration at 617-984-7249 or visit www.nfpa.org/codes.

For technical assistance, please call NFPA at 1-800-344-3555

FOR OFFICE USE ONLY

Log #:

Date Rec'd:

Date **Name** Megan Hayes **Tel. No.** [redacted]

Company National Electrical Manufacturers Association (NEMA) **Email** [redacted]

Street Address 1300 North 17th Street, Suite 900 **City** Rosslyn **State** VA **Zip** 22209

Please indicate organization represented (if any) NEMA

1. (a) Title of NFPA Standard National Electical Code **NFPA No. & Year** 70 & 2023

(b) Section/Paragraph 110.21(B)

2. Public Input Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposed Text of Public Input (include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

(B) Field-Applied Hazard Markings. Where caution, warning, or danger signs or labels are required by this Code, the sign or labels shall meet the following requirements:

(1) The ~~marking~~ sign or label shall warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note: ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels. ANSI Z535.2-2011 (R2017), *Environmental Facility and Safety Signs*, provides guidelines for the design, application, and use of safety signs in facilities and in the environment through consistent visual layout.

(2) Signs shall be permanently posted as required elsewhere in this *Code*. ~~The label~~ Labels shall be permanently affixed to the equipment or wiring method. Signs and labels ~~and~~ shall not be handwritten.

Exception to (2): Portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

(3) The sign or label shall be of sufficient durability to withstand the environment involved.

Informational Note: ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment. ANSI Z535.2-2011 (R2017), *Environmental Facility and Safety Signs*, provides guidelines for the design, application, and use of safety signs in facilities and in the environment through consistent visual layout.

4. Statement of Problem and Substantiation for Public Input: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Public Input, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

The Informational Notes to this Section should also include a reference to ANSI Z535.2-2011 (R2017), *Environmental Facility and Safety Signs* where the Code references 110.21(B) for caution, warning, or danger signs required at facilities and in the environment and not necessarily on products which are covered under ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*. Examples include 110.27(C), 110.34(C), and 555.10. These warning signs are intended to be posted at the entrances to rooms or on the facility premises.

The term "sign" has been added ahead the term "labels" in (B) and List Item #3 to indicate the rules apply to both signs and labels as intended by the section.

List Item #2 has been revised to address the different way signs and labels are installed. Signs are posted at entrances or on premises required by other sections of the code, as noted above, and labels are affixed to equipment or wiring methods. Both signs and labels should not be handwritten.

The reference to ANSI Z535.4-2011 has been revised to the most current edition which is (R2017).

5. Copyright Assignment

(a) ☒ I am the author of the text or other material (such as illustrations, graphs) proposed in the Public Input.

(b) ☐ Some or all of the text or other material proposed in this Public Input was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

_____

I hereby grant and assign to the NFPA all and full rights in copyright in this Public Input (including both the Proposed Text and the Statement of Problem and Substantiation). I understand that I acquire no rights in any publication of NFPA in which this Public Input in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this assignment.

Signature (Required) _____

PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To: Secretary, Standards Council National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

Public Input No. 1877-NFPA 70-2020 [Section No. 110.22]

110.22 Identification of Disconnecting Means.

(A) General.

Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification of the circuit source that supplies the disconnecting means. The marking shall be of sufficient durability to withstand the environment involved.

The markings shall be legible and permanent, comply with 110.21 (B) , and the text shall be a minimum of 6-mm (1⁄4-in.) high letters and body text a minimum of 3-mm (1⁄8-in.) high letters on a contrasting background.

(B) Engineered Series Combination Systems.

Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems.

Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Informational Note: See IEEE 3004.5-2014 *Recommended Practice for the Application of Low-Voltage Circuit Breakers in Industrial and Commercial Power Systems*, for further information on series tested systems.

Statement of Problem and Substantiation for Public Input

There are many requirements for warning signs. Some articles understand that some installers may have difficulty reading small print. Giving a minimum size (extracted from Article 690), is very important for the safety of the electrical installer.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 13 11:21:06 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The recommendation for legibility and durability is already covered in 110.22 (A). The recommendation for contrasting background and text size have not been adequately substantiated.

Public Input No. 2009-NFPA 70-2020 [New Section after 110.22(A)]

TITLE OF NEW CONTENT

Exception. Circuit breakers installed in switchboards and panelboards and used as disconnecting mean shall not be required to be marked with their source of supply.

Statement of Problem and Substantiation for Public Input

It does not make any sense or add any value to require a circuit breaker installed in a panelboard or switchboard and used as a disconnect to be marked with its power source. There is limited marking space on this equipment and the proposed exception reduces the amount of marking required. 408.4(B) already requires the panelboard or switchboard board itself to be marked as to its source of supply.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jul 25 14:46:07 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The first line of Section 110.22(A) already clearly indicates that the Disconnecting Means does not need to be marked 'if located and arranged so the purpose is evident'. As such the proposed PI does not add any clarity.

Public Input No. 2342-NFPA 70-2020 [Section No. 110.22(A)]

(A) General.

Each disconnecting means shall be legibly marked in accordance with 110.22(A)(1) and (A)(2). The markings shall be of sufficient durability to withstand the environment involved.

(1) To indicate its purpose unless located and arranged so the purpose is evident.

(2) In other than one- or two-family dwellings, ~~the marking shall include the identification of the~~ to identify the circuit source that supplies the disconnecting means. ~~The marking shall be of sufficient durability to withstand the environment involved.~~

Statement of Problem and Substantiation for Public Input

As currently written the requirement to identify the circuit source supplying the disconnecting means only applies when the disconnecting means is located and arranged so the purpose is not evident. By revising the section as proposed, it will be clear there are two separate marking requirements and the identification of the source circuit, which promotes electrical safety by design, is required even if the purpose marking is not required.

Submitter Information Verification

Submitter Full Name: Mark Hilbert
Organization: MR Hilbert Electrical Inspections and Training
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 17 11:20:01 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Adequate substantiation has not been provided by the submitter to make the proposed change.

Public Input No. 2563-NFPA 70-2020 [Section No. 110.22(A)]

(A) General.

Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification and location of the circuit source that supplies the disconnecting means. The marking shall be of sufficient durability to withstand the environment involved.

Statement of Problem and Substantiation for Public Input

This input is being submitted on behalf of the Minnesota Department of Labor and Industry. The Department's 15 office/field staff, and 65 plus contract electrical inspectors complete over 150,000 electrical inspections annually and are involved in the daily enforcement and interpretation of the National Electrical Code.
The marking should denote the location of the power source disconnecting means. The current language states that the power source disconnecting means may be marked by panel name only, which gives no indication to the power source location. The location identification will help service personnel to quickly locate the power source disconnect providing a safer installation.

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 17:38:32 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8583-NFPA 70-2021
Statement: It will be very helpful if identification and location of circuit source is indicated especially in large and high-rise buildings e.g. schools, high rise multifamily and large commercial buildings (Walmart, Target, Costco etc.).

Public Input No. 363-NFPA 70-2020 [Section No. 110.22(A)]

(A)_ General.

Each disconnecting means ~~shall~~ in other than one and two famiy dwellingsl shall be legibly marked ~~to indicate its purpose unless located~~ to identify the location of the circuit supplying the disconnecting means.The marking shall also indicate the purpose unless location and arranged so the purpose is evident. ~~In other than one- or two-family dwellings, the marking shall include the identification of the circuit source that supplies the disconnecting means.~~ The marking shall be of sufficient durability to withstand the environment involved.

Statement of Problem and Substantiation for Public Input

The language added in the 2020 NEC was a good change, however the way the section is currently constructed implies that if the purpose of the disconnecting means is obvious then the marking requirement is not needed. As such, with the supply circuit language in the second sentence this important marking requirement would also not be required This proposed arrangement of the section would require the supply circuit identification regardless if the purpose of the disconnect is evident.

Submitter Information Verification

Submitter Full Name: Joe Bellantoni
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jan 25 09:52:16 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: Adequate technical substantiation was not provided by the submitter to accept this change. Present language as revised in NEC 2020 is clear. No clear substantiation was provided as to what will be achieved with this PI.

Public Input No. 3798-NFPA 70-2020 [Section No. 110.22(A)]

(A) General.

Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. ~~In other than one- or two-family dwellings, the marking shall include the identification of the circuit source that supplies the disconnecting means. The marking shall~~ The marking shall be of sufficient durability to withstand the environment involved.

Statement of Problem and Substantiation for Public Input

This requirement sounds great but doesn't really work. If it applies to every disconnect it cannot be satisfied. How do you mark disconnecting means like those required for the ballast of electric-discharge lighting? How do you label every circuit breaker in a panelboard? Why would I label a receptacle for a cord-and-plug-connected appliance?
If it applies only to those pieces of equipment whose function is not obvious (as described in this section), then the rule is pointless.
Again, this requirement seems to have merit, but making a rule that applies to ALL disconnecting means is far too broad.

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 13:03:03 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The PI proposes to include the marking requirement for Disconnecting Means for 1&2 Family Dwellings also. Typically, home owners are familiar with the location of the electrical panel which feeds all equipment inside or outside the house. It will be difficult to enforce and is too broad. See 408.4(A) for identification of panelboard circuit breakers. While marking could be applied for the disconnecting means for a ballast of electric-discharge lighting, this likely is a case where the purpose is evident. The identification of the supply for such disconnecting means may be more properly addressed in Article 410. The panel is not sure why the submitter would label a receptacle for a cord-and-plug-connected appliance as the receptacle is not a disconnecting means.

Public Input No. 1876-NFPA 70-2020 [Section No. 110.24]

110.24 Available Fault Current.

(A) Field Marking.

Service equipment at other than dwelling units shall be legibly marked in the field with the available fault current. The field marking(s) shall include the date the fault-current calculation was performed and be of sufficient durability to withstand the environment involved.

The marking shall be legible and permanent, comply with 110.21(B), and shall be a of minimum 6-mm (1⁄4-in.) high letters and body text shall be of a minimum 3-mm (1⁄8-in.) high letters on a contrasting background.

The calculation shall be documented and made available to those authorized to design, install, inspect, maintain, or operate the system.

Informational Note No. 1: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current and interrupting ratings of equipment. *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace,* provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Informational Note No. 2: Values of available fault current for use in determining appropriate minimum short-circuit current and interrupting ratings of service equipment are available from electric utilities in published or other forms.

(B) Modifications.

When modifications to the electrical installation occur that affect the available fault current at the service, the available fault current shall be verified or recalculated as necessary to ensure the service equipment ratings are sufficient for the available fault current at the line terminals of the equipment. The required field marking(s) in 110.24(A) shall be adjusted to reflect the new level of available fault current.

Exception: The field marking requirements in 110.24(A) and 110.24(B) shall not be required in industrial installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

Statement of Problem and Substantiation for Public Input

There are many requirements for warning signs. Some articles understand that some installers may have difficulty reading small print. Giving a minimum size (extracted from Article 690), is very important for the safety of the electrical installer.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 13 11:19:02 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The Panel is not aware of NEC articles that “understand that some installers may have difficulty reading small print” and disagrees that the required marking is necessarily in place only “for the safety of the electrical installer.” Further, adequate technical substantiation was neither provided to justify that the existing requirement is inadequate nor justify the need for the recommended change.

Public Input No. 2747-NFPA 70-2020 [Section No. 110.24(A)]

(A) Field Marking.

Service equipment at other than dwelling units shall be legibly marked in the field with the available fault current. The field marking(s) shall include the date the fault-current calculation was performed and be of sufficient durability to withstand the environment involved. The calculation shall be documented and made available to those authorized to design, install, inspect, maintain, or operate the system.

Exception: Field labeling is not required for temporary services, the date the fault current calculation was performed shall be documented and made available before the temporary service is energized to those authorized to design, install, inspect, maintain or operate the system

Informational Note No. 1: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current and interrupting ratings of equipment. *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace,* provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Informational Note No. 2: Values of available fault current for use in determining appropriate minimum short-circuit current and interrupting ratings of service equipment are available from electric utilities in published or other forms.

Statement of Problem and Substantiation for Public Input

Temporary services that move from different location, the exception will require only documentation be submitted, the fault current calculation will be specific for that site without the posibility of an existing label from a previous site being overlooked at a field inspection with a field label that is not accurate for the available fault current at the site the temporary service is installed.

Submitter Information Verification

Submitter Full Name: Michael Dempsey
Organization: trinity code inspections
Street Address:
City:
State:
Zip:
Submittal Date: Sun Aug 30 15:58:06 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter proposes to do away with Field Labeling for Temporary Services which can move from site to site. For large projects (e.g. High-Rise Multifamily Dwelling Building or Office Buildings), Temporary Services can be of the size of 2000A, 480V, 3 Phase and can stay for 6 to 12 months or even more. For these and other reasons, field labeling must be required for the safety of workers. The submitter has not provided adequate technical substantiation why temporary services should have requirements that are less stringent than required for permanent services.

Public Input No. 887-NFPA 70-2020 [Section No. 110.24(A)]

(A) Field Marking.

Service equipment at other than dwelling units shall be legibly ~~marked in~~ marked in the field with the available fault current. The marking or label(s) shall be located on each single service disconnecting means and each service disconnecting means where two to six are installed in accordance with 230.71. The marking or label shall be with the service disconnection means marking required by 230.70(B). Where the service equipment consists of multisection service switchboards or switch gear, the available fault current marking or label shall be located at the vertical section containing the service disconnecting means. The field marking(s) or label(s) shall include the date the fault-current calculation was performed and be of sufficient durability to withstand the environment involved. The calculation shall be documented and made available to those authorized to design, install, inspect, maintain, or operate the system.

Informational Note No. 1: The available fault-current marking(s) addressed in 110.24 is related to required short-circuit current and interrupting ratings of equipment. *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace,* provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Informational Note No. 2: Values of available fault current for use in determining appropriate minimum short-circuit current and interrupting ratings of service equipment are available from electric utilities in published or other forms.

Statement of Problem and Substantiation for Public Input

The term “service equipment” in this rule ad as defined in Article 100 is too broad and does not provide direction on the specific and useful location of the markings required in this section. The 230.70(B) requirement to identify (mark or label) each service disconnecting means as a “service disconnect” seems to establish a logical location for the marking or label required by this rule. The revision also clarifies that compliance with this rule can be accomplished by using various types of markings or a label, such as a micarta engraved label or other types of labels. For purposes of this section the term "marked" includes legible script on the equipment or applied labels.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 21 12:14:55 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The present definition of Service Equipment already addresses the intent of this PI. The definition of Service Equipment in Article 100 is clear that service equipment can be Circuit Breaker(s), Switch(es) and fuse(s). As such, whether one or more Service Disconnects are provided, Field Marking as per Section 110.24 (A) still applies.

Public Input No. 2048-NFPA 70-2020 [Section No. 110.24(B)]

(B) Modifications.

When modifications to the electrical installation occur that affect the available fault current at the service, the available fault current shall be verified or recalculated as necessary to ensure the service equipment ratings are sufficient for the available fault current at the line terminals of the equipment. The required field marking(s) in 110.24(A) shall be adjusted to reflect the new level of available fault current.

Exception: The field marking requirements in 110.24(A) and 110.24(B) shall not be required in ~~industrial installations where~~ controlled access locations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

Statement of Problem and Substantiation for Public Input

This exception shouldn't be limited to industrial locations. It should apply to any location that has controlled access where only trained workers are able to service the installation. The Department of Energy facilities, for example, are not necessarily "industrial" but have extremely strict rules for working on the premises. The contractors must undergo extensive training, work packages must be created, means and methods must all be approved. This is part of a series of proposals to change "industrial locations/premises/occupancies /wiring-systems/..." to "controlled access locations."

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2047-NFPA 70-2020 [Section No. 110.21(A)(2)]	Global proposal to change 'industrial' to 'controlled access'
Public Input No. 2049-NFPA 70-2020 [Section No. 110.70]	
Public Input No. 2050-NFPA 70-2020 [Section No. 210.8(B)]	
Public Input No. 2051-NFPA 70-2020 [Section No. 210.8(B)]	
Public Input No. 2052-NFPA 70-2020 [Section No. 210.9]	
Public Input No. 2053-NFPA 70-2020 [Section No. 210.18]	
Public Input No. 2054-NFPA 70-2020 [Section No. 215.11]	
Public Input No. 2087-NFPA 70-2020 [Section No. 225.37]	
Public Input No. 2088-NFPA 70-2020 [Section No. 225.52(A)]	
Public Input No. 2090-NFPA 70-2020 [Section No. 230.205(C)]	
Public Input No. 2091-NFPA 70-2020 [Section No. 240.21(C)(3)]	
Public Input No. 2092-NFPA 70-2020 [Section No. 300.50(A) [Excluding any Sub-Sections]]	
Public Input No. 2093-NFPA 70-2020 [Section No. 336.10]	
Public Input No. 2094-NFPA 70-2020 [Section No. 368.56(B)]	

Submitter Information Verification

Submitter Full Name: Eric Stromberg

Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 17:53:08 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The term “controlled access locations” is vague and undefined. The exception in Section 110.24(B) does not require Field Marking in ‘Industrial Installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment’. The PI proposes to take that exception away and apply to all installations where ‘controlled access is provided’. The proposed change is not practical and not enforceable in all cases.

Public Input No. 1298-NFPA 70-2020 [New Section after 110.25]

TITLE OF NEW CONTENT 110.25 exception 2

Type your content here ... Pull out switch fuse blocks

Additional Proposed Changes

File Name	Description	Approved
th_5_.jpg	pullout fuse blocks	

Statement of Problem and Substantiation for Public Input

this type of fuse block is not lockable but can easily be pulled out & stored until work has been performed. I feel that this method is as effective as putting a lock through the breaker or fused disconnect

Submitter Information Verification

Submitter Full Name: James Dorsey
Organization: Douglas County Electrical Insp
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 14:48:49 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: A pullout fuse block does not meet the requirements of 110.25 and therefore should not be added as an exception.

Public Input No. 3835-NFPA 70-2020 [New Section after 110.25]

Absence of Voltage Test & Indication

A means shall be provided to verify the absence of voltage in accordance with an acceptable industry practice that does not expose personnel to shock or arc flash hazards or live parts at the test point for the disconnecting means for any voltage supplies or stored energy sources that present a shock or arc flash hazard up to and including 1000V in equipment such as switchboards, switchgear, panelboards, industrial control panels, motor control centers, and similar isolation equipment, that is located other than in dwelling units and is likely to require examination, adjustment, servicing, or maintenance.

Informational Note: NFPA 70E-2021 Standard for Electrical Safety in the Workplace provides guidance for safely verifying the absence of voltage including the use of devices like a permanently mounted absence of voltage tester.

Statement of Problem and Substantiation for Public Input

Testing for absence of voltage is an important step that helps increase safety by detecting several conditions that could lead to an electrical incident:

- Power remains on if the wrong disconnecting means is utilized or the source is mislabeled (see examples from OSHA Summaries)
- Presence of stored electrical energy from a capacitor, present after the disconnect is opened and locked out (see examples from OSHA Summaries)
- Power remains present when the disconnect handle is in the off position if the disconnect experiences a mechanical failure (see Recall Notices below)

An easily accessible means to test for and visually convey the status of presence and absence of voltage that is part of the equipment installation at the point of work before accessing industrial and commercial equipment would prevent this type of incident (several examples are included below) and further the purpose of the code in practical safeguarding of persons and property by leveraging safety by design principles. Absence of Voltage Testers (AVT) listed to UL 1436 are permanently mounted testers that visually indicate when all voltages are less than 3 V (ac and dc) at the test point. This test is initiated before doors and covers are removed preventing accidental contact with energized parts. AVTs listed to UL 1436 have been recognized as an acceptable method to test for the absence of voltage in NFPA 70E since 2018 (120.5 (7) Exception 1).

Permanently mounted AVTs installed on or near the equipment increase the likelihood that the test for absence of voltage test occurs before the equipment is accessed when compared to portable voltage test instruments. Additionally, AVTs often have a feature to visually indicate when ac or dc voltage that would cause a shock hazard is present. In each of the incidents described below, the voltage presence indicators (for AC and DC) would have provided a visual warning that voltage was still present.

OSHA Fatality and Catastrophe Investigation Summaries

A keyword search of the OSHA Fatality and Catastrophe Investigation Summaries (https://www.osha.gov/pls/imis/accidentsearch.html) reveals several incidents resulting in severe injury or death that are attributed to failure to test for absence of voltage after de-energizing the disconnecting means. Some examples:

1. Report ID: 0728900

Employee #1 was on the roof of a customer's building, changing filters for the customer's air conditioning units. The employee had shut off the unit, but he did not lock out the unit or check its power supply for stored energy. As he reached into the unit, he came into contact with a capacitor charged to 280 volts and received an electric shock.

2. Report ID: 0420600

An employee turned off the known energy source to an air conditioning and heat unit at the panel box in a private residence. He pulled the disconnect switch in a box adjacent to the fan or blower assembly in the

attic and was attempting to remove the air handler inside the blower housing. The heavy gold chain that the employee was wearing around his neck came in contact with or came in close proximity to a 10 microfarad, mfd, capacitor which can store 370 or more volts of alternating current. The chain burned an arc in his neck and carried sufficient current to his heart via the vascular tract to cause his death.

3. Report ID: 0316300

Employee #1 and his helper were installing a fan on a HVAC chiller unit. Employee asked his helper to open the circuit breaker to deenergize the unit, but Employee #1 never tested the fan circuit to ensure it was deenergized. Employee #1's helper opened the wrong breaker and when Employee #1 touched the conductors for the fan, he was electrocuted.

4. Report ID: 0452110

Employee #1 turned off breaker #22 in a panel box so that he could make a connection in a junction box. He was using a wire stripper to cut into the insulation around a conductor when he was electrocuted. The breakers in the panel box were not labeled, and breaker #22 did not control the current in the circuit on which Employee #1 was preparing to work. He also did not use a voltmeter or another type of instrument to test the circuit and confirm that the power was off.

5. Report ID 0522300

Employee #1 was working on an HVAC air handling unit that had not been cooling adequately. The "lockout" procedure did not include de-energization at the power supply or application of locks. Therefore, although the unit was shut off, it was still energized. Employee #1 was killed.

6. Report ID 0729700

An employee was repairing the head switch of the primary motor control center at an oil pumping site. The oil pump motor control center and the saltwater motor control center were not labeled as to what circuits were either controlled by them and/or passed through them. The motor control center was secured in anticipation of replacing the head switch. The employee opened a nearby junction box to perform the initial disconnection of wiring to the switch. The employee came into contact with a 480 volt unused circuit that passed through the motor control center. This 480 volt circuit was not de-energized by the cutout used to secure the motor control center and the employee did not test the circuits within the junction box to ensure they were all de-energized and sustained extensive electrical burns to the right hand and less serious burns to the left.

7. Report ID 0728900

Employee #1 was testing an electrical circuit with a multi-meter on a railcar. The railcar was supposed to be de-energized and locked out. Employee #1 was not using any form of personal protective equipment because there was not supposed to be any voltage applied to the system. As he tested the low voltage circuit, his hand contacted a higher voltage exposed wire connector, which was energized to approximately 650 volts DC. Employee #1 was insulated sufficiently to prevent a large amount of amperage form transferring from the energized object through his body and only suffered an electrical shock.

8. Report ID 0950631

Two employees of an electrical contractor went to a site to wipe down surfaces and vacuum the bottoms of 4,160-volt cubicles in an electrical room. They had a rag and Simple Green cleaning fluid. Neither employee had previously worked on equipment of this voltage, and the employees did not know the operating voltage of the equipment. The onsite employer racked out and locked the equipment to be cleaned, and Employee #1, an electrician, did a walk down with the employer to verify that the equipment was racked out. However, the two employees did not know that one of the cubicles remained energized from another source of electric energy. On the door of that cubicle was a red-stenciled sign that read, "CAUTION MAY BE ENERGIZED FROM AN ALTERNATE SOURCE." Neither employee noticed the sign, and the onsite employer did not mention the alternate energy source to the employees. The following day, after meeting with the onsite employer, the employees began to clean the cubicles. When Employee #2 was cleaning the still-energized cubicle, he felt a slight electric shock. He took out a 600-volt proximity tester, and it lit up without touching the conductors. Employee #1 retrieved a voltage meter rated for 750 volts and placed the meter leads on the conductors. The meter failed and the ensuing electric arc burned both employees. Employee #1 received second- and third-degree burns. He underwent skin graft surgery and was hospitalized for his injuries. Employee #2 was hospitalized for more than 24 hours. He received pain medication for his burns. (The original form did not list Employee #2 on an injury line.)

9. Report ID 0950632

Employee #1, an electrician, was wiring an electrical room to test for continuity at a construction site. Employee #1 and two coworkers, Coworker #1 and Coworker #2, were testing the continuity at the main panel outside. Coworker #1 went inside the building and had the tester inside the electrical room. Employee #1 and Coworker #2 went outside and opened up the main panel. Coworker #2 had a walkie-talkie and was standing behind Employee #1, relaying instructions from Coworker #1. Employee #1 thought that the power was down, and he did not check it prior to working on the panel. Employee #1 connected a length of wire from a grounded location on the frame to a connector that was hot, and there was an immediate flash arc. Employee #1 sustained second degree burns to his right arm, hand, and fingers, with a small area of third degree burns on his wrist. Employee #1 was transported to UCSD Burn Center, where he was hospitalized for eight days. The worksite where the accident occurred was a construction site where an existing building

was undergoing remodeling into a medical facility.
10. Report ID 0213600
Employee #1, employed by an electrical contractor, was working at a building jobsite. He was testing wires with a voltage meter to verify voltage. Employee #1 hit a live wire with his hand and sustained an electrical shock. Emergency services were called, and Employee #1 was transported to the hospital. He was admitted and treated for a thermal burn to his index finger. Subsequent investigation determined that Employee #1 was not wearing gloves when he came into contact with the bare electrical wire.

Disconnect Recall Notices

Several brands of disconnects that are commonly used in industrial and commercial applications have experienced recalls due to defects that allow power to remain present when the disconnect handle is in the off position, posing a shock hazard. This failure mode is an example of why testing for absence of voltage is critical in all applications.
Recalls (https://www.cpsc.gov/Recalls)
1. Example 1
Company A recalled more than a million safety switches manufactured between January 1, 2014 and January 18, 2018 because the power can stay on when the safety switch handle is in the off position, posing an electric shock or electrocution hazard. The switches may be installed in or around commercial buildings, outbuildings, apartments and homes with air conditioning units.
2. Example 2
Company B issued a safety recall of 26 models of safety switches that may not disconnect power when the handle is in the “off” position. The affected devices cover certain models of 30A and 60A heavy-duty safety switches manufactured between Nov. 19, 2015, and Jan. 23, 2018.
3. Example 3
Company C recalled 19,000 toggle and rotary switches. When switched OFF, one electrical pole may remain energized, posing a risk of electrical shock hazard. The switches are typically used with HVAC units, electric distribution and control panels and industrial uses. Primarily the switches are used commercially, however they may also be found in residential applications.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3908-NFPA 70-2020 [New Part after I.]	
Public Input No. 3912-NFPA 70-2020 [New Section after 440.14]	
Public Input No. 3934-NFPA 70-2020 [New Section after 409.110]	
Public Input No. 3941-NFPA 70-2020 [New Section after 430.99]	
Public Input No. 3980-NFPA 70-2020 [New Section after 408.8(B)]	
Public Input No. 3994-NFPA 70-2020 [Section No. 625.43]	
Public Input No. 4000-NFPA 70-2020 [Section No. 670.4(B)]	

Submitter Information Verification

Submitter Full Name: Rachel Bugaris
Organization: Panduit Corp
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 13:49:35 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This is a worker safety issue that is addressed by NFPA 70E, not an installation issue. The NEC doesn't preclude the use of a permanently mounted Absence of Voltage Tester (AVT) on

any equipment. Further, it is not the only way to determine absence of voltage.

Public Input No. 3738-NFPA 70-2020 [Section No. 110.25]

110.25 Lockable Disconnecting Means.

If a disconnecting means is required to be lockable open elsewhere in this *Code*, it shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.

Exception: Locking provisions for a cord-and-plug connection shall not be required to remain in place without the lock installed.

The disconnecting means shall be installed at a readily accessible location. If the disconnecting means exposes any energized terminals or wiring when physically opened, the enclosure shall be locked or require a tool to open

Additional Proposed Changes

File Name	Description	Approved
_2_Toddler_height_and_any_disconnect_switch_60_amps_or_less_have_no_guards.jpg		
_1_Square_D_WP_switch_with_no_latch_no_interlock_and_no_guards_just_lift_the_cover.jpg		
.1599694080573		

Statement of Problem and Substantiation for Public Input

The placement of disconnect switches in dwellings, in locations that are accessible by other than qualified personnel, particularly by children, is a potential hazard. Knife blade disconnect switch are the ONLY widely used piece of electrical equipment that does not require a tool to access the live components inside, thus they have no child safeguards. The disconnect enclosures can often be easily opened exposing potentially life threatening voltages and current levels if contacted by personnel. The disconnect equipment often is being installed on accessible external and internal surfaces of dwellings, in garages, and in almost any room except bathrooms in dwellings. An opened disconnect enclosure contains wiring and terminals that can be touched with tools, probes or hands. There is a need to require, that they be locked, or require a tool to physically open these enclosures.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4057-NFPA 70-2020 [Section No. 404.8(A)]	
Public Input No. 4071-NFPA 70-2020 [Section No. 440.11]	
Public Input No. 4080-NFPA 70-2020 [Section No. 680.13]	

Submitter Information Verification

Submitter Full Name:	Tommy Davis
Organization:	[Master Electrician, Retired IBEW, Retired Electrical Inspector
Affiliation:	Master Electrician, Retired IBEW member, Retired Electrical Inspector
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 11:35:53 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: Some disconnecting means are permitted to be in an accessible location and there is inadequate substantiation provided to require those to be in a readily accessible location. Product standards for disconnecting means address the concerns of the submitter. See 90.3 which allows Chapters 5, 6 and 7 to modify Chapters 1 through 7. For example, Article 705 specifically addresses disconnecting means for interconnected systems that may have load side terminals that are energized when open.

Public Input No. 376-NFPA 70-2020 [Section No. 110.25]

110.25 Lockable Disconnecting Means.

If a disconnecting means is required to be lockable open or closed elsewhere in this *Code*, it shall be capable of being locked in the open or closed position. The provisions for locking shall be permanent or require the use of a tool for removal and remain in place with or without the lock installed.

Exception: Locking provisions for a cord-and-plug connection shall not be required to remain in place without the lock installed.

Statement of Problem and Substantiation for Public Input

I can have a snap on device to accommodate a lock and it be easily removed defeating the requirement what is needed is one that cannot be easily removed such as a bolt on or behind a cover or dead front. Locked in the closed position is a Fire pump requirement (695.4 (B)(3)(2))

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: electrician
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 28 14:02:09 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: Adequate technical substantiation has not been provided to substantiate the need for a general requirement for a disconnecting means to be locked in the closed position when this is and can be addressed for specific applications in other articles, such as the one the submitter referenced in his substantiation.

Public Input No. 943-NFPA 70-2020 [Section No. 110.25]

110.25 Lockable Disconnecting Means.

If a disconnecting means is required to be lockable open elsewhere in this *Code*, ~~it~~ the disconnecting means shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed. Provisions for locking the disconnecting means enclosure, shall not be permitted to serve as the sole means for the disconnecting means being capable of being locked in the open position.

Exception: Locking provisions for a cord-and-plug connection shall not be required to remain in place without the lock installed.

Statement of Problem and Substantiation for Public Input

A common code argument that is used by installers and some manufacturers is "why can't an enclosure door that can be locked in the field also serve as meeting the requirements in 110.25?" The NEC needs to be clear and unambiguous on this topic, that the locking requirements applies to the actual disconnecting means itself, and not to the enclosure that the disconnecting means is mounted in. OSHA and NFPA 70E have extensive lock-out and tag-out requirements, but the NEC is the installation code as it applies to these requirements and the NEC is what drives installers and manufacturers to compliance. The propose language provides additional clarity on this important safety topic.

Submitter Information Verification

Submitter Full Name: Brian Baughman
Organization:
Affiliation: myself
Street Address:
City:
State:
Zip:
Submittal Date: Mon May 04 15:07:28 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The requirement is clear that the disconnecting means shall be capable of being locked in the open position, not the enclosure. In addition, it is also required that the provisions for locking the disconnecting means open shall remain in place with or without the lock installed. The panel reaffirms that the door or opening to an enclosure is not the disconnecting means.

Public Input No. 974-NFPA 70-2020 [Section No. 110.25]

110.25 Lockable Disconnecting Means.

If a disconnecting means is required to be lockable open elsewhere in this *Code*, it shall be capable of being locked in the open position. ~~The provisions for locking~~ The locking means shall remain in place with or without the lock installed.

Exception: ~~Locking provisions~~ The l ocking means for a cord-and-plug connection shall not be required to remain in place without the lock installed.

Statement of Problem and Substantiation for Public Input

The word “provisions” relates to something that is provided and is more general in meaning and thus is not as accurate as the word “means” which is the title of this section.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 06 11:38:24 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: If the disconnecting means is required to be lockable open then it should have the provisions for doing so. Accordingly, the term is valid as used in the text.

Public Input No. 1733-NFPA 70-2020 [Section No. 110.26]

110.26 Spaces About Electrical Equipment.

Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

(A) Working Space.

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*. Where the working space is provided by a platform, the platform shall provide the space required in this section.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space.

The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

(3) Height of Working Space.

The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6½ ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6½ ft).

Exception No. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

(4) Limited Access.

Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1). The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space.

(5) Separation from High-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

(B) Clear Spaces.

Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

(C) Entrance to and Egress from Working Space.

(1) Minimum Required.

At least one entrance of sufficient area shall be provided to give access to and egress from working space about electrical equipment.

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(3) Personnel Doors.

Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard For Safety For Panic Hardware*. For fire exit hardware, see UL 305, *Standard For Panic Hardware*, and UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies*.

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

(E) Dedicated Equipment Space.

All switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

(2) Outdoor.

Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2)(c).

(a) *Installation Requirements.* Outdoor electrical equipment shall be the following:

(2) Installed in identified enclosures

(3) Protected from accidental contact by unauthorized personnel or by vehicular traffic

(4) Protected from accidental spillage or leakage from piping systems

(e) *Work Space.* The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(f) *Dedicated Equipment Space.* The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

(F) Locked Electrical Equipment Rooms or Enclosures.

Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered accessible to qualified persons.

Additional Proposed Changes

File Name	Description	Approved
110.26A2_05_PH.png	Working space platform	

Statement of Problem and Substantiation for Public Input

Where a “platform” provides the required working space, it should be addressed in the NEC. Having the required working space when the “working platform” does not allow the electrician a safe, level surface creates a hazard that this rule is intended to prevent. See graphic. I say this platform is a violation, but I honestly don't have a good rule to make such a statement.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 25 16:57:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8633-NFPA 70-2021

Statement: The grade, floor or platform being flat and level in the working space is not addressed in the NEC. The Panel concludes that having a flat level working space is vital to the safety of personnel working on the equipment.


Depth of Working Space
110.26(A)(1) Comment
VIOLATION: The platform must be sized to the working space requirement; in this case the working platform is not 36-in. deep.
ON
OFF
CAUTION
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Public Input No. 1758-NFPA 70-2020 [Section No. 110.26(A)]

(A) Working Space.

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space.

The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

(3) Height of Working Space.

The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6½ ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6½ ft).

Exception No. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

(4) Limited Access.

Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1). The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space.

(5) Separation from High-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

(6) Grade, Floor, or Working Platform.

The grade, floor, or platform in the required working space in 110.26(A)(1), (2), (3) and (5) shall be kept clear and the floor, grade, or platform in the working space shall be as level and flat as practical.

Statement of Problem and Substantiation for Public Input

The driving text in 110.26 indicates that access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. The grade, floor or platform being flat and level in the working space is not addressed in the NEC, and in some cases where it is not it becomes an impediment to safe conditions for workers that must perform work (energized or not). Having a general, practical requirement to address this will go a long way for Code enforcers that run across many installations needing such a rule to be applied. Item (4) was not included in this requirement because often the equipment requiring access is elevated and there is no floor, grade, or working platform.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:

Zip:

Submittal Date: Mon Jun 29 09:24:53 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: FR-8633-NFPA 70-2021

Statement: The grade, floor or platform being flat and level in the working space is not addressed in the NEC. The Panel concludes that having a flat level working space is vital to the safety of personnel working on the equipment.

Public Input No. 1700-NFPA 70-2020 [Section No. 110.26(A)(1)]

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Extra-Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Statement of Problem and Substantiation for Public Input

Coordination with proposed new definitions for Low Voltage and Extra-Low Voltage.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1695-NFPA 70-2020 [New Definition after Definition: Voltage (of a circuit).]	Go together
Public Input No. 1695-NFPA 70-2020 [New Definition after Definition: Voltage (of a circuit).]	

Submitter Information Verification

Submitter Full Name: Paul Harouff
Organization: Deltek
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 25 14:01:17 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 2040-NFPA 70-2020 [Section No. 110.26(A)(1)]

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) ~~*Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.~~

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Statement of Problem and Substantiation for Public Input

This sub-section is currently in the Depth section of the required working space for energized equipment. As such, it could be interpreted as not applying to the Width or Height sections.

This is a companion proposal (2039) to move this text above the Depth, Width, and Height sections such that the allowance applies to all of them.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2039-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	Deleting text from sub-section 110.26(A)(1)(b) and adding it to 110.26(A)

Public Input No. 2041-NFPA 70-2020 [Section No. 110.26(A)(1)]

Public Input No. 2042-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
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Zip:
Submittal Date: Sun Jul 26 13:32:53 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 2041-NFPA 70-2020 [Section No. 110.26(A)(1)]

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
~~0–150~~ 50–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Statement of Problem and Substantiation for Public Input

The first line of the table starts at 0 volts. As written, the working space clearances apply to the exposed terminals of installed 5 volt power supplies.
CMP-1 added the informational note that points the user to NFPA 70E for guidance on potential exposure. NFPA 70E only considers voltages above 50 volts to be hazardous. As such, 70E doesn't apply to voltages below this threshold.
This PI is to align the thresholds for NFPA70 and NFPA70E.
In addition, OSHA 1910.303(g)(2)(i) states that "live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact..."
Unfortunately, OSHA table S-1 in 1910.303(g) shows 0-150 volts as well.

The author of this PI has also submitted a PI to move the low voltage special permission to the front of 110.26(A). This PI is somewhat related in that, of CMP-1 accepts PI 2041, this low voltage special

permission will no longer be necessary.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2039-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	If PI 2041 is accepted, PI 2039 will no longer be necessary
Public Input No. 2040-NFPA 70-2020 [Section No. 110.26(A)(1)]	if PI 2041 is accepted, the low voltage special permission can be deleted
Public Input No. 2042-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 13:40:50 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 2280-NFPA 70-2020 [Section No. 110.26(A)(1)]

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a) , (A)(1)(b), or (A)(1)(c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. ~~Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in .) shall be provided.~~

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

For the following conditions, a minimum working space depth shall be provided in compliance to manufacturer instructions for general service but shall not be less than 762 mm (30 in.);

(1) Front access to electrical equipment that shall only be serviced while non-energized.

(2) Where access to the sides or back of enclosed electrical equipment is required to work on nonelectrical serviceable parts.

Statement of Problem and Substantiation for Public Input

110.26(A) addresses minimum working clearances for equipment likely to require servicing while energized. 110.26(A)(1) deals with the minimum depth of working spaces for equipment with distance measure from the live parts. 110.26(A)(1)(a) states there is no minimum working clearance from the back and sides of dead front equipment if the serviceable parts are accessible from the front, but then does gives a minimum

distance for service to "non-electrical" components if there is a rear access requirement.
1) This requirement for non-electrical (aka non-energizable) parts is within a section for energized access requirements.
2) This requirement attends to a non-electrical part access requirement, while there is yet no general minimum clearance for non-energized electrical parts. A new paragraph 110.26(A)(1)(d) could be added to outline general minimum clearance requirements for "non-energized electrical parts."
3) 110.26(A)(1)(a); Also, clarify what is specifically meant by the term “horizontal” in 110.26(A)(1)(a); whether “width” or “depth” or “both” or some other intent. 110.26(A)(1) has depth in its title, but there is no other text to clarify what constitutes a minimum width working clearance for this application.
4) Also clarify whether minimum width requirement or access pathway minimum requirements to rear of equipment apply.
5) Also, if appropriate, clarify if non-energized service access requirements for the rear of equipment are any different compared to the front of equipment.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2281-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	
Public Input No. 2281-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 13 15:09:07 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 4236-NFPA 70-2020 [Section No. 110.26(A)(1)]

(1) Depth of Working Space.

The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (A)(1)(b), or (A)(1)(c) are met. ~~Distances shall be measured from the~~ The floor surface shall be flat with no steps, stairs, steep slopes, housekeeping pads, handrails, structural supports or other obstructions. The minimum distances required by this section shall be measured from the exposed live parts ~~or from the enclosure or opening if the live parts are enclosed~~ , or where enclosed, the furthermost projecting object of the equipment, such as door handles, protection relays, battery drip pans and the like, or other obstructions within the working space including obstacles near the floor surface .

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Low Voltage.* By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, switchgear, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Statement of Problem and Substantiation for Public Input

The current text doesn't clearly address other obstacles or hazards commonly encountered in a working space. For an example, an outdoor switchgear with the bottom of the equipment elevated 12 in. above grade on a concrete pad. There may be a permanent step which leads up to the top of the pad the switchgear is mounted on. There is no handrail. The working space in front of the equipment has no obstructions, but the concrete pad only extends only 24" in from the front of the equipment and has a fairly steep slope for drainage of rain.

If an incident were to occur, the worker could accidentally step back and fall off of the concrete pad. This

same issue can occur with a concrete house keeping slab within an electrical room. It is not 100% clear, in my opinion, that the working space should be looked upon as a full box type envelope from the floor to the top of the required head room. Most electricians, designers, and engineers are aware of the intent of this section, but not all.

This is a companion proposal to one for equipment more than 1000 V nominal.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4278-NFPA 70-2020 [Section No. 110.34(A)]	

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Enterprises, Inc.
Affiliation: Associated Builders and Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 07:41:53 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed wording is overly prescriptive and does not add clarity. In addition, there was not adequate technical substantiation provided to warrant this change.

Public Input No. 186-NFPA 70-2019 [Section No. 110.26(A)(2)]

(2) Width of Working Space.

~~The~~ (1) The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

(2) Open equipment doors shall not impede the entry to or egress from the working space.

Statement of Problem and Substantiation for Public Input

This is a more logical location for this requirement.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 185-NFPA 70-2019 [Section No. 110.26(C)(2)]	

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 17 14:32:40 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: FR-8635-NFPA 70-2021
Statement: The Panel concludes that the requirement for open equipment doors not impeding the entry or egress from the working space is most appropriately relocated.

Public Input No. 890-NFPA 70-2020 [Section No. 110.26(A)(2)]

(2) Width of Working Space.

The width of the working space shall be in accordance with (a) and (b).

(a) The width of the working space in front of the electrical equipment shall be the width of the equipment or ~~762 mm~~ 762 mm (~~30 in.~~ 30in), whichever is greater.

(b) In all cases, the work space shall permit at least ~~a~~ 90 degree opening of equipment doors or hinged panels. Equipment doors when fully opened shall not impede the entry to or the egress from the working space in a manner that entraps a worker(s).

Statement of Problem and Substantiation for Public Input

The new text added during the 2020 development process specifically addresses doors opening to a maximum 90-degree position and possibly entrapping a worker. The proposed revision relocates the sentence “Open equipment doors shall not impede the entry top or the egress from the working space” in Section 110.26(C)(2) to Section 110.26(A)(2) where the 90-degree opening of doors is currently addressed and would allow for application beyond installations involving large equipment as described in 110.26(C). This safety concern allies beyond just larger equipment. The revision also adds the concept of not entrapping a worker(s).

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Apr 21 12:31:13 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8635-NFPA 70-2021
Statement: The Panel concludes that the requirement for open equipment doors not impeding the entry or egress from the working space is most appropriately relocated.

Public Input No. 180-NFPA 70-2019 [Section No. 110.26(A)(3)]

(3) Height of Working Space.

The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6½ ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6½ ft). If the service equipment or panelboard is located in an area that meets the headroom clearance in the general rule, the service equipment or panelboard may not be relocated to an area with less then the required headroom clearance in the general rule.

Exception No. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

Statement of Problem and Substantiation for Public Input

I've had contractors relocate panels during a service change from a location where they had the 6 1/2 ft headroom clearance and move them to a location where the headroom clearance was below 6 1/2 feet. The current wording of the exception did not prohibit this and was allowed by state regulators that interpret the code in Wisconsin. The change would prohibit the relocation of service equipment and panelboards from being relocated from a location that has the proper work space clearances to a location where the headroom clearance is below the general rule.

Submitter Information Verification

Submitter Full Name: Brian Schewe
Organization: City of Appleton
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 10 15:56:17 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 4286-NFPA 70-2020 [Section No. 110.26(A)(4)]

(4) Limited Access.

Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).

(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.

(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.

(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1), and shall be unobstructed to the floor by fixed cabinets, walls, or partitions. Space reductions in accordance with 110.26(A)(1)(b) shall be permitted. The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space provided the location of weight-bearing structural members does not result in a side reach of more than 150 mm (6 in.) to work within the enclosure.

Statement of Problem and Substantiation for Public Input

The present requirement does not adequately address a condition where the workspace in front of a duct heater occurs above a partition. This can easily occur, and when it does, it is impossible to work from a stepladder in front of the open enclosure. In such cases the electrician is forced into a contorted position in order to work from the ladder, which in turn results in a significant reduction in safety. This input also recognizes that the weight-bearing heavy tee-bars cannot be set out of the way and pose a similar problem. Low voltage work, available by special permission, is correlated in this text. This approach was initially accepted for the 2017 NEC, but was subsequently lost after being relocated from CMP 17 in Art. 424 to CMP 1 in Art. 110. This wording also addresses the fact that headroiom need not extend, and often does not extend, higher than that needed for the installation.

Submitter Information Verification

Submitter Full Name: Frederic Hartwell
Organization: Hartwell Electrical Services, Inc.
Affiliation: self
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 09:24:56 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8637-NFPA 70-2021
Statement: This revision will clarify what is in the work space. The Panel concludes that the wording addresses the fact that headroom need not extend, higher than that needed for the installation.

Public Input No. 4411-NFPA 70-2020 [Section No. 110.26(A)(5)]

(5) Separation from High-Voltage Equipment.

Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by ~~a suitable~~ an approved partition, fence, or screen.

Statement of Problem and Substantiation for Public Input

As currently written, the use of the term "suitable" is subjective. Suitable to whom? By revising the language to require the partition, fence, etc., to be "approved" clarifies that the method used to achieve separation must be acceptable to the AHJ. This will provide clarity to the user of the Code.

Submitter Information Verification

Submitter Full Name: Jebediah Novak
Organization: Cedar Rapids Electrical JATC
Affiliation: IBEW Local #405
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 12:22:27 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Inadequate substantiation has been provided to support the proposed revision.

Public Input No. 2039-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*. By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

Statement of Problem and Substantiation for Public Input

Currently, the allowance for smaller working spaces is in the Depth section. The allowance should be moved to the top of 110.26(A), such that it also applies to width and height.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2040-NFPA 70-2020 [Section No. 110.26(A)(1)]	
Public Input No. 2041-NFPA 70-2020 [Section No. 110.26(A)(1)]	
Public Input No. 2042-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 13:25:40 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 2042-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*. For Class 2 systems, smaller working spaces shall be permitted.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

Statement of Problem and Substantiation for Public Input

As written, the working space distances apply to all systems and all voltages. If the working space is to protect the user from shock, Class 2 already does that. All systems are already required to comply with 110.26. Special permission shouldn't be required to relax the 110.26(A) dimensions for Class 2 systems. As an example, there are many building automation systems that are Class 2. Many of these installations are above ceilings where it can be extremely difficult to comply with the dimensions of 110.26(A).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2039-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	If this PI is accepted, PI 2039 is unnecessary
Public Input No. 2040-NFPA 70-2020 [Section No. 110.26(A)(1)]	Companion to 2039
Public Input No. 2041-NFPA 70-2020 [Section No. 110.26(A)(1)]	If PI 2041 is accepted, this PI is unnecessary

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 14:08:00 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 2281-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while either energized or non-energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

Statement of Problem and Substantiation for Public Input

110.26(A)(1)(a) shows requirements for service of non-electrical parts at the rear of equipment, and can apply whether or not the equipment is energized. 110.26(A) constrains its application to working clearances for equipment likely to require servicing while energized, hence its sub-paragraph is not coherent for including non-energized clearance requirements.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2280-NFPA 70-2020 [Section No. 110.26(A)(1)]	
Public Input No. 2280-NFPA 70-2020 [Section No. 110.26(A)(1)]	

Submitter Information Verification

Submitter Full Name: John Blissett
Organization: Bernhard TME
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 13 15:20:09 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1 (d) Statement of the problem and substantiation for Public Input.

Public Input No. 402-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]

Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this *Code*. The required working space shall provide a floor, platform, grade or similar working surface that is as flat and level as practicable for the entire required depth and width of the working space.

Informational Note: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

Additional Proposed Changes

File Name	Description	Approved
Attic_air_handler.jpg	Attic air handler with no floorboards to work safely from	
Sump_Pump_pit.JPG	basement sump pump pit encroaching working space for electric panel	

Statement of Problem and Substantiation for Public Input

There are no provisions in this code that require a flat and level working surface for working on this energized equipment. Working on energized equipment where the working surface has a steep grade or uneven surfaces can pose serious hazards for the worker. Troubleshooting an energized air handler installed in an unfinished attic where no floorboards have been laid down is extremely dangerous for a worker trying to balance on top of floor joists while working on energized equipment! You may have done similar work yourself and remember how precarious that situation cane be! Very dangerous! Or perhaps it's an exterior service disconnect installed where the grade drops precipitously from the edge of the building where the disconnect is located. What about a basement panelboard installed near a large uncovered sump pump pit in the floor? How can a worker be safe if he needs to straddle a giant hole in the floor while his hands are in an energized panel? The working space depth, width and height may be code compliant but if there is no flat level place to stand or place a ladder, it places the worker in peril. This should not be permitted as it creates a very dangerous working condition. It does not matter WHO builds this platform, or grades the earth to be level, or pours a flat level concrete pad, but this rule helps ensure that it WILL be done. The AHJ would be able to enforce this and make it safer for the electrical workers.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 403-NFPA 70-2020 [Section No. 110.34(A)]	

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sun Feb 02 09:26:53 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8633-NFPA 70-2021
Statement: The grade, floor or platform being flat and level in the working space is not addressed in the NEC. The Panel concludes that having a flat level working space is vital to the safety of personnel working on the equipment.





Public Input No. 1872-NFPA 70-2020 [Section No. 110.26(B)]

(B) Clear Spaces.

Working space required by this section shall not be used for permanent or temporary storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

Statement of Problem and Substantiation for Public Input

Additional text clarifies that the working space is not permitted to be used for 'temporary' storage.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 13 10:38:59 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. The Panel continues to clarify that the space is not to be used for storage of any kind. Adding the words “permanent or temporary” will not add to clarity of this requirement. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 566-NFPA 70-2020 [Section No. 110.26(B)]

(B) Clear Spaces.

Working space required by this section shall not be used for storage and shall be maintained for usage . When normally enclosed live parts are exposed for inspection or servicing, the working space it self shall be readily accessible and , if in a passageway or general open space, shall be suitably guarded.

Additional Proposed Changes

File Name	Description	Approved
IMG_0233.JPG	ready access	

Statement of Problem and Substantiation for Public Input

ready access is not always available the section requires no storage in the work space however says nothing about getting to the work space or out of the work space. this would remind people the need to keep this area readily accessible when in use . the guarding can not restrict access to and from. There is currently no notice to maintain this work space which if outdoors could have debris and vegetation compromise the workspace

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Sat Feb 29 10:05:52 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed wording “maintained for usage” is vague and may create an enforcement issue as to what “usage” is. The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.


PARK &
RIDE

Public Input No. 1873-NFPA 70-2020 [Section No. 110.26(C)]

(C) Entrance to and Egress from Working Space.

(1) ~~Minimum~~ One Required Entrance .

(a) At least one entrance of sufficient area shall be provided to give access to and egress from working space about electrical equipment.

(

~~2) Large Equipment.~~

~~For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space. This requirement shall apply to either of the following conditions:~~

(1) ~~For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide~~

(2) ~~For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide~~

~~Open equipment doors shall not impede the entry to or egress from the working space.~~

~~b) A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.~~

(a) *(1) Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) (2) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1) , a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(c) Open equipment doors shall not impede the entry to or egress from the working space.

(2) Two Required Entrances .

For equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) Where a single piece of equipment is rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) Where multiple service disconnecting means are installed, in accordance with 230.71 and the combined ampere rating is 1200 amperes or more and the width of the multiple service disconnecting means is over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

(3) Personnel Doors.

Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard For Safety For Panic Hardware*. For fire exit hardware, see UL 305, *Standard For Panic Hardware*, and UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies*.

Statement of Problem and Substantiation for Public Input

My edits are intended to make this rule easier to understand and apply. I relocated the rules in (2) relating to a single entrance to working space to (1) and changed the title to Single Entrance. Then I changed the title for (2) from Large Equipment to (2) Two Entrances Required. The text about service disconnecting means was edited to make it easier for the Code user determine when a single entrance is permitted, and when two entrances are required.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 13 10:43:43 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed wording will not add clarity or usability. The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 914-NFPA 70-2020 [Section No. 110.26(C)(1)]

(1) Minimum Required.

At least one entrance ~~of sufficient area shall~~ not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to and egress from working space about electrical equipment.

Statement of Problem and Substantiation for Public Input

This PI recommends replacing "sufficient area" with specific measurements that correlate with the measurements in 110.26(C)(2) Large Equipment.
The term "sufficient area" is vague and unenforceable which does not comply with section 3.2.1 of the NEC Style Manual. Additionally, having a minimum specific measurement will provide clarity and uniform understanding for industry professionals. Entrance to (and egress from) the working space is critical for the safety of workers no matter the amperage rating or how large/small the equipment is. Furthermore establishing a minimum specific measurement will align this requirement with the scope of the NEC and enhance practical safeguarding of persons from the hazards arising from the use of electricity.

Submitter Information Verification

Submitter Full Name: Vincent Dellacroce
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Wed Apr 29 17:07:50 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate technical substantiation as to the dimensions proposed. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1025-NFPA 70-2020 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

Exception No. 1 to 110.26(C)(2) for Table 110.26(A)(1), Condition 3 : In supervised industrial locations, under single management, used exclusively for manufacturing or process control activities where conditions of maintenance and supervision ensure that only qualified persons service the equipment, open equipment doors shall not be considered an obstruction where one or more of the following conditions exist:

(1) Documented safe switching procedures allowing equipment only on one side of the work space to be opened while energized,

(2) Opposing equipment is mechanically interlocked so that equipment only on one side of the work space can be opened while energized,

(3) In existing buildings where existing electrical equipment is being replaced in accordance with 110.26(A)(1)(c),

(4) By other approved means

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

This single sentence was added without public review as required by NFPA regulations. It is having unintended consequences. For supervised industrial locations under single management there are several conditions where there need to be exceptions. The same exceptions should not apply to large equipment installations where it is possible for large equipment to be serviced by persons that aren't familiar with the installation and the hazards involved.

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Enterprises, Inc.
Affiliation: Associated Builders and Contractors
Street Address:
City:

State:
Zip:
Submittal Date: Mon May 11 12:35:01 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate technical substantiation. The proposed exception is too broad. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1822-NFPA 70-2020 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

Open equipment doors shall not ~~impede~~ reduce the width of the entry to or egress from the working space to less than 610 mm (24 in .).

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

As currently written this requirement can not be complied with unless the entry/egress is behind the individual working on the equipment. If the worker has to turn left or right and the equipment door does not open 180 degrees,the egress has been impeded. Even if the equipment is installed in a very large room, any open door that I need to maneuver around is, by definition, an obstruction.

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 09 11:09:59 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate technical substantiation as to the dimension of 24 inches. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 185-NFPA 70-2019 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

~~Open equipment doors shall not impede the entry to or egress from the working space.~~

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(1) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(2) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1) , a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

This is more logically located with other requirements for doors.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 186-NFPA 70-2019 [Section No. 110.26(A)(2)]	

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 17 14:31:27 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: FR-8643-NFPA 70-2021
Statement: The Panel concludes that the requirement for open equipment doors not impeding the entry or egress from the working space is most appropriately relocated to 110.26(A)(2).

The addition of the 6 foot combined width requirement for service disconnecting means adds clarity.

Public Input No. 1891-NFPA 70-2020 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71(B) where the combined ampere rating is 1200 amperes or more and ~~over~~ where the combined width is over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Additional Proposed Changes

File Name	Description	Approved
110.26_C_.pdf	Service equipment example	

Statement of Problem and Substantiation for Public Input

This PI attempts to provide clarification to the large equipment requirements when two to six service disconnects are installed per 230.71(B).
First, the reference has been revised to 230.71(B) as it is where the two to six service disconnect requirements are located.
Second, language has been added to attempt to make it clear that the combined width of all service disconnects should be added together. If that total is over 6', no matter where the service equipment is located, it would have to comply with the large equipment requirements.
Looking at the attached graphic from the IAEI 2020 Analysis of Changes presentation we see a 800 amp and 600 amp service disconnect. If they were to be installed close enough together and the distance from the far left side of the 800 amp disconnect to the far right side of the 600 amp disconnect was less than 6', would this be considered large equipment? Using the same graphic, what if the 800 amp disconnect was to be located on the far left wall and left of entrance/egress No. 1? Where would the 6' measurement start and stop?
Basing the requirement on the combined width of the equipment will provide clarity to industry when two to six service disconnects are installed.

Submitter Information Verification

Submitter Full Name: Vincent Dellacroce
Organization:
Street Address:

City:
State:
Zip:
Submittal Date: Tue Jul 14 09:07:00 EDT 2020
Committee: NEC-P01

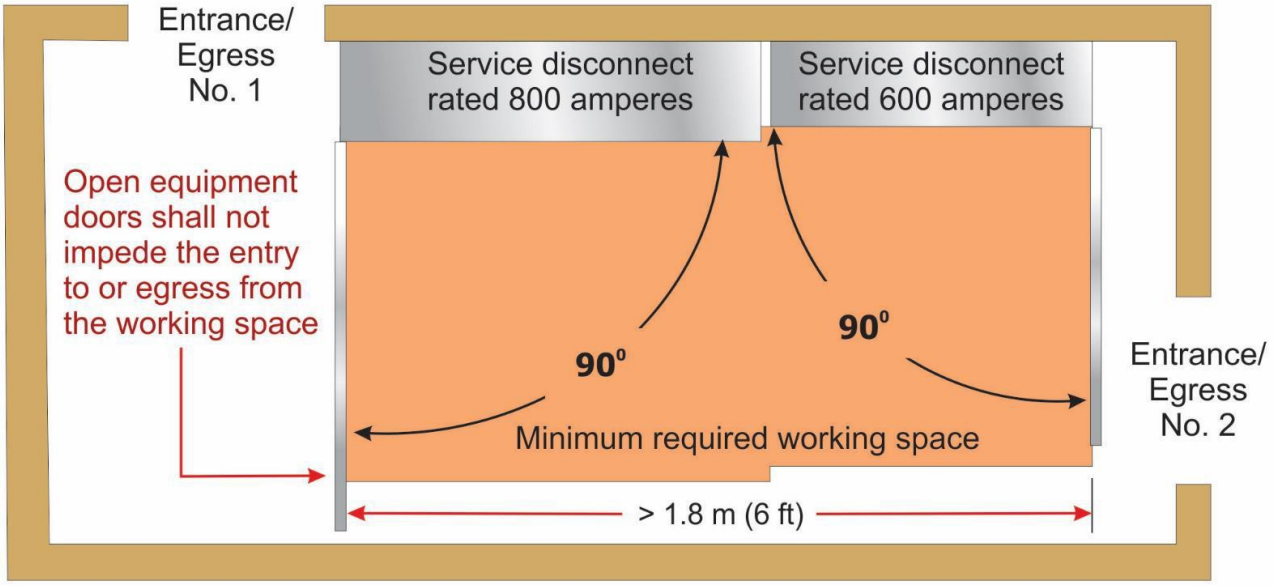
Committee Statement

Resolution: FR-8643-NFPA 70-2021

Statement: The Panel concludes that the requirement for open equipment doors not impeding the entry or egress from the working space is most appropriately relocated to 110.26(A)(2).

The addition of the 6 foot combined width requirement for service disconnecting means adds clarity.

110.26(C)(2) Large Equipment



Large equipment is generally required to have an entrance/egress at each end of the working space for equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide or for service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

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Public Input No. 2010-NFPA 70-2020 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and the total length of the installation, including the space between the individual disconnects is over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space. Open doors that reduce the entry or egress space to less than 610 mm (24 in) shall be considered as impeding the entry or egress space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

There are two proposed changes to clarify the rules in this PI.

The first addresses how to measure the space occupied by the 2 to 6 individual service disconnecting means for the application of the large equipment rule. The new language makes it clear that this an end to end measurement including the space between the individual disconnects. The current language does not tell us if the measurement is just the sum of the disconnects themselves or includes the space between the disconnects. This is a worker safety rule and any error should be on the conservative side, requiring the inclusion of the space between the disconnects.

The second proposed change looks at what constitutes an impediment to the entry or egress path where an equipment door is open. The new language specifies that where the space with the door open is less than 24", that the path has been impeded. The 24" is based on the parent text in 110.26(C)(2)

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jul 25 14:53:23 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8643-NFPA 70-2021

Statement: The Panel concludes that the requirement for open equipment doors not impeding the entry or egress from the working space is most appropriately relocated to 110.26(A)(2).

The addition of the 6 foot combined width requirement for service disconnecting means adds clarity.

Public Input No. 2787-NFPA 70-2020 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or ~~more and over 1.8 m (6 ft) wide~~ more

Open equipment doors shall not impede the entry to or egress from the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Statement of Problem and Substantiation for Public Input

In the second draft stage of the 2020 NEC revision cycle, CMP-1 added the 6 foot requirement to 110.26(C)(2)(2) in an apparent attempt to correlate with 110.26(C)(2)(1). This creates significant problems in the field. How do I measure the six feet? Do I measure just the width of the enclosures? Do I include the space between enclosures? How do I measure when three enclosures are on one wall and three on another?

The reality is that the distance is irrelevant. This requirement is addressing the significant arc flash energy that exists with service equipment at 1200 amps or more. The energy released in an arc flash incident is the same, the distance referenced in 110.26(C)(2)(2), no matter how you measure it, is not a factor.

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 01 07:44:30 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate technical substantiation. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 3703-NFPA 70-2020 [Section No. 110.26(C)(2)]

(2) Large Equipment.

For large equipment that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide

(2) For service disconnecting means installed in accordance with 230.71 where the combined ampere rating is 1200 amperes or more and over 1.8 m (6 ft) wide

Open equipment doors shall not impede the entry to or egress from the working space.

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

Ex 1: In supervised industrial locations with written safety procedures ensure that equipment doors facing each other will not be open at the same time, only the largest of the two doors shall be considered when evaluating egress obstruction.

Ex 2: The requirement for doors obstructing egress shall not apply to replacement equipment in existing installations.

Statement of Problem and Substantiation for Public Input

The broad requirement of prohibiting equipment doors from obstructing egress is great on paper but problematic in reality. In some of the facilities that I teach the equipment rooms would need to be approximately 30 feet larger, and replacing equipment is now impossible.

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:08:04 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate technical substantiation. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 3563-NFPA 70-2020 [Section No. 110.26(C)(3)]

(3) Personnel Doors.

Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard For Safety For Panic Hardware*. For fire exit hardware, see UL 305, *Standard For Panic Hardware*, and UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies*.

Additional Proposed Changes

File Name	Description	Approved
Door_obstruction.jpg	Sprinkler pipe obstructing electric room door from fully opening.	

Statement of Problem and Substantiation for Public Input

Doors must be able to open at least 90 degrees in order for people to safely and quickly escape danger in an emergency situation such as an electrical explosion or arc flash event. If the door were to come to a sudden stop at only 30 degrees due to an obstruction, people rushing through the door could be hindered or even injured during their escape. I have actually been "stunned" and even disoriented by doors not opening fully and coming to an unexpected and sudden early stop. Now imagine that scenario during an panic situation! It could result in injuries or even death.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3566-NFPA 70-2020 [Section No. 110.33(A)(3)]	
Public Input No. 3568-NFPA 70-2020 [Section No. 480.10(E)]	
Public Input No. 3570-NFPA 70-2020 [Section No. 450.43(C)]	
Public Input No. 3575-NFPA 70-2020 [Section No. 646.19 [Excluding any Sub-Sections]]	
Public Input No. 3582-NFPA 70-2020 [Section No. 110.31(A)(4)]	

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 07:31:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8363-NFPA 70-2021

Statement: The Panel revised the references in Informational Notes in Article 90 and 110 to conform with the designated structure in 3.1.3.1 and 4.1.3 of the revised NEC Style Manual.

The Panel concludes that doors should open at least 90 degrees which will allow a safe means of egress for personnel.


THIS IS A RATED F
DO NOT PENETRAT
AT EXT. 6-2422 FOR

Public Input No. 4280-NFPA 70-2020 [New Section after 110.26(D)]

Emergency Illumination

An emergency lighting system shall automatically illuminate the areas around electrical service equipment greater than 200 amperes for a duration of not less than 90 minutes.

Statement of Problem and Substantiation for Public Input

To provide INGRESS AND egress illumination in the event of a power failure -- especially when the power failure is the result of an accident at the service. Previous responses to this proposal refer to building codes and NFPA 101. Sections 1008 (Means of Egress Illumination) and Section 1009 (Accessible Means of Egress) of the ICC's International Building Code do not contemplate the condition in which a power failure caused the outage to begin with and that there would be no illumination for worker rescue. NFPA 101 refers to the IBC which effectively creates a do-nothing loop which should be remedied in an NEC section that sets general rules for electrical safety.

Electrical professionals should not rely upon the International Building Code to assure adequate illumination to rescue a fallen electrician.

Submitter Information Verification

Submitter Full Name:	Michael Anthony
Organization:	Standards Michigan
Affiliation:	IEEE Education & Healthcare Facilities Electrotechnology Committee
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 10 09:13:23 EDT 2020
Committee:	NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate substantiation. The proposed requirement is overly broad and as written applies to all service equipment, not just emergency equipment.

Public Input No. 205-NFPA 70-2019 [Section No. 110.26(D)]

(D)_ Illumination.

~~Illumination shall~~ Illumination of not less than 10 footcandles shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

Additional Proposed Changes

File Name	Description	Approved
electrical_room_lighting.JPG	Electrical Room Lighting	

Statement of Problem and Substantiation for Public Input

It has now become necessary to define the minimum lighting level in electrical rooms, in order that room occupants be able to read the NFPA-70 warnings which are required for life-safety [see 110.16(A), (B), etc.]. Failure to define a minimum level at this time will cause illumination about electrical equipment to fall prey to the energy conservation codes, some of which may mandate lesser lighting levels in order to reduce energy consumption.

10 footcandles is the recommended level for electrical closets; this information was taken from the "The Lighting Handbook Reference and Application" 10th edition (2011), Chapter 22 "Lighting for Common Applications," page 22.26 and 22.27.*

*20 footcandles for equipment rooms

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 26 16:34:18 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not adequate included technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.



Public Input No. 240-NFPA 70-2020 [Section No. 110.26(D)]

(D) Illumination.

Illumination of not less than 500 lux shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, transfer switches, generators or motor control centers installed indoors or outdoors . Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

Additional Proposed Changes

File Name	Description	Approved
Table_22.2_IES_hb.JPG	IES HB Table 22.2	

Statement of Problem and Substantiation for Public Input

With LED lighting being used as the base line for Energy codes (California) and are limiting the wattage able to be used in electrical spaces for illumination a minimum level of illumination needs to be specified.
110.26 attempts to specify that illumination is required for the working space provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment, however the level of illumination is not specified or referenced.

110.26 D needs to indicate a minimum level of illumination to permit ready and safe operation and maintenance of the electrical equipment. Note that there may need to be a level for safe access and operation and a second higher level of illumination of the working space for maintenance of the electrical equipment (example racking in or out of a breaker, loading or mounting a breaker, inspecting a breaker, wire terminations etc).

The IES handbook gives guidelines 100 lux (10fc) and electrical panels which is the light level of most hallways which could facilitate safe operation of panel board breakers.
The IES hand book also gives Equipment rooms a higher illumination level of 200 lux (20fc) and for Manufacturing basic industrial maintenance tasks a minimum illumination level of 500 lux (50fc).

The requirements should be for both indoor and outdoor installations.

Specifying a minimum level of illumination for ready and safe operation and maintenance of the electrical equipment will give a lighting designer more than just a energy code to use as guidance for electrical spaces and may require the addition of a separate fixture to be used only during maintenance of the equipment while the rest of the space is illuminated at a lower level for the ingress and egress of the working spaces. The trade off may be that the lower 10fc level of illumination can be occupancy controlled while the higher 50fc illumination level is separately manually controlled.

Submitter Information Verification

Submitter Full Name: Ben Capehart
Organization: Schetter Electric Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 02 18:44:32 EST 2020

Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 2564-NFPA 70-2020 [Section No. 110.26(D)]

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors. The illumination level must be adequate to easily read warning signs, panel directories, and to perform service work. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

Informational Note: See OSHA Standard 1926.56 for minimum light levels.

Statement of Problem and Substantiation for Public Input

This input is being submitted on behalf of the Minnesota Department of Labor and Industry. The Department's 15 office/field staff, and 65 plus contract electrical inspectors complete over 150,000 electrical inspections annually and are involved in the daily enforcement and interpretation of the National Electrical Code.
Electrical equipment is often located in basements and utility rooms that are illuminated poorly. The current language does not address the minimum amount of lighting required for the proper servicing of the electrical equipment. This language will help the Authority Having Jurisdiction (AHJ) to enforce some minimum lighting performance requirements.

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 17:43:55 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not included adequate technical substantiation to warrant a change. "easily read warning signs" is not specific or easily defined. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 2783-NFPA 70-2020 [Section No. 110.26(D)]

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control ~~centers installed indoors~~ centers . Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

Statement of Problem and Substantiation for Public Input

Outdoor service equipment, switchboards, switchgear, panelboards, or motor control centers may be accessed for maintenance or service at night. A flashlight may be the only means of illumination. For remote locations a simple switch controlled luminaire would meet this requirement.

Submitter Information Verification

Submitter Full Name: Richard Hollander
Organization: Shums Coda Associates
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 31 20:58:17 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Sufficient technical substantiation has not been provided by the submitter. The Code does not prohibit what the submitters are suggesting. Further, in some cases, outdoor illumination might conflict with local ordinances for light pollution or light level.

Public Input No. 3369-NFPA 70-2020 [Section No. 110.26(D)]

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors. Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles. Enclosed rooms meeting the requirements of 110.26(C)(2) for Large Equipment shall be provided with both normal and emergency illumination that meets the requirements of 700.12.

Statement of Problem and Substantiation for Public Input

This code change is intended to address commercial buildings with service equipment that often requires two means of entrance/egress due to potential safety concerns for egress. In an emergency situation such as equipment failure and an arc-flash, the general lighting will typically not be on to provide illumination for egress for personnel servicing this equipment or provide illumination for emergency personnel to enter the area/room to rescue injured personnel.

Submitter Information Verification

Submitter Full Name: Rudolph Garza
Organization: IAEI
Affiliation: IAEI
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 11:28:52 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Reference to all of 700.12 may be overly restrictive. The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 4394-NFPA 70-2020 [Section No. 110.26(D)]

(D) Illumination.

Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, panelboards, or motor control centers installed indoors or outdoors . Control by automatic means shall not be permitted to control all illumination within the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.

Statement of Problem and Substantiation for Public Input

In many locations service equipment, switchgear and panelboards are being installed outdoors without any exterior lighting being provided to allow for safe operation of the electrical equipment. Having to rely on the use of portable lighting when accessing or operating this equipment does create an unsafe situation for the electrical worker. In many parts of the country during the winter months daylight hours are minimal at best. If it is required for indoor installations then it shoud be required for outdoor installations also.

Submitter Information Verification

Submitter Full Name: Wendell Whistler
Organization: IBEW Local 280
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 11:52:46 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Sufficient technical substantiation has not been provided by the submitter. The Code does not prohibit what the submitters are suggesting. Further, in some cases, outdoor illumination might conflict with local ordinances for light pollution or light level.

Public Input No. 3720-NFPA 70-2020 [Section No. 110.26(E)]

(E) Dedicated Equipment Space.

All switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces ~~and protected from damage~~ .

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

(2) Outdoor.

Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2)(c).

(a) *Installation Requirements.* Outdoor electrical equipment shall be the following:

(2) Installed in identified enclosures

(3) Protected from accidental contact by unauthorized personnel or by vehicular traffic

(4) Protected from accidental spillage or leakage from piping systems

(e) *Work Space.* The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(f) *Dedicated Equipment Space.* The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

Statement of Problem and Substantiation for Public Input

This PI seeks to remove the language about physical damage, as it is already required by 110.27(B). Terra decided to underline existing text, so I apologize if that created any confusion.

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:21:24 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The Panel concludes that the equipment dedicated space shall be protected from damage. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1013-NFPA 70-2020 [Section No. 110.26(E)(1)]

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A ceiling with removable tiles such as dropped, suspended, or a similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Additional Proposed Changes

File Name	Description	Approved
suspended_drywall_ceiling_1.jpg	Suspended drywall ceiling WITHOUT removable tiles.	
Dropped_drywall_ceiling.jpg	Dropped drywall ceiling	

Statement of Problem and Substantiation for Public Input

This section needs to be revised to in order to recognize the fact that not all dropped or suspended ceilings have removable tiles. Many types of dropped or suspended ceilings exist that may not be considered " structural" as described in this present text, but these ceilings do in fact create a solid "finished" ceiling, For example; dropped or suspended ceilings without removable tiles can be made from drywall attached to metal framing members suspended from the metal trusses above. Wire mesh and plaster can also be used to create a solid finished ceiling on metal framing that is suspended from the concrete deck above. These types of solid ceilings create the finished space but are presently not permitted within the 6ft. dedicated space above electrical switchboards or panelboards. But why not? Installing a panelboard or switchboard in a space where this type of ceiling is installed at a typical height of 8-10ft. is virtually impossible to comply with the 6ft, dedicated space required above the electrical equipment! Unless of course a portion of the ceiling is removed above the electrical equipment! This seems too extreme. There is simply no good reason to prohibit these types of solid ceilings in the 6ft. space above electrical equipment. There seems to be confusion about which types of dropped or suspended ceilings are meant to be covered by this rule. I believe this revision will help clarify that issue. Please see photos example submitted with this PI.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:

Zip:

Submittal Date: Sat May 09 08:51:56 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.


2020 NEC®
Suspended drywall ceiling
Less than 6ft. = Violation
Switchboard


Dropped drywall ceiling

Public Input No. 1122-NFPA 70-2020 [Section No. 110.26(E)(1)]

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

~~Suspended~~

Informational Note: *Ceilings* . A dropped, framed, suspended, or similar ceiling that ~~does~~ is not ~~add strength~~ vital to the building structure shall not be considered a structural ceiling.

Statement of Problem and Substantiation for Public Input

Framed ceilings are being used as a way to skirt the provisions of this section. electrical room come in all size for smaller rooms it is easier to install a framing stud to support the drop ceiling. This type of framed ceiling causes confusion in the field because this section title states suspended ceilings not being structural and leaves the framed one being miss interpreted as structural. It is not, like a wall, one could be barring (structural) the other non-barring (non-structural). If the space above the panel exist the NEC requires it to remain open.

this is more of a definition offering guidance and is confusing listed as a general rule. Is a drop ceiling allowed in the dedicated space? The answer would be no based on the exception in 110.26 (E) (1) (1) (a). However some AHJ think otherwise because of this section. Making this an informational note would make it clear this type of ceiling, unless it has removable panels, is not allowed in the dedicated space.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1424-NFPA 70-2020 [Section No. 110.26(E)(1)]	

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: master electrician
Street Address:
City:
State:

Zip:

Submittal Date: Mon May 18 12:09:07 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: The proposed language in the PI for an Informational Note contains a requirement by the use of the words “shall not be” and does not comply with NEC Style Manual, Section 3.1.3. The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1306-NFPA 70-2020 [Section No. 110.26(E)(1)]

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.For the purpose of this section a dropped ceiling, framed, suspended or similar type that is not vital to the building structure shall not be considered a structural ceiling.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) ~~*Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.~~

Statement of Problem and Substantiation for Public Input

Framed ceilings are being used as a way to skirt the provisions of this section. electrical room come in all size for smaller rooms it is easier to install a framing stud to support the drop ceiling. This type of framed ceiling causes confusion in the field because this section title states suspended ceilings not being structural and leaves the framed one being miss interpreted as structural. It is not, like a wall, one could be barring (structural) the other non-barring (non-structural). If the space above the panel exist the NEC requires it to remain open.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1424-NFPA 70-2020 [Section No. 110.26(E)(1)]	

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 29 09:32:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1424-NFPA 70-2020 [Section No. 110.26(E)(1)]

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(~~d~~ c).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the ~~structural ceiling~~ bottom side or the floor or roof decking , whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) ~~*Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.~~

Additional Proposed Changes

File Name	Description	Approved
110.png	2004 110.26 (F) (1) (a)	

Statement of Problem and Substantiation for Public Input

This section has been misinterpreted for many years because of the structural ceiling language. Installer and AHJ are allowing framed sheet rock ceilings to skirt the dedicated space. In 2004 the CMP stated that the space includes the area above the bottom of the floor joist to the bottom side of the floor decking. This new language reflects the intent of the dedicated space extending to the floor or roof decking above the equipment, even if the bottom of the floor joist or roof rafters a covered with sheet rock.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1306-NFPA 70-2020 [Section No. 110.26(E)(1)]	
Public Input No. 1122-NFPA 70-2020 [Section No. 110.26(E)(1)]	

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master Electrician
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 02 17:20:04 EDT 2020

Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input

1-222 Log #3515 NEC-P01 **Final Action: Reject**
(110-26(F)(1)a)

Submitter: Robert H. Keis Dover, DE

Recommendation:

Add new sentence to end of paragraph section (a):
For the purpose of this section the dedicated space shall not extend above the bottom of the floor joist above the equipment where there is no finished ceiling.

Substantiation:

There are too many arguments in the field about where this six foot dedicated space ends on the upper side when there are exposed ceiling joist. Plumbers have been prohibited from running their pipes through the floor joist above because of conflicts of where this six foot space ends above the electrical equipment. If there is a ceiling installed then there is no problem, but with open joist some electricians are claiming all the space up to the subfloor above.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that this dedicated space includes the area above the bottom of the floor joist if it is within the area extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower. Therefore CMP 1 concludes that foreign systems, such as plumbing pipes as the submitter suggests, are a potential source of damage to electrical equipment from condensation, leaks, or breaks in such foreign systems.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Public Input No. 255-NFPA 70-2020 [Section No. 110.26(E)(1)]

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical ~~Space~~ Zone* . The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the electrical equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* The area above the dedicated ~~space required~~ electrical zone required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Statement of Problem and Substantiation for Public Input

The word "space" is somewhat vague by nature, and using the word "zone" in the title seems to clarify the intent. The second sentence in (a) even uses the term "zone."

It's a zone.

The word "zone" sounds much more restrictive and will help the electrical inspector in the field, who must enforce this section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 256-NFPA 70-2020 [Section No. 110.26(E)(2)]	
Public Input No. 256-NFPA 70-2020 [Section No. 110.26(E)(2)]	

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 07 15:19:03 EST 2020

Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 4042-NFPA 70-2020 [Section No. 110.26(E)(1)]

(1) Indoor.

Indoor installations shall comply with 110.26(E)(1)(a) through (E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) *Foreign Systems.* ~~The~~ Pipes or ducts foreign to the electrical installation and requiring periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located in the vicinity of the area above the dedicated space required by 110.26(E)(1)(a). Protection shall be ~~permitted to contain foreign systems, provided protection is installed~~ provided where necessary to avoid damage ~~to the electrical equipment~~ from condensation ~~,~~ leaks ~~, or~~ and breaks in such foreign systems. Piping and other facilities shall not be considered foreign if provided for fire protection of the electrical installation.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Statement of Problem and Substantiation for Public Input

110.26(E)(1)(b), Foreign System have created many hazards or problems. Proposing more restrictive prohibitions similiar to the requirement in 110.34(F). . The following are some of the hazards that will be present when forign systems above electrical equipment;

1) Sewer pipes, main water pipes and similar systems with large amount of fluid are not stopped with drip pans.

2) Where these electrical equipment are emergency and legally required power systems during a pipe brake will pause an imidiate hazard to the safety of human life.

3) In healthcare facilities, it is very common to have in such facilities, patients bathrooms and exam room sinks with piping installed at the ceiling of the floor below, this will be true for spaces above main electrical distribution rooms.

4) Foreign systems where installed above electrical equipment require workers (unqualified to work on electrical equipment) to work above energized electrical equipment.

Submitter Information Verification

Submitter Full Name: Mathher Abbassi
Organization: New York City Department Of Buildings
Street Address:
City:
State:
Zip:

Submittal Date: Wed Sep 09 18:45:57 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1515-NFPA 70-2020 [Section No. 110.26(E)(2)]

(2) Outdoor installation requirements .

Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2) ~~(c).~~

(a) ~~*Installation Requirements.* Outdoor electrical equipment shall be the following:~~

(2) ~~Installed in identified enclosures~~

(1) Protected from

~~accidental contact by unauthorized personnel or by vehicular traffic~~

(3) ~~Protected from accidental spillage or leakage from piping systems~~

(1) physical damage by a vehicle or other mobile operated equipment.

(2) *Work Space.* The working clearance space shall include the zone described in 110.26(A) . No architectural appurtenance or other equipment shall be located in this zone.

(3) *Dedicated Equipment Space.* The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation.

~~No piping or other equipment foreign to the electrical installation shall be located in this zone~~

(d)

(1) Foreign Systems shall not be permitted in the dedicated space area. Foreign systems, shall be permitted above the dedicates space area and if needed additional protection shall be installed to avoid damage to the electrical equipment from leaks, or breaks in such foreign systems .

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

Statement of Problem and Substantiation for Public Input

equipment installed outdoors already has a to be rated for outdoor use110.28 and accidental contact 110.27. the rules are redundant. physical protection from vehicle is a possibility IF likely to happen otherwise not necessary, the current language appears to require protection all the times. Also this hazard could happen with other mobile equipment such as a fork lift. the foreign equipment allowed above would only cause an issue if other than water like a corrosive liquid was involved. There is no need to protect a NEMA 4 enclosure from water condensation or leakage. Accidental spillage is to vague a term and would imply an open container to spill from not a piping system, that would be a leak.

Submitter Information Verification

Submitter Full Name: Alfio Torrisi
Organization: Master electrician
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 15 11:33:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 256-NFPA 70-2020 [Section No. 110.26(E)(2)]

(2) Outdoor.

Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2)(c).

(a) *Installation Requirements.* Outdoor electrical equipment shall be the following:

(2) Installed in identified enclosures

(3) Protected from accidental contact by unauthorized personnel or by vehicular traffic

(4) Protected from accidental spillage or leakage from piping systems

(e) *Work Space.* The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(f) *Dedicated ~~Equipment Space~~ Electrical Zone* . The space equal to the width and depth of the electrical equipment, and extending from grade to a height of 1.8 m (6 ft) above the electrcial equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

Statement of Problem and Substantiation for Public Input

Note: I did not change (a)(1), (a)(2), (a)(3), and I did not add (a)(4).

Terra is acting up again and I can't get rid of those lines. This is terrible and it makes suggesting code changes very difficult.

The reason for the change is for clarity. The word "space" is somewhat vague by nature, and using the word "zone" in the title seems to clarify the intent. The word "zone" sounds much more restrictive and will help the electrical inspector in the field, who must enforce this section.

The reason for the change is also for consistency - we use Dedicated Electrical Zone for "Indoor" 110.26(E)(1), so it makes sense to use the same terminology for "Outdoor" 110.26(E)(2); the appropriate section (Indoor or Outdoor) defines the zone with subtle differences, and makes clear that nothing foreign to the electrical installation can be installed in the "Dedicated Electrical Zone."

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 255-NFPA 70-2020 [Section No. 110.26(E)(1)]	
Public Input No. 255-NFPA 70-2020 [Section No. 110.26(E)(1)]	

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:

Zip:

Submittal Date: Tue Jan 07 15:25:55 EST 2020

Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 3709-NFPA 70-2020 [Section No. 110.26(E)(2)]

(2) Outdoor.

~~Outdoor installations shall comply with 110.26(E)(2)(a) through (E)(2)(c).~~

- ~~*Installation Requirements.* Outdoor electrical equipment shall be the following:~~

(1) ~~Installed in identified enclosures~~

(2) ~~Protected from accidental contact by unauthorized personnel or by vehicular traffic~~

(3) ~~Protected from accidental spillage or leakage from piping systems~~

~~*Work Space.*~~
The

~~working clearance~~
space

~~shall include the zone described in 110.26(A) . No architectural appurtenance or other equipment shall be located in this zone. *Dedicated Equipment Space.* The space~~
equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

Statement of Problem and Substantiation for Public Input

The text marked for deletion is already covered elsewhere in the Code or it doesn't belong here at all. See 110.27 and 110.28, for example. The working space and dedicated space are two different requirements and should not be mixed together here.

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Ryan Jackson
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:12:59 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Removing this section will not add clarity to the Code. The Panel affirms the requirements as they presently exist are appropriate for this section. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 596-NFPA 70-2020 [Section No. 110.26(E) [Excluding any Sub-Sections]]

All service equipment, switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

Statement of Problem and Substantiation for Public Input

The addition of service equipment would add clarity to the code that the service disconnects required in 230.85 should also have dedicated equipment space. A service rated disconnecting means should have the same protections as service rated switchgear and service rated panelboards. The same should also apply to service rated transfer equipment.

Submitter Information Verification

Submitter Full Name: Brian Baughman
Organization:
Affiliation: myself
Street Address:
City:
State:
Zip:
Submittal Date: Wed Mar 04 09:41:50 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8654-NFPA 70-2021
Statement: The addition of service equipment adds clarity to the Code that the service disconnects required in 230.85 should also have dedicated equipment space. A service rated disconnecting means should have the same protections as service rated switchgear and service rated panelboards.

Public Input No. 1423-NFPA 70-2020 [Section No. 110.27(A)]

(A) Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this *Code,* live parts of electrical equipment operating at 50 to 1000 volts, nominal shall be guarded against accidental contact by approved ~~enclosures or~~ enclosures requiring the use of a key or tool to open any enclosure doors or remove any covers, or by any of the following means:

(1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.

(2) By permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

(3) By location on a balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

(4) By elevation above the floor or other working surface as follows:

(5) A minimum of 2.5 m (8 ft) for 50 volts to 300 volts between ungrounded conductors

(6) A minimum of 2.6 m (8 ft 6 in.) for 301 volts to 600 volts between ungrounded conductors

(7) A minimum of 2.62 m (8 ft 7 in.) for 601 volts to 1000 volts between ungrounded conductors

Additional Proposed Changes

File Name	Description	Approved
70933DB6-6F0B-42DA-93CC-B2176A8FA4D2.jpeg	no tools tools needed to open 1	
D152D016-6D70-4761-8BEA-5130B5565CE6.jpeg	no tools needed to open 2	

Statement of Problem and Substantiation for Public Input

This rule follows the same logic that drove changes for the disconnecting means specified in Section 690.13(A). We do not want children or any other unknowledgeable person being able to unknowingly expose themselves to dangerous electrical hazards by simply flipping open the cover for an unlocked or unsecured enclosed switch or other electrical enclosure. There are many other types of enclosures that have hinged covers that can be opened without the use of any tools too. It could be a timeclock box in a grandmother's basement, or it could be a disconnect for an air conditioner in a homeowner's backyard! This type of enclosure poses a dangerous hazard to curious children especially young boys who seem to be more prone to getting shocks and burns than their female counterparts. Requiring the use of a key or tool to access live parts is a simple, but HUGE safety improvement that can be implemented for a few pennies! Nuts and bolts could be used, screws could be used, some types of cable ties, and of course locks and keys could also provide a means for securing covers to prevent easy access to energized parts. I think it's time to recognize that this hazard is real, but huge improvements towards safer installations can be very simple and inexpensive. It's time to make this rule a mandatory requirement throughout the Code, rather than only in select installations.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:

State:
Zip:
Submittal Date: Tue Jun 02 14:37:22 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The PI does not add clarity to the Code. The proposed change has not been adequately substantiated. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.


PUMP 3
67A
ON
MURRAY
Heavy Duty
Safety Switch
30A 600VAC, 250VDC
Horsepower Rated
DANGER
Hazardous Voltage.
Will cause death or
serious injury.
OFF
8329
8328
8327


BRYANT
CAT. NO. HFN302
TYPE 1 ENCLOSURE-INDOOR
60 Amp 600 Volts AC
TRS60R

Public Input No. 4232-NFPA 70-2020 [Section No. 110.27(A)]

(A) Live Parts Guarded Against Accidental Contact.

Except as elsewhere required or permitted by this *Code,* live parts of electrical equipment operating at 50 to 1000 volts, nominal shall be guarded against accidental contact by approved enclosures or by any of the following means:

(1) By location in a room, ~~vault~~ cage , vault or similar enclosure that is accessible only to qualified persons.

(2) By permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts including from above . ~~Any~~ Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.

(3) By location on a balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.

(4) By elevation above the floor or other working surface as follows:

(5) A minimum of 2.5 m (8 ft) for 50 volts to 300 volts between ungrounded conductors

(6) A minimum of 2.6 m (8 ft 6 in.) for 301 volts to 600 volts between ungrounded conductors

(7) A minimum of 2.62 m (8 ft 7 in.) for 601 volts to 1000 volts between ungrounded conductors

Statement of Problem and Substantiation for Public Input

This is a modification of a proposal made last cycle to strengthen the requirement to protect untrained persons from reaching into an exterior switchgear assembly with live parts. Many industrial class installations of regulated public utilities protect their switchgear from above with screening from animals and vandalism and untrained persons who may not understand electrical hazards. Oil-filled transformers, for example, do not have as loud a 60-cycle hum does not signal an electrical hazard as loudly as a dry-type transformer. I know of at least one example of an extreme electrical injury that was suffered by a young person who was unfamiliar with silent exterior switchgear that was live and could be accessed from above. Changes were made to the NEC several years ago when a young person drowned in a spa for lack of an emergency OFF switch nearby. The NEC should respond in a similar manner to protect untrained persons from accessing live exterior electrical equipment from above.

Submitter Information Verification

Submitter Full Name:	Michael Anthony
Organization:	Standards Michigan
Affiliation:	IEEE Education & Healthcare Facility Electrotechnology Committee
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 10 07:32:31 EDT 2020
Committee:	NEC-P01

Committee Statement

Resolution: The submitter has not provided sufficient substantiation to warrant the change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input. The word “cage” is subjective and would create confusion for the Authority Having Jurisdiction to determine what a cage is. “Vault” is a defined term and “room” is an understood term.

Public Input No. 3926-NFPA 70-2020 [New Section after 110.27(C)]

(D) Enclosure Doors and Covers.

Where a disconnecting means for circuits operating at 50 V or greater are readily accessible to unqualified persons, an enclosure door or hinged cover that exposes live parts when open shall have its door or cover locked or require a tool to open.

Statement of Problem and Substantiation for Public Input

Similar language was added during the 2020 cycle within Articles 690, Section 690.15(A), and in Article 705, Section 705.20(5). This language was added in response to public input addressing concerns that where some enclosure types are used, such as safety switches with hinged-doors, these can be opened without the use of tools (albeit when in the off/open position). These devices may expose live parts that are not guarded. Therefore where these devices are located in readily accessible locations, accessible to unqualified persons, a requirement to prevent the cover from being opened without the use of a tool or a key is advised. One practical means of achieving this without a lock and without modifying an enclosure is by adding a bolt and nut combination fastened through a lock hasp integrated into the enclosure door or cover. This method of securement has been observed in the field. This language is being suggested in 110.27 in an effort to harmonize requirements for this equipment in these applications across this Code. If accepted, the slightly different language in 690 and 705 would no longer be necessary and is suggested to be removed through related PIs from this group.

The PV Industry Forum (PVIF) is a collaborative initiative of several organizations dedicated to continually improving the installation safety of PV systems in the U.S. The organizations are the Solar Energy Industry Association (SEIA), the PV Industry Codes Council (PVICC), Solar Energy International (SEI), the Interstate Renewable Energy Council (IREC), and the Large-Scale Solar Association (LSA). This coalition has come together to organize, convene, support and mentor solar industry professionals through the NEC public input process, which is open to all solar industry participants.
This collaborative effort has resulted in the consensus development of numerous solar-related Public Input proposals for consideration. The list of task group members indicates those individuals who have contributed to the development of various Public Inputs in nine different tasks groups. A consensus process was used to develop each Public Input, therefore this list does not necessarily indicate that each individual or their representative organization participated in or has agreed with every proposed Public Input submitted under the PVIF effort. Each participant has agreed that any original proposal that they submitted and which was subsequently improved by our process is assigned as original and / or improved work to PVIF for submittal and release to NFPA as a proposed Public Input.
Members of the PVIF's effort include the following representatives. Note that those noted below participated in specific task groups and not necessarily all task groups on specific items proposed. Each member is at their discretion to individually comment on PI's as they deem appropriate and their inclusion here is not necessarily an endorsement of all the PI's submitted.
Evelyn Butler, SEIA; Jason Fisher, SEIA; Ward Bower, Ward Bower Innovations LLC/SEIA; Joseph Cain, P.E., SEIA; Bill Brooks, PVICC; John Berdner, PVICC, Rebekah Hren, Solar Energy International; Brian Mehalic, Solar Energy International; Mark Rodriguez, Sunrun; Paul Joyce, Sunrun; Brian Ewing, Swinerton; Sumana Seshadri, Swinerton; Christian Eder, Fronius USA; Isaac Opalinsky, SunPower; Chris Fox, SunPower; James Cormican, RBI Solar; Dave Compaan, RBI Solar; Shawn Shaw, Natural Power; Cody Oram, Vivint Solar; Greg Elvestad, Vivint Solar; Mike Weimer, Westwood Professional Services; Doug Mutcher, Westwood Professional Services; Jeff Wang, Staubli; Colleen O'Brien, UL; John Doty, UL; Laurie Florence, UL; Tim Zgonena, UL ; Gokul Kalyan, FTC Solar; Ali Sedaghat, FTC Solar; K.C. Radford, Radian Generation; Jan Dominguez, LG Electronics; Ben Chamberlain, Olivewood Energy; Klaus Nicolaedis, Unirac Inc.; Leif Cook, Core Development Group; Martin Herzfeld, Herzfeld; Dave Click, esaSolar; Sean White, principal; Kate Collardson, BayWa r.e. Solar Systems; Bryan Holland, NEMA; Jack Lyons, NEMA; Mike Stone, NEMA; Evan Martin, BURNDY; Terry McKinch, Mortenson; Jason Bobruk, SolarEdge Technologies; Reid ; train, Savion; Charlie Dearie, McCalmont Engineering; Sumanth Lokanath, Ray Illuminati LLC; Yann Schwarz, Esdec Inc.; Joseph Armano, PanelClaw, Inc.; Michael Heinrich, PanelClaw, Inc.; Steve Wurmlinger, SMA Solar Technology AG; Thomas Wegener, SMA Solar Technology AG; Chris Flueckiger, Key Renewables; Matt Piantedosi, Ridgeline Energy Analytics; Samantha Doshi, Intertek; Kyle Breuning, Tesla; Charles Picard, Tesla; Steve Connolly, Tesla; Greg Ball, Tesla; Jake West, Tesla; Jamie Daggett, DNV

GL; MinWah Leung, DNV GL; Bob White, Fimer SpA; Marvin Hamon, Pure Power Engineering; Milton Nogueira, Roof Tech; Peter Seidel, First Solar; Jason Smolko, Copperweld;

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3663-NFPA 70-2020 [Section No. 690.15(A)]	Location of similar requirements in 690 for removal if accepted.
Public Input No. 3942-NFPA 70-2020 [Section No. 705.20]	Location of similar requirements in 705 for removal if accepted.
Public Input No. 3663-NFPA 70-2020 [Section No. 690.15(A)]	
Public Input No. 3942-NFPA 70-2020 [Section No. 705.20]	

Submitter Information Verification

Submitter Full Name: Evelyn Butler
Organization: Solar Energy Industries Assn
Affiliation: PV Industry Forum (PVIF)
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 15:34:52 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Disconnecting means for circuits operating at 50 v or greater are equipped from the factory with a means to be locked. The submitter has not provided adequate technical substantiation of a problem that would require a general requirement in Article 110.

Public Input No. 3055-NFPA 70-2020 [New Section after 110.28]

110.29 Cybersecurity

An electrical installation, in other than dwelling units, that is connected to a communication network and permitted to control any portion of the premises electrical system shall comply with (1) and (2).

(1) A Cybersecurity Assessment shall be conducted on the connected system determine vulnerabilities to cyber-attacks.

(2) A Cybersecurity Commissioning Certification shall be conducted on the connected system to ensure they are designed against cyber-attacks and known vulnerabilities.

Documentation of the assessment and certification shall be made available to those authorized to inspect, operate, and maintain the system.

Informational note (1): ANSI/ISA 62443 Cybersecurity Standards series can be utilized to meet the assessment requirement. Other ways are thru the NIST Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, and UL 2900-2-3 for Security and Life Safety Signaling Systems.

Informational note (2): Examples of the commissioning certification used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(a) The ISA Security Compliance Institute (ISCI) conformity assessment program

(b) Certification of compliance by a nationally recognized test laboratory

(c) Manufacturer certification for the specific type and brand of system provided

Additional Proposed Changes

File Name	Description	Approved
Water_Treatment_Plant_Hit_by_Cyber-attack.pdf	Cyber Attacks on Water Treatment	
Cyber_Security_Protection_for_our_Schools.pdf	Cyber Security Protection for Schools	
Hackers_force_water_utilities_to_sink_or_swim.pdf	Hackers attacking water utilities	
State_of_Cyber_Attacks_in_Hospital_Emergency_Management_2019.pdf	Cybersecurity status for Hospitals	
History_of_Industrial_Control_System_Cyber_Incidents.pdf	Cyber Attacks on Industrial Control Systems	

Statement of Problem and Substantiation for Public Input

Cybersecurity should be considered as an aspect of safety and reliability in addition to the other factors affecting the availability of an electrical system. If an attacker can affect the building control system, individual sensors or other IoT devices to the point of either preventing normal operation or displaying the appearance of normal operation while failing the system, creates an unsafe condition. The increase in cyber attacks on industrial, utility, and institutional installations where the electrical infrastructure can be made to create unsafe conditions. Examples of these unsafe conditions can be changing overcurrent protection rating of a circuit breaker, arc energy reduction settings, SCADA systems, building management control systems, security systems, HVAC, motor controllers, or fire protection systems. This is especially true as

more people or children work on line because of Covid-19. The public input is focused only on electrical systems that can be controlled from external communication networks such as the internet. These connections can be wired, wireless, or use other data media. cybersecurity is essential to expand the safety of the electrical system.

https://www.varonis.com/blog/cybersecurity-statistics/

- 71% of data breaches were financially motivated and 25% were motivated by espionage
- Cybersecurity breaches have increased by 11% since 2018 and 67% since 2014
- 61% of organizations have experienced an IoT security incident
- IoT devices experience an average of 5,200 attacks per month
- The cost of a single data breach in the healthcare industry was $6.5 Million
- Average cost of a single malware attack on a company is $2.6M

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3070-NFPA 70-2020 [New Section after 517.2]	
Public Input No. 3075-NFPA 70-2020 [New Section after 670.6]	
Public Input No. 3080-NFPA 70-2020 [New Section after 700.8]	
Public Input No. 3083-NFPA 70-2020 [Section No. 708.4]	
Public Input No. 3087-NFPA 70-2020 [Section No. 708.8]	

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 04 11:25:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: While Panel 1 recognizes that protecting life-safety equipment and electrical systems connected to a communication network from cyber-attacks is very important, the Panel considers a proposed requirement in Article 110 overly broad. Public comments to specific articles would be more appropriate. Further, locating the recommendation in Article 110 would not apply to network communications systems covered by Chapter 8 except where the requirements are specifically referenced in Chapter 8.

Public Input No. 1811-NFPA 70-2020 [Section No. 110.28]

110.28 Enclosure Types.

Enclosures (other ~~than surrounding fences or walls covered in 110.31~~ than fences or walls surrounding an installation) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway or unsealed openings.

Table 110.28 Enclosure Selection

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use									
	Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

Informational Note No. 3: Dusttight enclosures are suitable for use in hazardous locations in accordance with 502.10(B)(4), 503.10(A)(2), and 506.15(C)(9).

Informational Note No. 4: Dusttight enclosures are suitable for use in unclassified locations and in Class II, Division 2; Class III; and Zone 22 hazardous (classified) locations.

Statement of Problem and Substantiation for Public Input

The Article 100 definition for "Enclosure":encompasses "fences and walls surrounding an installation". The enclosures Type-rated via either NEMA Standards 250 or UL Standards UL 50E include tests for rejection of ingress or egress of solids and liquids on size scales irrelevant for surrounding fences and walls. These standards do not evaluate the ability to exclude the entire body of a determined person, vehicle, herd of bovines, flood waters, et cetera. The parenthetic 110.31 exclusionary condition placed on "enclosures" in 110.28 disregards surrounding fences and wall for installations rated greater than 1000 volts. Nonetheless, the exclusion should extend to surrounding fences and walls for installations rated equal to or less than 1000 volts as well. Therefore, the exclusion should be for ALL surrounding fences and walls by deletion of the 110.31 reference. It's also unclear why the narrow 110.31 reference was reflected previously since the requirement 110.28 goes on to limit applicability to "rated not over 1000 volts nominal ", as do the scopes of the aforementioned standards.

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Further, as worded the requirement is ambiguous as to "surrounding" is an adjective modifying "fence or walls" or a gerund phrase referring to solely those enclosures that ACT UPON fences or walls (i.e., enclosures that surround a fence or walls). This will bring this requirement's wording into correlation with the Article 100 definition for "Enclosure":.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2434-NFPA 70-2020 [Definition: Enclosure.]	consideration of fences and walls surrounding an installation
Public Input No. 2438-NFPA 70-2020 [Section No. 300.6]	Revision correlation with Art 100 definition Enclosure and with Art 312
Public Input No. 2434-NFPA 70-2020 [Definition: Enclosure.]	
Public Input No. 2438-NFPA 70-2020 [Section No. 300.6]	

Submitter Information Verification

Submitter Full Name: Brian Rock
Organization: Hubbell Incorporated
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jul 08 11:15:51 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided sufficient adequate substantiation to warrant the change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 1960-NFPA 70-2020 [Section No. 110.28]

110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls covered in 110.31) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway or unsealed openings.

Table 110.28 Enclosure Selection

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use									
	Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

Informational Note No. 3: Dusttight enclosures are suitable for use in hazardous locations in accordance with 502.10(B)(4), 503.10(A)(2), and 506.15(C)(9).

Informational Note No. 4: Dusttight enclosures are suitable for use in unclassified locations and in Class II, Division 2; Class III; and Zone 22 hazardous (classified) locations.

Informational Note No. 5: For additional information, see NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum), for the description of the Enclosure Type Ratings and Ancillary - PW, for Pressure Wash.

Statement of Problem and Substantiation for Public Input

An Informational Note is being proposed to make the user of the Code aware that a standard exist that describes the individual Enclosures Types used in Table 110.28. This is indication to Ancillary Rating - PW, is also indicated for clarification.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jul 22 13:09:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8669-NFPA 70-2021

Statement: While it is understood that the Informational Notes are not enforceable, they do give insight how to understand what is being said in the Code. The addition of the Informational Notes 5, 6 and 7 add clarity about specific enclosure types.

Informational Note No. 3 was modified to add a reference to 502.10(A)(3) based on PI-2382. Informational Note No. 4 was not modified because all dusttight enclosures are not suitable for use in Division 1 locations.

Public Input No. 2382-NFPA 70-2020 [Section No. 110.28]

110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls covered in 110.31) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway or unsealed openings.

Table 110.28 Enclosure Selection

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use									
	Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

Informational Note No. 3: Dusttight enclosures are suitable for use in hazardous locations in accordance with 502.10 (A)(3), 502.10(B)(4), 503.10(A)(2), and 506.15(C)(9).

Informational Note No. 4: Dusttight enclosures are suitable for use in unclassified locations and in Class II, Division 1 and Division 2; Class III; and Zone 22 hazardous (classified) locations.

Statement of Problem and Substantiation for Public Input

Informational Note #3 and Informational Note 4 both do not indicate that Dusttight enclosures and be used in a Class II Division 1 location. But in 502.10 (A)(3) it clearly states that a Dusttight enclosure with threaded bosses can be used as long as there are no taps, joints or terminal connections. While it is understood that the Informational notes are not part of the code, they do give insight how to understand what is being said.

Submitter Information Verification

Submitter Full Name: Lowell Reith
Organization: Interstates Construction Servi
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 18 14:39:51 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8669-NFPA 70-2021
Statement: While it is understood that the Informational Notes are not enforceable, they do give insight how to understand what is being said in the Code. The addition of the Informational Notes 5, 6 and 7 add clarity about specific enclosure types.

Informational Note No. 3 was modified to add a reference to 502.10(A)(3) based on PI-2382. Informational Note No. 4 was not modified because all dusttight enclosures are not suitable for use in Division 1 locations.

Public Input No. 2957-NFPA 70-2020 [Section No. 110.28]

110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls covered in 110.31) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway, cable, or unsealed openings.

Table 110.28 Enclosure Selection

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use									
	Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: Ingress protection (IP) ratings may be found in ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

Informational Note No. 3: Dusttight enclosures are suitable for use in hazardous locations in accordance with 502.10(B)(4), 503.10(A)(2), and 506.15(C)(9).

Informational Note No. 4: Dusttight enclosures are suitable for use in unclassified locations and in Class II, Division 2; Class III; and Zone 22 hazardous (classified) locations.

Statement of Problem and Substantiation for Public Input

Add the word 'cable' so that the rule is complete.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:54:35 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The submitter has not provided adequate substantiation to warrant the change. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 4019-NFPA 70-2020 [Section No. 110.28]

110.28 Enclosure Types.

Enclosures (other than surrounding fences or walls covered in 110.31) of switchboards, switchgear, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 1000 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway or unsealed openings.

Table 110.28 Enclosure Selection

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use									
	Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*Mechanism shall be operable when ice covered.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No.

~~2:~~

2: Some Type 4X enclosures may be marked "indoor only."

Informational Note No. 3: Some Type 4, 4X and 12 enclosures are ventilated. One way to determine applicable requirements for evaluating such enclosures is to refer to UL 508A, Standard for Industrial Control Panels.

Informational Note No. 4: Ingress protection (IP) ratings may be found in ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*. IP ratings are not a substitute for Enclosure Type ratings.

Informational Note No. 3 5 : Dusttight enclosures are suitable for use in hazardous locations in accordance with 502.10(B)(4), 503.10(A)(2), and 506.15(C)(9).

Informational Note No. 4 6 : Dusttight enclosures are suitable for use in unclassified locations and in Class II, Division 2; Class III; and Zone 22 hazardous (classified) locations.

Statement of Problem and Substantiation for Public Input

It may be assumed that all Type 4X enclosures are suitable for both indoor and outdoor use as evidenced by the way the Type 4X rating is presented in the Table. However, some Type 4X enclosures may be marked “Indoor Only.” Therefore, Informational Note No. 2 is intended to provide this clarification.

Some Type 4, 4X and 12 enclosures are ventilated. Although they are ventilated, these enclosures provide the degree of protection stated in the Table. Published requirements exist for evaluating these enclosures and they are found in UL 508A, the Standard For Industrial Control Panels. Informational Note No. 3 raises the level of awareness of the existence of these enclosures and provides a reference for requirements covering their evaluation.

Submitter Information Verification

Submitter Full Name: John Kovacik
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 17:45:07 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8669-NFPA 70-2021

Statement: While it is understood that the Informational Notes are not enforceable, they do give insight how to understand what is being said in the Code. The addition of the Informational Notes 5, 6 and 7 add clarity about specific enclosure types.

Informational Note No. 3 was modified to add a reference to 502.10(A)(3) based on PI-2382. Informational Note No. 4 was not modified because all dusttight enclosures are not suitable for use in Division 1 locations.

Public Input No. 3582-NFPA 70-2020 [Section No. 110.31(A)(4)]

(4) Locks.

Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Additional Proposed Changes

File Name	Description	Approved
Door_obstruction.jpg	sprinkler pipe preventing electric room door from fully opening	

Statement of Problem and Substantiation for Public Input

Doors must be able to open at least 90 degrees in order for people to escape danger in an emergency situation such as an electrical explosion or arc flash event. If the door were to come to a sudden stop at only 30 degrees open due to an obstruction, people rushing through the door could be hindered or even injured during their escape. I have actually been "stunned" and even disoriented by doors not opening fully and coming to an unexpected and sudden early stop. Now imagine that scenario during an panic situation! It could result in injuries or even death.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3563-NFPA 70-2020 [Section No. 110.26(C)(3)]	door swing
Public Input No. 3566-NFPA 70-2020 [Section No. 110.33(A)(3)]	door swing
Public Input No. 3568-NFPA 70-2020 [Section No. 480.10(E)]	door swing
Public Input No. 3570-NFPA 70-2020 [Section No. 450.43(C)]	door swing
Public Input No. 3575-NFPA 70-2020 [Section No. 646.19 [Excluding any Sub-Sections]]	door swing

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 08:18:13 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8673-NFPA 70-2021
Statement: CMP-1 adds a requirement for doors to open at least 90 degrees in the direction of egress.

Including the Informational Note found in 110.26(C)(3) in 110.31(A)(4) provides the user the same clarity and information for installations over 1000 volts, Nominal.


THIS IS A RATED F
DO NOT PENETRAT
AT EXT. 6-2422 FOR

Public Input No. 4314-NFPA 70-2020 [Section No. 110.31(A)(4)]

(4) Locks.

Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard for Safety for Panic Hardware* .

For fire exit hardware, see UL 305, *Standard for Panic Hardware,* and UL10C, *Standard for Safety for Positive*

Pressure Fire Tests of Door Assemblies.

Statement of Problem and Substantiation for Public Input

Including the Informational Note found in 110.26(C)(3) in 110.31(A)(4) provides the user the same clarity and information for installations over 1000 volts, Nominal. Additionally it correlates Part II 1000 volts, Nominal, or less with Part III Over 1000 volts, nominal in the same fashion as found with other requirements.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4331-NFPA 70-2020 [Section No. 110.33(A)(3)]	

Submitter Information Verification

Submitter Full Name: Michael Farrell III
Organization: IBEW LU#8 Toledo, OH
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 09:59:16 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8673-NFPA 70-2021
Statement: CMP-1 adds a requirement for doors to open at least 90 degrees in the direction of egress.

Including the Informational Note found in 110.26(C)(3) in 110.31(A)(4) provides the user the same clarity and information for installations over 1000 volts, Nominal.

Public Input No. 3681-NFPA 70-2020 [Section No. 110.31(A)(5)]

(5) Transformers.

Where a transformer is installed in a vault as required by Part II of Article 450, the vault shall be constructed in accordance with the requirements of Part III of Article 450.

Informational Note No. 1: For additional information, see ANSI/ASTM E119-2018a, *Method for Fire Tests of Building Construction and Materials*, and NFPA 80-2019, *Standard for Fire Doors and Other Opening Protectives*.

Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. The installation requirements for oil filled transformers in vaults are found in Part II of Article 450, specifically Sections 450.24, 25, and 26.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 10:42:50 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8676-NFPA 70-2021
Statement: This revision complies with section 4.1.4 of the NEC Style Manual that prohibits reference to an entire article, other than Article 100. The deletion of “the requirements” would add clarity to the code.

Public Input No. 4043-NFPA 70-2020 [Section No. 110.31(A)(5)]

(5) Transformers.

Where a transformer is installed in a vault as required by Article 450, the vault shall be constructed in accordance ~~with the requirements~~ with Part III of ~~Part III of~~ Article 450.

Informational Note No. 1: For additional information, see ANSI/ASTM E119-2018a, *Method for Fire Tests of Building Construction and Materials*, and NFPA 80-2019, *Standard for Fire Doors and Other Opening Protectives*.

Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.

Statement of Problem and Substantiation for Public Input

Deleting the words "the requirements of" does not change the meaning of the requirement.
constructed in accordance with the requirements of Part III of Article 450
constructed in accordance with Part III of Article 450.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 18:54:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8676-NFPA 70-2021
Statement: This revision complies with section 4.1.4 of the NEC Style Manual that prohibits reference to an entire article, other than Article 100. The deletion of “the requirements” would add clarity to the code.

Public Input No. 3741-NFPA 70-2020 [Section No. 110.31(C)(1)]

(1) In Places Accessible to Unqualified Persons.

Outdoor electrical installations that are open to unqualified persons shall ~~comply with Parts I, II, and III of Article 225~~ . be guarded or insulated.

Informational Note. See 225.1 for Outside Branch Circuits and Feeders.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As Article 225 has only 3 parts, this current requirement, as written, is in violation of the Style Manual. As such, it is proposed to require guarding or insulation, if that's what is intended, and then point individuals to the Scope of Article 225.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:37:12 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The deletion of the requirements to follow Part III of Article 225 and only require outdoor installations to only be guarded or insulated is too restrictive.

Public Input No. 2112-NFPA 70-2020 [Section No. 110.31 [Excluding any Sub-Sections]]

Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Table 110.31 Minimum Distance from Fence to Live Parts

	Minimum Distance to Live Parts	
Nominal Voltage	m	ft
1001–13,799	3.05	10
13,800–230,000	4.57	15
Over 230,000	5.49	18

Informational Note

~~: For~~

No.1: See Part III of Article 450 for construction requirements for transformer vaults.

Informational Note No. 2: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI/IEEE C2-2017, *National Electrical Safety Code*.

~~Informational Note: See Article 450 for construction requirements for transformer vaults.~~

Statement of Problem and Substantiation for Public Input

References to other standards shall not be in mandatory Code text as indicated in the note under the Table. Change the note to new Informational Note No. 1 and make the reference to ANSI/IEEE C2-2017, National Electrical Safety Code as Informational Note No. 2. This revision complies with section 4.2 of the NEC Style Manual that references to other standards shall be in the Informational Notes.

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: IEC
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 31 22:15:59 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8367-NFPA 70-2021

Statement: The Panel revised the references in Informational Notes in Article 90 and 110 to conform with the designated structure in 3.1.3.1 and 4.1.3 of the revised NEC Style Manual.

Public Input No. 3676-NFPA 70-2020 [Section No. 110.31 [Excluding any Sub-Sections]]

Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Table 110.31 Minimum Distance from Fence to Live Parts

	Minimum Distance to Live Parts	
Nominal Voltage	m	ft
1001–13,799	3.05	10
13,800–230,000	4.57	15
Over 230,000	5.49	18

Note: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI/IEEE C2-2017, *National Electrical Safety Code*.

Informational Note: See Part III of Article 450 for construction requirements for transformer vaults.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed that we instead refer folks to Part III of Article 450.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 10:39:29 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8367-NFPA 70-2021
Statement: The Panel revised the references in Informational Notes in Article 90 and 110 to conform with the designated structure in 3.1.3.1 and 4.1.3 of the revised NEC Style Manual.

Public Input No. 4370-NFPA 70-2020 [Section No. 110.33(A)]

(A) Entrance.

At least one entrance to enclosures for electrical installations as described in 110.31 not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to the working space about electrical equipment.

Open equipment doors shall not impede the entryto or egress from the working space.

(1) Large Equipment.

On switchgear and control panels exceeding 1.8 m (6 ft) in width, there shall be one entrance at each end of the equipment. A single entrance to the required working space shall be permitted where either of the conditions in 110.33(A)(1)(a) or (A)(1)(b) is met.

(a) *Unobstructed Exit.* Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.34(A), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.34(A) for equipment operating at that voltage and in that condition.

(2) Guarding.

Where bare energized parts at any voltage or insulated energized parts above 1000 volts, nominal, are located adjacent to such entrance, they shall be suitably guarded.

(3) Personnel Doors.

Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Statement of Problem and Substantiation for Public Input

This is necessary to correlate with safety driven requirements ts added last cycle in 110.26.

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 11:24:48 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8681-NFPA 70-2021
Statement: CMP-1 adds a requirement for open doors to correlate with 110.26.

Public Input No. 3566-NFPA 70-2020 [Section No. 110.33(A)(3)]

(3) Personnel Doors.

Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Additional Proposed Changes

File Name	Description	Approved
Door_obstruction.jpg	Sprinkler piping obstructing electric room door from fully opening	

Statement of Problem and Substantiation for Public Input

Doors must be able to open at least 90 degrees in order for people to escape danger in an emergency situation such as an electrical explosion or arc flash event. If the door were to come to a sudden stop at only 30 degrees open due to an obstruction, people rushing through the door could be hindered or even injured during their escape. I have actually been "stunned" and even disoriented by doors not opening fully and coming to an unexpected and sudden early stop. Now imagine that scenario during an panic situation! It could result in injuries or even death.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3563-NFPA 70-2020 [Section No. 110.26(C)(3)]	unobstructed door swing
Public Input No. 3568-NFPA 70-2020 [Section No. 480.10(E)]	
Public Input No. 3570-NFPA 70-2020 [Section No. 450.43(C)]	
Public Input No. 3575-NFPA 70-2020 [Section No. 646.19 [Excluding any Sub-Sections]]	
Public Input No. 3582-NFPA 70-2020 [Section No. 110.31(A)(4)]	

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 08:00:09 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8771-NFPA 70-2021

Statement: CMP-1 adds a requirement for doors to open at least 90 degrees in the direction of egress. Including the Informational Note found in 110.26(C)(3) in 110.31(A)(4) provides the user the same clarity and information for installations over 1000 volts, Nominal


THIS IS A RATED F
DO NOT PENETRAT
AT EXT. 6-2422 FOR

Public Input No. 4331-NFPA 70-2020 [Section No. 110.33(A)(3)]

(3) Personnel Doors.

Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: For information on panic hardware, see UL 305, *Standard for Safety for Panic Hardware.*

For fire exit hardware, see UL 305, *Standard for Panic Hardware* , and UL 10C, *Standard for Safety for*

Positive Pressure Fire Tests of Door Assemblies..

Statement of Problem and Substantiation for Public Input

Including the Informational Note found in 110.26(C)(3) in 110.33(A)(3) provides the user the same clarity and information for installations over 1000 volts, Nominal. Additionally it correlates Part II 1000 volts, Nominal, or less with Part III Over 1000 volts, nominal in the same fashion as found with other requirements.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4314-NFPA 70-2020 [Section No. 110.31(A)(4)]	Similar revision and addition of Informational Notes

Submitter Information Verification

Submitter Full Name: Michael Farrell III
Organization: IBEW LU#8 Toledo, OH
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 10:22:21 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8771-NFPA 70-2021
Statement: CMP-1 adds a requirement for doors to open at least 90 degrees in the direction of egress. Including the Informational Note found in 110.26(C)(3) in 110.31(A)(4) provides the user the same clarity and information for installations over 1000 volts, Nominal

Public Input No. 3497-NFPA 70-2020 [Section No. 110.33(B)]

(B) Access.

Permanent ~~ladders or~~ stairways shall be provided to give safe access to the working space around electrical equipment installed on platforms, balconies, or mezzanine floors or in attic or roof rooms or spaces.

Statement of Problem and Substantiation for Public Input

Permanent ladders are not considered a safe means of egress, especially from electrical equipment spaces. They don't offer fast egress nor allow unconscious or injured workers to be transported or removed out of such spaces safely utilizing permanent ladder (ship ladders).

Below is an excerpt from the 2020 International Building Code where permits such permanent ladder for specific occupies only.

1009.11 Ship ladders.
Ship ladders are permitted to be used in Group I-3 as a component of a means of egress to and from control rooms or elevated facility observation stations not more than 250 square feet (23 m2) with not more than three occupants and for access to unoccupied roofs. Ship ladders shall have a minimum tread depth of 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the nosing projection is no less than 81/2 inches (216 mm). The maximum riser height shall be 91/2 inches (241 mm). Handrails shall be provided on both sides of ship ladders. The minimum clear width at and below the handrails shall be 20 inches (508 mm).

Submitter Information Verification

Submitter Full Name: Mathher Abbassi
Organization: New York City Department Of Buildings
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 17:50:47 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This section addresses access, not egress. The submitter has not provided sufficient substantiation that a permanent ladder would not be suitable for access to electrical equipment spaces. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 403-NFPA 70-2020 [Section No. 110.34(A)]

(A) Working Space.

Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed.The required working space shall provide a floor, platform, grade or similar working surface that is as flat and level as practicable for the entire depth and width of the working space.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment

Nominal Voltage to Ground	Minimum Clear Distance Condition 1	Condition 2	Condition 3
1001–2500 V	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501–9000 V	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9001–25,000 V	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001 V–75 kV	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75 kV	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:

(1) **Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

(2) **Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

(3) **Condition 3** — Exposed live parts on both sides of the working space.

Additional Proposed Changes

File Name	Description	Approved
Sump_Pump_pit.JPG	uncovered sump pump pit	

Statement of Problem and Substantiation for Public Input

There are no provisions in this code that require a flat and level working surface for working on this energized equipment. Working on energized equipment where the working surface has a steep grade or uneven surfaces can pose serious hazards for the worker. Troubleshooting an energized air handler installed in an unfinished attic where no floorboards have been laid down is extremely dangerous for a worker trying to balance on top of floor joists while working on energized equipment! You may have done similar work yourself and remember how precarious that situation cane be! Very dangerous! Or perhaps it's an exterior service disconnect installed where the grade drops precipitously from the edge of the building where the

disconnect is located. What about a basement switchboard or switchgear installed near a large sump pump pit in the floor? How can a worker be safe if he needs to straddle a giant hole in the floor while his hands are in energized swicthgear? The working space depth and width may be code compliant but if there is no flat level place to stand or place a ladder, it places the worker in peril. This should not be permitted as it creates a very dangerous working condition. It does not matter WHO builds this platform, or grades the earth to be level, or pours a flat level concrete pad, but this rule helps ensure that it WILL be done. The AHJ would be able to enforce this and make it safer for the electrical workers.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 402-NFPA 70-2020 [Section No. 110.26(A) [Excluding any Sub-Sections]]	Providing flat and level working surfaces

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sun Feb 02 10:21:45 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8712-NFPA 70-2021
Statement: The grade, floor or platform being flat and level in the working space is not addressed in the NEC. The Panel concludes that having a flat level working space is vital to the safety of personnel working on the equipment.



Public Input No. 4278-NFPA 70-2020 [Section No. 110.34(A)]

(A) Working Space.

Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). ~~Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed~~ The floor surface shall be flat with no steps, stairs, steep slopes, housekeeping pads, handrails, structural supports or other obstructions. The minimum distances required by this section shall be measured from the exposed live parts, or where enclosed, the furthermost projecting object of the equipment, such as door handles, protection relays, battery drip pans and the like, or other obstructions within the working space including obstacles near the floor surface .

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
1001–2500 V	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501–9000 V	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9001–25,000 V	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001 V–75 kV	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75 kV	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:

(1) **Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

(2) **Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

(3) **Condition 3** — Exposed live parts on both sides of the working space.

Statement of Problem and Substantiation for Public Input

See related PI 4236 for substantiation.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4236-NFPA 70-2020 [Section No. 110.26(A)(1)]	Working space requirements

Submitter Information Verification

Submitter Full Name: Paul Guidry

Organization:	Fluor Enterprises, Inc.
Affiliation:	Associated Builders and Contractors
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 10 09:07:19 EDT 2020
Committee:	NEC-P01

Committee Statement

Resolution: See FR-8712 relative to new requirements for a flat level working space surface. The addition of the list items added would be too restrictive. This should be a design consideration. This PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 95-NFPA 70-2019 [Section No. 110.40]

110.40 Temperature Limitations at Terminations.

Conductors shall be permitted to be terminated based on the 90°C (194°F) temperature rating and ampacity as given in Table 311.60(C)(67) through Table 311.60(C)(86), unless otherwise identified. Ampacities of listed terminals or terminals which are part of listed equipment, shall not be subject to ambient temperature correction factors other than required for conductors in 311.60.

Statement of Problem and Substantiation for Public Input

Electrical equipment has minimum and maximum temperature ratings. Presently, the Code does not address ambient temperature correction factors for terminals which are conductors themselves. For instance, a circuit breaker may have a maximum ambient operating temperature of 50 deg. C. Then, 311.60 has correction factors which apply to the conductors. But, the terminals themselves are not addressed for ambient temperature correction.

This is a companion proposal to one for 110.14(C)(1) for terminals less than 1000V. And, it is a companion proposal for new Informational Note to 311.60(D)

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 94-NFPA 70-2019 [Section No. 110.14(C)(1)]	Terminal ratings
Public Input No. 97-NFPA 70-2019 [Section No. 311.60(D)(4)]	
Public Input No. 2122-NFPA 70-2020 [Section No. 110.14(C)(1)]	

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Enterprises, Inc.
Affiliation: Associated Builders and Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Tue Nov 12 15:36:38 EST 2019
Committee: NEC-P01

Committee Statement

Resolution: Field wiring terminals are rated for a specific sized conductor or range of conductor sizes and an “ampacity level rating”, which is based on the ampacity ratings of the NEC. Equipment markings are independent of any on the individual terminal connectors, and are covered in general requirements as specified in 110.14. Terminal temperatures are addressed in end-product standards and are part of the rating of the overall end-product equipment. This is determined using the appropriately sized conductor (based on the NEC and the marking on the equipment) and its rated ampacity. “Ambient temperature correction factors” apply to conductors (Chapter 3) and not the equipment. While the size of conductor terminated may be impacted by the correction factor, the result of this adjustment does not impact the rating of the end-product or its associated terminal.

Public Input No. 3236-NFPA 70-2020 [Section No. 110.41]

110.41 Inspections and Tests.

(A) Pre-energization and Operating Tests.

~~Where required elsewhere in this *Code* , the~~ The complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction and shall be tested when first installed on-site. Equipment ground impedance and insulation resistance tests shall be performed on all equipment and cables.

(B) Test Report.

A test report covering the results of the tests required in 110.41(A) shall be available to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.

Statement of Problem and Substantiation for Public Input

There continues to be many injury and equipment damaging incidents due to a lack of proper acceptance testing. This input makes this a clear requirement by eliminating the "elsewhere in the code" language. As well, it clearly requires a check of equipment ground impedance and insulation resistance - the two most important factors in preventing and clearing short circuits and arc flashes. Systems that have errors in the installation work or in the new equipment that create short circuit conditions pose a significant hazard to those energizing through switching as well as those in the vicinity of the fault. Proper acceptance testing prior to energization, especially equipment ground impedance and insulation resistance tests, are key to preventing these incidents.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 09:41:15 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Removing “Where required elsewhere" in the Code would not add clarity and may possibly cause correlation issues with other Articles or Sections. The submitter did not provide adequate technical substantiation to warrant this change and the PI does not comply with the Regulations Governing the Development of NFPA Standards, Section 4.3.4.1(d) Statement of the problem and substantiation for Public Input.

Public Input No. 3695-NFPA 70-2020 [Section No. 110.51(B)]

~~**(B)** Other Articles.~~

~~The requirements of this part shall be additional to, or amendatory of, those prescribed in Articles 100 through 490 of this *Code*.~~

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As Section 90.3 gives the arrangement of the code, and the remaining clauses of 110.51 make it clear how these sections apply, it is believed that 110.51(B) can be deleted without impact on the usability of the Code.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 10:59:09 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8713-NFPA 70-2021

Statement: Section 4.1.4 of the 2020 NEC Style Manual prohibits reference to an entire article, other than Article 100. As Section 90.3 gives the arrangement of the code, and the remaining clauses of 110.51 make it clear how these sections apply, 110.51(B) is deleted without impact on the usability of the Code.

Public Input No. 2959-NFPA 70-2020 [Section No. 110.53]

110.53 Conductors.

High-voltage conductors in tunnels shall be installed in metal ~~conduit or other metal~~ raceway, Type MC cable, or other approved multiconductor cable. Multiconductor portable cable shall be permitted to supply mobile equipment.

Statement of Problem and Substantiation for Public Input

The words "conduit or other metal" are redundant, so delete.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:56:39 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8714-NFPA 70-2021
Statement: “Conduit” is removed to eliminate redundancy. Conduit is a subset of raceway.

Public Input No. 3699-NFPA 70-2020 [Section No. 110.58]

110.58 Disconnecting Means.

A switch or circuit breaker that simultaneously opens all ungrounded conductors of the circuit shall be installed within sight of each transformer or motor location for disconnecting the transformer or motor. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors. The switch or circuit breaker for a motor shall comply with the applicable requirements of Part IX of Article 430.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed that we instead refer folks to Part IX of Article 430 where the disconnecting requirements are found.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:04:19 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8350-NFPA 70-2021
Statement: The reference to Part IX of Article 430 in 110.58 was added in the last sentence to comply with 4.1.4 of the revised NEC Style Manual.

Public Input No. 2049-NFPA 70-2020 [Section No. 110.70]

110.70 General.

Electrical enclosures intended for personnel entry and specifically fabricated for this purpose shall be of sufficient size to provide safe work space about electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized. Such enclosures shall have sufficient size to permit ready installation or withdrawal of the conductors employed without damage to the conductors or to their insulation. They shall comply with this part.

Exception: Where electrical enclosures covered by Part V of this article are ~~part of an industrial wiring system operating~~ in a controlled location operating under conditions of maintenance and supervision that ensure that only qualified persons monitor and supervise the system, they shall be permitted to be designed and installed in accordance with appropriate engineering practice. If required by the authority having jurisdiction, design documentation shall be provided.

Statement of Problem and Substantiation for Public Input

This exception shouldn't be limited to industrial locations. It should apply to any location that has controlled access where only trained workers are able to service the installation. The Department of Energy facilities, for example, are not necessarily "industrial" but have extremely strict rules for working on the premises. The contractors must undergo extensive training, work packages must be created, means and methods must all be approved. This is part of a series of proposals to change "industrial locations/premises/occupancies /wiring-systems/..." to "controlled access locations."

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2047-NFPA 70-2020 [Section No. 110.21(A)(2)]	part of global proposal to change 'industrial' to 'controlled access'
Public Input No. 2048-NFPA 70-2020 [Section No. 110.24(B)]	part of global proposal to change 'industrial' to 'controlled access'
Public Input No. 2050-NFPA 70-2020 [Section No. 210.8(B)]	
Public Input No. 2051-NFPA 70-2020 [Section No. 210.8(B)]	
Public Input No. 2052-NFPA 70-2020 [Section No. 210.9]	
Public Input No. 2053-NFPA 70-2020 [Section No. 210.18]	
Public Input No. 2054-NFPA 70-2020 [Section No. 215.11]	
Public Input No. 2087-NFPA 70-2020 [Section No. 225.37]	
Public Input No. 2088-NFPA 70-2020 [Section No. 225.52(A)]	
Public Input No. 2090-NFPA 70-2020 [Section No. 230.205(C)]	
Public Input No. 2091-NFPA 70-2020 [Section No. 240.21(C)(3)]	
Public Input No. 2092-NFPA 70-2020 [Section No. 300.50(A) [Excluding any Sub-Sections]]	

Public Input No. 2093-NFPA 70-2020 [Section No. 336.10]

Public Input No. 2094-NFPA 70-2020 [Section No. 368.56(B)]

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 26 17:58:58 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed wording in the PI could cause confusion as to what a “controlled location” is as opposed to the current wording which is understood throughout the NEC. The submitter has not provided adequate technical substantiation to warrant the change.

Public Input No. 3702-NFPA 70-2020 [Section No. 110.72]

110.72 Cabling Work Space.

A clear work space not less than 900 mm (3 ft) wide shall be provided where cables are located on both sides, and not less than 750 mm (2½ ft) where cables are only on one side. The vertical headroom shall be not less than 1.8 m (6 ft) unless the opening is within 300 mm (1 ft), measured horizontally, of the adjacent interior side wall of the enclosure.

Exception: A manhole containing only one or more of the following shall be permitted to have one of the horizontal work space dimensions reduced to 600 mm (2 ft) where the other horizontal clear work space is increased so the sum of the two dimensions is not less than 1.8 m (6 ft):

(1) Optical fiber cables ~~as covered in Article 770~~

(2) Power-limited fire alarm circuits supplied in accordance with 760.121

(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 725.121

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed that delete reference to Article 770, or instead refer to a part of Article 770 in compliance with the Style Manual if the CMP determines this reference is required.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:06:38 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8349-NFPA 70-2021
Statement: In Section 110.72, reference to Article 770 was removed.

Public Input No. 3475-NFPA 70-2020 [Section No. 110.73]

110.73 Equipment Work Space.

Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 1000 volts or less. Where the installation is over 1000 volts, the work space and associated requirements in 110.34 shall be met. A manhole access cover that weighs over 45.4 kg (100 lb) shall be considered as meeting the requirements of 110. 26(F) and 110. 34(C).

Statement of Problem and Substantiation for Public Input

Section 110.73 is applicable to installation at 1000 volts or less, and to installation over 1000 volts. The last sentence of the section considers that a manhole cover of 100 lb suffice the installation requirement of 110.34(C) of over 1000 volt, a reference to 110.26(F) is also appropriate for the installation at 1000 volts or less to cover all installations addressed.

Submitter Information Verification

Submitter Full Name: Mathher Abbassi
Organization: New York City Department Of Buildings
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 16:21:20 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8715-NFPA 70-2021
Statement: A manhole cover that weighs over 100 lb would offer equivalent restriction of access to all equipment.

Public Input No. 4049-NFPA 70-2020 [Section No. 110.74(A)]

(A) 1000 Volts, Nominal, or Less.

Wire bending space for conductors operating at 1000 volts or less shall be provided in accordance ~~with the requirements of~~ with 314.28.

Statement of Problem and Substantiation for Public Input

Deleting the words "the requirements of" does not change the meaning of the code section.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 19:07:04 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8717-NFPA 70-2021
Statement: CMP-1 editorially revises the requirement by removing the unnecessary text.

Public Input No. 3706-NFPA 70-2020 [Section No. 110.75(A)]

(A) Dimensions.

Rectangular access openings shall not be less than 650 mm × 550 mm (26 in. × 22 in.). Round access openings in a manhole shall be not less than 650 mm (26 in.) in diameter.

Exception: A manhole that has a fixed ladder that does not obstruct the opening or that contains only one or more of the following shall be permitted to reduce the minimum cover diameter to 600 mm (2 ft):

(1) Optical fiber cables ~~as covered in Article 770~~

(2) Power-limited fire alarm circuits supplied in accordance with 760.121

(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 725.121

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed that delete reference to Article 770, or instead refer to a part of Article 770 in compliance with the Style Manual if the CMP determines this reference is required.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 11:09:25 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8718-NFPA 70-2021
Statement: Section 4.1.4 of the 2020 NEC Style Manual prohibits reference to an entire article, other than Article 100. CMP-1 removes the reference to Article 770 as it is unnecessary.

Public Input No. 3772-NFPA 70-2020 [New Section after 110.79]

See Attached Word Document for Changes

Additional Proposed Changes

File Name	Description	Approved
Articles_110_115_-_Final.docx	PI to Revise Article 110 and Add New Article 115	

Statement of Problem and Substantiation for Public Input

This Public Input is submitted on behalf of a Correlating Committee Long-Range Planning Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, David Temple, Donny Cook, Dean Hunter, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, and Kevin Rogers. This Public Input, along with other companion Public Inputs, was developed with the goal of improving usability and providing a platform to increase the focus on requirements associated with Medium or High Voltage.

Installations, including campus-wide distribution systems, microgrids, alternative energy installations, etc., are covered by the Scope of the NEC®; however, requirements for conductors, equipment, and raceways used in applications operating in systems rated over 1000 volts are treated as an “after-thought” in how they are arranged in the document and covered by Technical Committees. In many cases, the “over 1000 volts” requirements exist in a dedicated “Part” within the Article – such is the case with existing Article 300. In other cases, similar products are handled in two separate Articles, such as with “switchgear”, with equipment rated 1000 volts and below addressed in Article 408, and equipment rated over 1000 volts addressed in Article 490. In addition to these two approaches, there are Articles where the “over 1000 volts” is intermingled with the “under 1000 volt” requirements, such as the case with Article 225. In many of these cases, the information for over 1000 volts is very limited (for example, Article 240 has only 3 Sections in the Part dedicated to requirements for over 1000 volts).

This Task Group’s initial tasks was to establish a demarcation for what can be referred to as Medium or High Voltage. The recommendation has been to establish this threshold as being equipment rated over 1000 Vac, 1500 Vdc. It is believed that levels below these voltages can be addressed with existing requirements for systems rated 1000 V ac max, and 1500 V dc, as this has been established as an upper limit for photovoltaic applications within Article 690, with requirements noting that those systems are not required to comply with Parts II and III of Article 490.

Using these limits, the Task Group then set out to identify a structure to better align requirements, improve consistency in approach, improve usability, and create the opportunity for Code Making Panels to have an increased focus on higher voltage applications.
Below is a summary of the proposed Chapter 1 changes:

- Article 110 remains “General Requirements for Electrical Installations,” with requirements specific only to installations above 1000 V being relocated to new Article 115.
- Article 115 is created to cover “Requirements for Electrical Installations Over 1000 volts, nominal”

For added clarity, the below table shows the article 110/115 restructuring and renumber of Parts:
(embedded figure included in Word Doc. that includes proposed changes)

Note: There are other Public Inputs being submitted that address restructuring, and these are identified as “Companion Public Inputs”. Other Article or Section references may be impacted due restructuring activities by those companion Public Inputs.

A list of the Companion Public Inputs is listed below. If this PI (MV Task Group PI-1) and the individual other PI’s are adopted, then the listed references in Articles 110/115 would need to be updated:

- MV Task Group PI-2: Article 200 with a proposed New Article 205
- MV Task Group PI-3: Articles 210/215/230 with a proposed New Article 235
- MV Task Group PI-4: Article 250 with a proposed New Article 255
- MV Task Group PI-5: Articles 300/310/311/314/369/399 with a proposed New Article 305

- New 115.10 [Old 110.36]: References to 300.37, 300.39, 300.40, and 300.50 would change to 305.7, 305.8, 305.9, and 305.15
- New 115.14 [Old 110.40]: References to in Table 311.60(C)(67) through Table 311.60(C)(86) would change to Table 315.60(C)(67) through Table 315.60(C)(86)
- 110.74(B): References to 314.71(A) and (B) would change to 305.21(A) and (B)
- MV Task Group PI-6: Articles 490/430/450/460/470 with a proposed New Article 495
- New 115.10 [Old 110.36]: Reference to 490.25 would change to 495.24

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3728-NFPA 70-2020 [Global Input]	Companion Public Input (Articles 245 and 295)
Public Input No. 3765-NFPA 70-2020 [New Section after 250.194(B)]	Companion Public Input (Article 255)
Public Input No. 3815-NFPA 70-2020 [New Section after 200.11]	Companion Public Input (Article 205)
Public Input No. 3819-NFPA 70-2020 [Global Input]	Companion Public Input (Article 235)
Public Input No. 3827-NFPA 70-2020 [Global Input]	Companion Public Input (Article 305)
Public Input No. 3838-NFPA 70-2020 [Section No. 690.31(A)]	Companion Public Input (Section 690.31(A))
Public Input No. 3846-NFPA 70-2020 [Section No. 694.30(A)]	Companion Public Input (Section 694.30(A))
Public Input No. 3849-NFPA 70-2020 [New Part after IV.]	Companion Public Input (Section 706.30)
Public Input No. 3728-NFPA 70-2020 [Global Input]	
Public Input No. 3765-NFPA 70-2020 [New Section after 250.194(B)]	
Public Input No. 3815-NFPA 70-2020 [New Section after 200.11]	
Public Input No. 3819-NFPA 70-2020 [Global Input]	
Public Input No. 3827-NFPA 70-2020 [Global Input]	
Public Input No. 3838-NFPA 70-2020 [Section No. 690.31(A)]	
Public Input No. 3846-NFPA 70-2020 [Section No. 694.30(A)]	
Public Input No. 3849-NFPA 70-2020 [New Part after IV.]	

Submitter Information Verification

Submitter Full Name: Robert Osborne
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 12:16:27 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: Inadequate technical substantiation has been provided for the creation of a new article. Part III of Article 110 already addresses installations over 1000 V and a new article is not required. Correlation issues are alleviated through this action which otherwise would have conflicted with

meeting actions shown in the First Draft review from Panels 5, 8, 10 and 11.

MV Task Group PI-1: Article 110/115 Substantiation.

Substantiation:

This Public Input is submitted on behalf of a Correlating Committee Long-Range Planning Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, David Temple, Donny Cook, Dean Hunter, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, and Kevin Rogers. This Public Input, along with other companion Public Inputs, was developed with the goal of improving usability and providing a platform to increase the focus on requirements associated with Medium or High Voltage.

Installations, including campus-wide distribution systems, microgrids, alternative energy installations, etc., are covered by the Scope of the NEC®; however, requirements for conductors, equipment, and raceways used in applications operating in systems rated over 1000 volts are treated as an "after-thought" in how they are arranged in the document and covered by Technical Committees. In many cases, the "over 1000 volts" requirements exist in a dedicated "Part" within the Article – such is the case with existing Article 300. In other cases, similar products are handled in two separate Articles, such as with "switchgear", with equipment rated 1000 volts and below addressed in Article 408, and equipment rated over 1000 volts addressed in Article 490. In addition to these two approaches, there are Articles where the "over 1000 volts" is intermingled with the "under 1000 volt" requirements, such as the case with Article 225. In many of these cases, the information for over 1000 volts is very limited (for example, Article 240 has only 3 Sections in the Part dedicated to requirements for over 1000 volts).

This Task Group's initial tasks was to establish a demarcation for what can be referred to as Medium or High Voltage. The recommendation has been to establish this threshold as being equipment rated over 1000 Vac, 1500 Vdc. It is believed that levels below these voltages can be addressed with existing requirements for systems rated 1000 V ac max, and 1500 V dc, as this has been established as an upper limit for photovoltaic applications within Article 690, with requirements noting that those systems are not required to comply with Parts II and III of Article 490.

Using these limits, the Task Group then set out to identify a structure to better align requirements, improve consistency in approach, improve usability, and create the opportunity for Code Making Panels to have an increased focus on higher voltage applications.

Below is a summary of the proposed Chapter 1 changes:

- Article 110 remains "General Requirements for Electrical Installations," with requirements specific only to installations above 1000 V being relocated to new Article 115.

- Article 115 is created to cover "Requirements for Electrical Installations Over 1000 volts, nominal"

For added clarity, the below table shows the article 110/115 restructuring and renumber of Parts:

2020	2023	
Art 110	Art 110	Art 115 (New)
Part I: General • Applies to all voltages	Part I: General • Applies to all voltages • Add Info note that Over 1000V has moved to 115	Part I: General • Scope notes that Art 110 Part I always applies unless 115 modifies
Part II: 1000 V or Less	Part II: 1000 V or Less	
Part III: Over 1000 V		Part I: General • 2020 110 Part III (Over 1000V) moved to 115 Part I
Part IV: Tunnel Installations Over 1000 V		Part II: Tunnel Installations Over 1000 V
Part V: Manhole and Elect Enclosures Intended for Personnel Entry	Part III: Manhole and Elect Enclosures Intended for Personnel Entry	

Note: There are other Public Inputs being submitted that address restructuring, and these are identified as “Companion Public Inputs”. Other Article or Section references may be impacted due restructuring activities by those companion Public Inputs.

A list of the Companion Public Inputs is listed below. If this PI (MV Task Group PI-1) and the individual other PI’s are adopted, then the listed references in Articles 110/115 would need to be updated:

- MV Task Group PI-2: Article 200 with a proposed New Article 205
- MV Task Group PI-3: Articles 210/215/230 with a proposed New Article 235
- MV Task Group PI-4: Article 250 with a proposed New Article 255
- MV Task Group PI-5: Articles 300/310/311/314/369/399 with a proposed New Article 305
    - New 115.10 [Old 110.36]: References to 300.37, 300.39, 300.40, and 300.50 would change to 30**5.7**, 30**5.8**, 30**5.9**, and 30**5.15**
    - New 115.14 [Old 110.40]: References to in Table 311.60(C)(67) through Table 311.60(C)(86) would change to Table 31**5**.60(C)(67) through Table 31**5**.60(C)(86)
    - 110.74(B): References to 314.71(A) and (B) would change to 3**05.21**(A) and (B)
- MV Task Group PI-6: Articles 490/430/450/460/470 with a proposed New Article 495
    - New 115.10 [Old 110.36]: Reference to 490.25 would change to 49**5.**24

Article 115 Requirements for Electrical Installations Over 1000 Volts AC, 1500 Volts DC, Nominal

Part I. Scope and General

115.1 Scope.

This article applies to systems over 1000 volts ac and 1500 volts dc, nominal, and covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations. In no case shall this article apply to equipment on the supply side of the service point.

115.3 Other Articles.

Conductors and equipment used on circuits over 1000 volts and 1,500 volts dc, nominal, shall comply with Part I of article 110 and Part III of article 110 and also with this article, which supplement or modify Part I of article 110.

115.5 Enclosure for Electrical Installations.

Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by a lock(s) or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazard(s) associated with the installation.

For installations other than equipment as described in 115.5(D), a wall, screen, or fence shall be used to enclose an outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 115.5.

Table 115.5 Minimum Distance from Fence to Live Parts

Nominal Voltage	Minimum Distance to Live Parts	
	m	ft
1001–13,799	3.05	10
13,800–230,000	4.57	15
Over 230,000	5.49	18

Note: For clearances of conductors for specific system voltages and typical BIL ratings, see ANSI/IEEE C2-2017, *National Electrical Safety Code.*

Informational Note: See Article 450 for construction requirements for transformer vaults.

(A) Electrical Vaults.

Where an electrical vault is required or specified for conductors and equipment 115.5(A)(1) to (A)(5) shall apply.

(1) Walls and Roof.

The walls and roof shall be constructed of materials that have adequate structural strength for the conditions, with a minimum fire rating of 3 hours. For the purpose of this section, studs and wallboard construction shall not be permitted.

(2) Floors.

The floors of vaults in contact with the earth shall be of concrete that is not less than 102 mm (4 in.) thick, but where the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the load imposed on it and a minimum fire resistance of 3 hours.

(3) Doors.

Each doorway leading into a vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of 3 hours. The authority having jurisdiction shall be permitted to require such a door for an exterior wall opening where conditions warrant.

Exception to (1), (2), and (3): Where the vault is protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction with a 1-hour rating shall be permitted.

(4) Locks.

Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

(5) Transformers.
Where a transformer is installed in a vault as required by Article 450, the vault shall be constructed in accordance with the requirements of Part III of Article 450.

Informational Note No. 1: For additional information, see ANSI/ASTM E119-2018a, *Method for Fire Tests of Building Construction and Materials*, and NFPA 80-2019, *Standard for Fire Doors and Other Opening Protectives*.
Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.

(B) Indoor Installations.

(1) In Places Accessible to Unqualified Persons.
Indoor electrical installations that are accessible to unqualified persons shall be made with metal-enclosed equipment. Switchgear, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs. Openings in ventilated dry-type transformers or similar openings in other equipment shall be designed so that foreign objects inserted through these openings are deflected from energized parts.

(2) In Places Accessible to Qualified Persons Only.
Indoor electrical installations considered accessible only to qualified persons in accordance with this section shall comply with 115.34, 115.36, and 490.24.

(C) Outdoor Installations.

(1) In Places Accessible to Unqualified Persons.
Outdoor electrical installations that are open to unqualified persons shall comply with Parts I, II, and III of Article 225.

(2) In Places Accessible to Qualified Persons Only.
Outdoor electrical installations that have exposed live parts shall be accessible to qualified persons only in accordance with the first paragraph of this section and shall comply with 115.34, 115.36, and 490.24.

(D) Enclosed Equipment Accessible to Unqualified Persons.
Ventilating or similar openings in equipment shall be designed such that foreign objects inserted through these openings are deflected from energized parts. Where exposed to physical damage from vehicular traffic, suitable guards shall be provided. Equipment located outdoors and accessible to unqualified persons shall be designed such that exposed nuts or bolts cannot be readily removed, permitting access to live parts. Where equipment is accessible to unqualified persons and the bottom of the enclosure is less than 2.5 m (8 ft) above the floor or grade level, the enclosure door or hinged cover shall be kept locked. Doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes shall be locked, bolted, or screwed on. Underground box covers that weigh over 45.4 kg (100 lb) shall be considered as meeting this requirement.

115.6 Work Space About Equipment.
Sufficient space shall be provided and maintained about electrical equipment to permit ready and safe operation and maintenance of such equipment. Where energized parts are exposed, the minimum clear work space shall be not less than 2.0 m (6½ ft) high (measured vertically from the floor or platform) and the width of the equipment or 914 mm (3 ft) wide (measured parallel to the equipment), whichever is greater. The depth shall be as required in 115.34(A). In all cases, the work space shall permit at least a 90-degree opening of doors or hinged panels. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

115.7 Entrance to Enclosures and Access to Working Space.

(A) Entrance.
At least one entrance to enclosures for electrical installations as described in 115.31 not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to the working space about electrical equipment.

(1) Large Equipment.

On switchgear and control panels exceeding 1.8 m (6 ft) in width, there shall be one entrance at each end of the equipment. A single entrance to the required working space shall be permitted where either of the conditions in 115.7(A)(1)(a) or (A)(1)(b) is met.

(a) *Unobstructed Exit.* Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 115.8(A), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 115.8(A) for equipment operating at that voltage and in that condition.

(2) Guarding.
Where bare energized parts at any voltage or insulated energized parts above 1000 volts, nominal, are located adjacent to such entrance, they shall be suitably guarded.

(3) Personnel Doors.
Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

(B) Access.
Permanent ladders or stairways shall be provided to give safe access to the working space around electrical equipment installed on platforms, balconies, or mezzanine floors or in attic or roof rooms or spaces.

115.8 Work Space and Guarding.

(A) Working Space.
Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 115.8(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 115.8(A) Minimum Depth of Clear Working Space at Electrical Equipment

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
1001–2500 V	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501–9000 V	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9001–25,000 V	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001 V–75 kV	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75 kV	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:
(1) **Condition 1** — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.
(2) **Condition 2** — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.
(3) **Condition 3** — Exposed live parts on both sides of the working space.

(B) Separation from Low-Voltage Equipment.
Where switches, cutouts, or other equipment operating at 1000 volts, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating at over 1000 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.

Exception: Switches or other equipment operating at 1000 volts, nominal, or less and serving only equipment within the high-voltage vault, room, or enclosure shall be permitted to be installed in the high-voltage vault, room, or enclosure without a partition, fence, or screen if accessible to qualified persons only.

(C) Locked Rooms or Enclosures.
The entrance to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 1000 volts, nominal, shall be kept locked unless such entrances are under the observation of a qualified person at all times.

Permanent and conspicuous danger signs shall be provided. The danger sign shall meet the requirements in 110.21(B) and shall read as follows:

DANGER — HIGH VOLTAGE — KEEP OUT

(D) Illumination.
Illumination shall be provided for all working spaces about electrical equipment. Control by automatic means only shall not be permitted. The lighting outlets shall be arranged so that persons changing lamps or making repairs on the lighting system are not endangered by live parts or other equipment.

The points of control shall be located so that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.

(E) Elevation of Unguarded Live Parts.
Unguarded live parts above working space shall be maintained at elevations not less than required by Table 118.34(E).

Table 115.8(E) Elevation of Unguarded Live Parts Above Working Space

Nominal Voltage Between Phases	Elevation	
	m	ft
1001–7500 V	2.7	9
7501–35,000 V	2.9	9 ft 6 in.
Over 35 kV	Add 9.5 mm per kV above 35 kV	Add 0.37 in. per kV above 35 kV

(F) Protection of Service Equipment, Switchgear, and Industrial Control Assemblies.
Pipes or ducts foreign to the electrical installation and requiring periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located in the vicinity of the service equipment, switchgear, or industrial control assemblies. Protection shall be provided where necessary to avoid damage from condensation leaks and breaks in such foreign systems. Piping and other facilities shall not be considered foreign if provided for fire protection of the electrical installation.

115.10 Circuit Conductors.
Circuit conductors shall be permitted to be installed in raceways; in cable trays; as metal-clad cable Type MC; as bare wire, cable, and busbars; or as Type MV cables or conductors as provided in 300.37, 300.39, 300.40, and 300.50. Bare live conductors shall comply with 490.24.

Insulators, together with their mounting and conductor attachments, where used as supports for wires, single-conductor cables, or busbars, shall be capable of safely withstanding the maximum magnetic forces that would prevail if two or more conductors of a circuit were subjected to short-circuit current.

Exposed runs of insulated wires and cables that have a bare lead sheath or a braided outer covering shall be supported in a manner designed to prevent physical damage to the braid or sheath. Supports for lead-covered cables shall be designed to prevent electrolysis of the sheath.

115.14 Temperature Limitations at Terminations.
Conductors shall be permitted to be terminated based on the 90°C (194°F) temperature rating and ampacity as given in Table 311.60(C)(67) through Table 311.60(C)(86), unless otherwise identified.

115.15 Inspections and Tests.

(A) Pre-energization and Operating Tests.

Where required elsewhere in this *Code*, the complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction and shall be tested when first installed on-site.

(B) Test Report.
A test report covering the results of the tests required in 115.15(A) shall be available to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.

Part II. Tunnel Installations over 1000 Volts, Nominal

115.25 General.

(A) Covered.
This part shall apply to the installation and use of high-voltage power distribution and utilization equipment that is portable, mobile, or both, such as substations, trailers, cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, underground excavators, and the like.

(B) Other Articles.
The requirements of this part shall be additional to, or amendatory of, those prescribed in Articles 100 through 490 of this *Code*.

(C) Protection Against Physical Damage.
Conductors and cables in tunnels shall be located above the tunnel floor and so placed or guarded to protect them from physical damage.

115.26 Overcurrent Protection.
Motor-operated equipment shall be protected from overcurrent in accordance with Parts III, IV, and V of Article 430. Transformers shall be protected from overcurrent in accordance with 450.3.

115.27 Conductors.
High-voltage conductors in tunnels shall be installed in metal conduit or other metal raceway, Type MC cable, or other approved multiconductor cable. Multiconductor portable cable shall be permitted to supply mobile equipment.

115.28 Bonding and Equipment Grounding Conductors.

(A) Grounded and Bonded.
All non–current-carrying metal parts of electrical equipment and all metal raceways and cable sheaths shall be solidly grounded and bonded to all metal pipes and rails at the portal and at intervals not exceeding 300 m (1000 ft) throughout the tunnel.

(B) Equipment Grounding Conductors.
An equipment grounding conductor shall be run with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor shall be permitted to be insulated or bare.

115.29 Transformers, Switches, and Electrical Equipment.
All transformers, switches, motor controllers, motors, rectifiers, and other equipment installed belowground shall be protected from physical damage by location or guarding.

115.30 Energized Parts.
Bare terminals of transformers, switches, motor controllers, and other equipment shall be enclosed to prevent accidental contact with energized parts.

115.31 Ventilation System Controls.
Electrical controls for the ventilation system shall be arranged so that the airflow can be reversed.

115.32 Disconnecting Means.
A switch or circuit breaker that simultaneously opens all ungrounded conductors of the circuit shall be installed within sight of each transformer or motor location for disconnecting the transformer or motor. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors. The switch or circuit breaker for a motor shall comply with the applicable requirements of Article 430.

115.33 Enclosures.
Enclosures for use in tunnels shall be dripproof, weatherproof, or submersible as required by the environmental conditions. Switch or contactor enclosures shall not be used as junction boxes or as raceways for conductors feeding through or tapping off to other switches, unless the enclosures comply with 312.8.

Article 110 Requirements for Electrical Installations

Part I. General

110.1 Scope.
This article covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations.

Informational Note No. 1: See Informative Annex J for information regarding ADA accessibility design.

Informational Note No. 2: For supplemental or modifying general requirements that apply only to systems over 1000 volts ac or 1500 volts dc, nominal, see article 115.

~~**Part III. Over 1000 Volts, Nominal**~~

(All of Part III and Part IV is relocated to New Article 115)

Part ~~V~~III. Manholes and Other Electrical Enclosures Intended for Personnel Entry

110.70 General.
Electrical enclosures intended for personnel entry and specifically fabricated for this purpose shall be of sufficient size to provide safe work space about electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized. Such enclosures shall have sufficient size to permit ready installation or withdrawal of the conductors employed without damage to the conductors or to their insulation. They shall comply with this part.
Exception: Where electrical enclosures covered by Part III of this article are part of an industrial wiring system operating under conditions of maintenance and supervision that ensure that only qualified persons monitor and supervise the system, they shall be permitted to be designed and installed in accordance with appropriate engineering practice. If required by the authority having jurisdiction, design documentation shall be provided.

110.71 Strength.
Manholes, vaults, and their means of access shall be designed under qualified engineering supervision and shall withstand all loads likely to be imposed on the structures.
Informational Note: See ANSI C2-2007, *National Electrical Safety Code,* for additional information on the loading that can be expected to bear on underground enclosures.

110.72 Cabling Work Space.
A clear work space not less than 900 mm (3 ft) wide shall be provided where cables are located on both sides, and not less than 750 mm (2½ ft) where cables are only on one side. The vertical headroom shall be not less than 1.8 m (6 ft) unless the opening is within 300 mm (1 ft), measured horizontally, of the adjacent interior side wall of the enclosure.
Exception: A manhole containing only one or more of the following shall be permitted to have one of the horizontal work space dimensions reduced to 600 mm (2 ft) where the other horizontal clear work space is increased so the sum of the two dimensions is not less than 1.8 m (6 ft):

(1) Optical fiber cables as covered in Article 770

(2) Power-limited fire alarm circuits supplied in accordance with 760.121

(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 725.121

110.73 Equipment Work Space.
Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 1000 volts or less. Where the installation is over 1000 volts, the work space and associated requirements in 115.34 shall be met. A manhole access cover that weighs over 45.4 kg (100 lb) shall be considered as meeting the requirements of 115.34(C).

110.74 Conductor Installation.
Conductors installed in manholes and other enclosures intended for personnel entry shall be cabled, racked up, or arranged in an approved manner that provides ready and safe access for persons to enter for installation and maintenance. The installation shall comply with 110.74(A) or 110.74(B), as applicable.
(A) 1000 Volts, Nominal, or Less.

Wire bending space for conductors operating at 1000 volts or less shall be provided in accordance with the requirements of 314.28.

(B) Over 1000 Volts, Nominal.

Conductors operating at over 1000 volts shall be provided with bending space in accordance with 314.71(A) and (B), as applicable.

Exception: Where 314.71(B) applies, each row or column of ducts on one wall of the enclosure shall be calculated individually, and the single row or column that provides the maximum distance shall be used.

110.75 Access to Manholes.

(A) Dimensions.

Rectangular access openings shall not be less than 650 mm × 550 mm (26 in. × 22 in.). Round access openings in a manhole shall be not less than 650 mm (26 in.) in diameter.

Exception: A manhole that has a fixed ladder that does not obstruct the opening or that contains only one or more of the following shall be permitted to reduce the minimum cover diameter to 600 mm (2 ft):

(1) Optical fiber cables as covered in Article 770

(2) Power-limited fire alarm circuits supplied in accordance with 760.121

(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 725.121

(B) Obstructions.

Manhole openings shall be free of protrusions that could injure personnel or prevent ready egress.

(C) Location.

Manhole openings for personnel shall be located where they are not directly above electrical equipment or conductors in the enclosure. Where this is not practicable, either a protective barrier or a fixed ladder shall be provided.

(D) Covers.

Covers shall be over 45 kg (100 lb) or otherwise designed to require the use of tools to open. They shall be designed or restrained so they cannot fall into the manhole or protrude sufficiently to contact electrical conductors or equipment within the manhole.

(E) Marking.

Manhole covers shall have an identifying mark or logo that prominently indicates their function, such as "electric."

110.76 Access to Vaults and Tunnels.

(A) Location.

Access openings for personnel shall be located where they are not directly above electrical equipment or conductors in the enclosure. Other openings shall be permitted over equipment to facilitate installation, maintenance, or replacement of equipment.

(B) Locks.

In addition to compliance with the requirements of 110.34, if applicable, access openings for personnel shall be arranged such that a person on the inside can exit when the access door is locked from the outside, or in the case of normally locking by padlock, the locking arrangement shall be such that the padlock can be closed on the locking system to prevent locking from the outside.

110.77 Ventilation.

Where manholes, tunnels, and vaults have communicating openings into enclosed areas used by the public, ventilation to open air shall be provided wherever practicable.

110.78 Guarding.

Where conductors or equipment, or both, could be contacted by objects falling or being pushed through a ventilating grating, both conductors and live parts shall be protected in accordance with the requirements of 110.27(A)(2) or 110.31(B)(1), depending on the voltage.

110.79 Fixed Ladders.

Fixed ladders shall be corrosion resistant.

Public Input No. 4505-NFPA 70-2020 [New Definition after Definition: Module.]

Occupiable Space.

A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged for labor, and which is equipped with means of egress and light and ventilation facilities.

Statement of Problem and Substantiation for Public Input

This new definition is confined to Article 690 application of 690.12, Rapid Shutdown rules. The broad definition of “building” in the Article 100 has cause numerous problems in the field for enforcement and installers alike. By using a term used in the building code, specifically defined in Article 690, both enforcement and installers will understand what types of buildings rapid shutdown systems were intended for. Without this new definition, structures such as carport will be defined as buildings and AHJs will feel compelled to enforce rules that were never intended for those structures.

The PV Industry Forum (PVIF) is a collaborative initiative of several organizations dedicated to continually improving the installation safety of PV systems in the U.S. The organizations are the Solar Energy Industry Association (SEIA), the PV Industry Codes Council (PVICC), Solar Energy International (SEI), the Interstate Renewable Energy Council (IREC), and the Large-Scale Solar Association (LSA). This coalition has come together to organize, convene, support and mentor solar industry professionals through the NEC public input process, which is open to all solar industry participants.
This collaborative effort has resulted in the consensus development of numerous solar-related Public Input proposals for consideration. The list of task group members indicates those individuals who have contributed to the development of various Public Inputs in nine different tasks groups. A consensus process was used to develop each Public Input, therefore this list does not necessarily indicate that each individual or their representative organization participated in or has agreed with every proposed Public Input submitted under the PVIF effort. Each participant has agreed that any original proposal that they submitted and which was subsequently improved by our process is assigned as original and / or improved work to PVIF for submittal and release to NFPA as a proposed Public Input.
Members of the PVIF’s effort include the following representatives. Note that those noted below participated in specific task groups and not necessarily all task groups on specific items proposed. Each member is at their discretion to individually comment on PI’s as they deem appropriate and their inclusion here is not necessarily an endorsement of all the PI’s submitted.
Evelyn Butler, SEIA; Jason Fisher, SEIA; Ward Bower, Ward Bower Innovations LLC/SEIA; Joseph Cain, P.E., SEIA; Bill Brooks, PVICC; John Berdner, PVICC, Rebekah Hren, Solar Energy International; Brian Mehalic, Solar Energy International; Mark Rodriguez, Sunrun; Paul Joyce, Sunrun; Brian Ewing, Swinerton; Sumana Seshadri, Swinerton; Christian Eder, Fronius USA; Isaac Opalinsky, SunPower; Chris Fox, SunPower; James Cormican, RBI Solar; Dave Compaan, RBI Solar; Shawn Shaw, Natural Power; Cody Oram, Vivint Solar; Greg Elvestad, Vivint Solar; Mike Weimer, Westwood Professional Services; Doug Mutcher, Westwood Professional Services; Jeff Wang, Staubli; Colleen O'Brien, UL; John Doty, UL; Laurie Florence, UL; Tim Zgonena, UL ; Gokul Kalyan, FTC Solar; Ali Sedaghat, FTC Solar; K.C. Radford, Radian Generation; Jan Dominguez, LG Electronics; Klaus Nicolaedis, Unirac Inc.; Leif Cook, Core Development Group; Martin Herzfeld, Herzfeld; Dave Click, esaSolar; Sean White, principal; Kate Collardson, BayWa r.e. Solar Systems; Bryan Holland, NEMA; Jack Lyons, NEMA; Mike Stone, NEMA; Evan Martin, BURNDY; Terry McKinch, Mortenson; Jason Bobruk, SolarEdge Technologies; Reid ; train, Savion; Charlie Dearie, McCalmont Engineering; Sumanth Lokanath, Ray Illuminati LLC; Yann Schwarz, Esdec Inc.; Joseph Armano, PanelClaw, Inc.; Michael Heinrich, PanelClaw, Inc.; Steve Wurmlinger, SMA Solar Technology AG; Thomas Wegener, SMA Solar Technology AG; Chris Flueckiger, Key Renewables; Matt Piantedosi, Ridgeline Energy Analytics; Samantha Doshi, Intertek; Kyle Breuning, Tesla; Charles Picard, Tesla; Steve Connolly, Tesla; Greg Ball, Tesla; Jake West, Tesla; Jamie Daggett, DNV GL; MinWah Leung, DNV GL; Bob White, Fimer SpA; Marvin Hamon, Pure Power Engineering; Milton Nogueira, Roof Tech; Peter Seidel, First Solar; Jason Smolko, Copperweld;

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Committee: NEC-P01

Committee Statement

Resolution: FR-9576-NFPA 70-2021
Statement: A new definition for occupiable space is added for consistent application of the NEC.

Public Input No. 1161-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits
	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials
	UL Subject 267	Wire Pulling Compounds
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 635	Insulated Bushings

Article	Standard Number	Standard Title
	UL 1479	Fire Tests of Through-Penetration Firestops
	UL 1565	Positioning Devices
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
	UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds
	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables
	UL 66	Fixture Wire
	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables
	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum
	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing

Article	Standard Number	Standard Title
368	UL 1953	Power Distribution Blocks
	UL Subject 509	Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
	UL 98	Enclosed and Dead-Front Switches
	UL Subject 98A	Open-Type Switches
	UL 363	Knife Switches
	UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
	UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
	UL 917	Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
	UL 891	Switchboards
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires

Article	Standard Number	Standard Title
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products
	UL 935	Fluorescent-Lamp Ballasts
	UL 1029	High-Intensity-Discharge Lamp Ballasts
	UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
	UL 1574	Track Lighting Systems
	UL 1598	Luminaires
	UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
	UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
	UL 1993	Self-Ballasted Lamps and Lamp Adapters
	UL 2388	Flexible Lighting Products
	UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
	UL 8752	Organic Light Emitting Diode (OLED) Panels
	UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
	UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
	UL Subject 8800	Horticultural Lighting Equipment
411	UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 1838	Low-Voltage Landscape Lighting Systems
	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers
	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings

Article	Standard Number	Standard Title
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances
	UL 834	Heating, Water Supply, and Power Boilers — Electric
	UL 873	Temperature-Indicating and -Regulating Equipment
	UL 1042	Electric Baseboard Heating Equipment
	UL 1673	Electric Space Heating Cables
	UL 1693	Electric Radiant Heating Panels and Heating Panel Sets
	UL 1995	Heating and Cooling Equipment
	UL 1996	Electric Duct Heaters
	UL 2021	Fixed and Location-Dedicated Electric Room Heaters
426	UL Subject 1588	Roof and Gutter De-Icing Cable Units
427	IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications
	UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications
	UL Subject 2049	Residential Pipe Heating Cable
430	UL 508C	Power Conversion Equipment
	UL 845	Motor Control Centers
	UL 1004-1	Rotating Electrical Machines — General Requirements
	UL 1004-2	Impedance Protected Motors
	UL 1004-3	Thermally Protected Motors
	UL 2111	Overheating Protection for Motors
	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers

Article	Standard Number	Standard Title
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations
	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”

Article	Standard Number	Standard Title
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment
	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors
	UL 1047	Isolated Power Systems Equipment
	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment
	UL 1573	Stage and Studio Luminaires and Connector Strips
	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs
	UL 814	Gas-Tube-Sign Cable
	UL 879	Electric Sign Components
	UL 879A	LED Sign and Sign Retrofit Kits
	UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings
	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment
	UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
	UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
	UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles
	UL 2580	Batteries for Use in Electric Vehicles
	UL 2594	Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
	UL 1419	Professional Video and Audio Equipment

Article	Standard Number	Standard Title
	UL 1492	Audio-Video Products and Accessories
	UL 1711	Amplifiers for Fire Protective Signaling Systems
	UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
	UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
	UL 1778	Uninterruptible Power Systems
	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
	UL Subject 3703	Solar Trackers
	UL Subject 3730	Photovoltaic Junction Boxes
	UL 4703	Photovoltaic Wire
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
	UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
	UL Subject 9703	Distributed Wiring Harnesses
	UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements

Article	Standard Number	Standard Title
	UL 3003	Distributed Generation Cables
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 3741	Photovoltaic Hazard Control
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	UL Subject 6140	Wind Turbine Generating Systems
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway

Article	Standard Number	Standard Title
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL Subject 523	Telephone Service Drop Wire
	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

UL 61730-1 and UL 61730-2 were adopted and published in December of 2017 in an effort to internationally harmonize evaluation and testing requirements of photovoltaic (PV) modules. The standard technical panel (STP) for photovoltaic modules (formally STP 1703 now STP 61730), will no longer be updating UL 1703 with the intention that UL 1703 will be replaced by UL 61730. As such, the NEC and NFPA requirements should include UL 61730 in their list of applicable standards.

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Committee Statement

Resolution: CMP-1 notes that the referenced standards already exist in Annex A, Article 690. UL 1703 is a relevant standard for existing certifications.

Public Input No. 2253-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses

	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits

	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials

UL Subject 267	Wire Pulling Compounds

UL 514B	Conduit, Tubing, and Cable Fittings

UL 635	Insulated Bushings

UL 1479	Fire Tests of Through-Penetration Firestops

UL 1565	Positioning Devices

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

UL 2239	Hardware for the Support of Conduit, Tubing and Cable

UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds

	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables

UL 66	Fixture Wire

UL 83	Thermoplastic-Insulated Wires and Cables

	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations	

UL 514A	Metallic Outlet Boxes	

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers	

	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables

	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel

	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	

	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum

	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing
368	UL 1953	Power Distribution Blocks

UL Subject 509		Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
UL 817		Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
UL 98		Enclosed and Dead-Front Switches
UL Subject 98A		Open-Type Switches
UL 363		Knife Switches
UL 773		Plug-In Locking Type Photocontrols for Use with Area Lighting
UL 773A		Nonindustrial Photoelectric Switches for Lighting Control
UL 917		Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
UL 891		Switchboards

	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products

UL 935	Fluorescent-Lamp Ballasts
UL 1029	High-Intensity-Discharge Lamp Ballasts
UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
UL 1574	Track Lighting Systems
UL 1598	Luminaires
UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
UL 1993	Self-Ballasted Lamps and Lamp Adapters
UL 2388	Flexible Lighting Products
UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
UL 8752	Organic Light Emitting Diode (OLED) Panels
UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
UL Subject 8800	Horticultural Lighting Equipment
411 UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
UL 1838	Low-Voltage Landscape Lighting Systems

	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers

	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances

UL 834	Heating, Water Supply, and Power Boilers — Electric	
UL 873	Temperature-Indicating and -Regulating Equipment	
UL 1042	Electric Baseboard Heating Equipment	
UL 1673	Electric Space Heating Cables	
UL 1693	Electric Radiant Heating Panels and Heating Panel Sets	
UL 1995	Heating and Cooling Equipment	
UL 1996	Electric Duct Heaters	
UL 2021	Fixed and Location-Dedicated Electric Room Heaters	
426 UL Subject 1588	Roof and Gutter De-Icing Cable Units	
427 IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications	
UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications	
UL Subject 2049	Residential Pipe Heating Cable	
430 UL 508C	Power Conversion Equipment	
UL 845	Motor Control Centers	
UL 1004-1	Rotating Electrical Machines — General Requirements	
UL 1004-2	Impedance Protected Motors	
UL 1004-3	Thermally Protected Motors	
UL 2111	Overheating Protection for Motors	

	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations

	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors

	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment

	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors

UL 1047	Isolated Power Systems Equipment

	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs

UL 814	Gas-Tube-Sign Cable

UL 879	Electric Sign Components

UL 879A	LED Sign and Sign Retrofit Kits

UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice

	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings

	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment

UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements

UL 2231-2		Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
UL 2251		Plugs, Receptacles and Couplers for Electrical Vehicles
UL 2580		Batteries for Use in Electric Vehicles
UL 2594		Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
UL 1419		Professional Video and Audio Equipment
UL 1492		Audio-Video Products and Accessories
UL 1711		Amplifiers for Fire Protective Signaling Systems
UL 6500		Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
UL 60065		Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
UL 1778		Uninterruptible Power Systems
UL 60950-1		Information Technology Equipment Safety — Part 1: General Requirements
UL 60950-21		Information Technology Equipment Safety — Part 21: Remote Power Feeding

	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
UL Subject 3703	Solar Trackers
UL Subject 3730	Photovoltaic Junction Boxes
UL 4703	Photovoltaic Wire
UL 6703	Connectors for Use in Photovoltaic Systems
UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
UL Subject 9703	Distributed Wiring Harnesses
UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
UL 3003	Distributed Generation Cables
UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
UL 3741	Photovoltaic Hazard Control
694 UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
UL Subject 6140	Wind Turbine Generating Systems
UL 6141	Wind Turbines Permitting Entry of Personnel

	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers

	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems

UL 2196	Fire Tests for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables

750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems

UL 268A	Smoke Detectors for Duct Application

UL 497B	Protectors for Data Communication and Fire Alarm Circuits

UL 1424	Cables for Power-Limited Fire-Alarm Circuits

UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits

	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable

	UL 2024	Optical Fiber and Communication Cable Raceway
800	UL 444	Communications Cables

UL 489A	Circuit Breakers for Use in Communication Equipment

UL 497	Protectors for Paired-Conductor Communications Circuits

UL 497A	Secondary Protectors for Communications Circuits

UL 497C	Protectors for Coaxial Communications Circuits

UL Subject 497E	Protectors for Antenna Lead-In Conductors

UL Subject 523	Telephone Service Drop Wire

	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators

	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

An update is proposed for Annex A, UL2196, listed under Article 728 to properly reflect the title of this standard, namely "Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables." Public Inputs are offered to Articles 700, 725, 728, 760, 770, 800, and 805 and other locations in the Code which refer to Circuit Integrity Cable to correlate these requirements in the various sections throughout the code. This public input is a result of the Correlating Committee Task Group for Circuit Integrity Cable efforts to correlate information on Circuit Integrity (-CI) cable throughout the NEC®. Members of the task group included Blake Shugarman from UL – Principal Engineer for Circuit Integrity Systems, Larry Shudak from UL - Principal Engineer for Life Safety Technologies and member of NFPA 72, Anthony Tassone from UL – Principal Engineer Seasonal and Holiday Decorative Products and Telecommunications Cables - CMP16, Jim Conrad from Marmon Innovation and Technology Group – CMP13, George Straniero from AFC Cable Systems – CMP6, CMP3, and CC, Paul Casparro from IBEW – CMP3, and Rich Holub from DuPont – CMP14 and CC.

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Committee: NEC-P01

Committee Statement

Resolution: FR-9160-NFPA 70-2021
Statement: This revision will update UL 2196 in Informative Annex A under Article 728 to properly reflect the title of this standard. "Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables."

Public Input No. 2265-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits
	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials
	UL Subject 267	Wire Pulling Compounds
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 635	Insulated Bushings

Article	Standard Number	Standard Title
	UL 1479	Fire Tests of Through-Penetration Firestops
	UL 1565	Positioning Devices
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
	UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds
	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables
	UL 66	Fixture Wire
	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables
	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum
	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing

Article	Standard Number	Standard Title
368	UL 1953	Power Distribution Blocks
	UL Subject 509	Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
	UL 98	Enclosed and Dead-Front Switches
	UL Subject 98A	Open-Type Switches
	UL 363	Knife Switches
	UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
	UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
	UL 917	Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
	UL 891	Switchboards
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires

Article	Standard Number	Standard Title
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products
	UL 935	Fluorescent-Lamp Ballasts
	UL 1029	High-Intensity-Discharge Lamp Ballasts
	UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
	UL 1574	Track Lighting Systems
	UL 1598	Luminaires
	UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
	UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
	UL 1993	Self-Ballasted Lamps and Lamp Adapters
	UL 2388	Flexible Lighting Products
	UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
	UL 8752	Organic Light Emitting Diode (OLED) Panels
	UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
	UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
	UL Subject 8800	Horticultural Lighting Equipment
411	UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 1838	Low-Voltage Landscape Lighting Systems
	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers
	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings

Article	Standard Number	Standard Title
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances
	UL 834	Heating, Water Supply, and Power Boilers — Electric
	UL 873	Temperature-Indicating and -Regulating Equipment
	UL 1042	Electric Baseboard Heating Equipment
	UL 1673	Electric Space Heating Cables
	UL 1693	Electric Radiant Heating Panels and Heating Panel Sets
	UL 1995	Heating and Cooling Equipment
	UL 1996	Electric Duct Heaters
	UL 2021	Fixed and Location-Dedicated Electric Room Heaters
426	UL Subject 1588	Roof and Gutter De-Icing Cable Units
427	IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications
	UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications
	UL Subject 2049	Residential Pipe Heating Cable
430	UL 508C	Power Conversion Equipment
	UL 845	Motor Control Centers
	UL 1004-1	Rotating Electrical Machines — General Requirements
	UL 1004-2	Impedance Protected Motors
	UL 1004-3	Thermally Protected Motors
	UL 2111	Overheating Protection for Motors
	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers

Article	Standard Number	Standard Title
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations
	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”

Article	Standard Number	Standard Title
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment
	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors
	UL 1047	Isolated Power Systems Equipment
	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment
	UL 1573	Stage and Studio Luminaires and Connector Strips
	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs
	UL 814	Gas-Tube-Sign Cable
	UL 879	Electric Sign Components
	UL 879A	LED Sign and Sign Retrofit Kits
	UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings
	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment
	UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
	UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
	UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles
	UL 2580	Batteries for Use in Electric Vehicles
	UL 2594	Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
	UL 1419	Professional Video and Audio Equipment

Article	Standard Number	Standard Title
	UL 1492	Audio-Video Products and Accessories
	UL 1711	Amplifiers for Fire Protective Signaling Systems
	UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
	UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
	UL 1778	Uninterruptible Power Systems
	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
	UL Subject 3703	Solar Trackers
	UL Subject 3730	Photovoltaic Junction Boxes
	UL 4703	Photovoltaic Wire
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
	UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
	UL Subject 9703	Distributed Wiring Harnesses
	UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements

Article	Standard Number	Standard Title
	UL 3003	Distributed Generation Cables
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 3741	Photovoltaic Hazard Control
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	UL Subject 6140	Wind Turbine Generating Systems
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway

Article	Standard Number	Standard Title
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL Subject 523	Telephone Service Drop Wire
	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Additional Proposed Changes

File Name	Description	Approved
AnnexAPressurize.docx	Standards for pressurized enclosures and rooms, and for ventilated rooms.	

Statement of Problem and Substantiation for Public Input

Pressurized Enclosure "p" is permitted in NEC 2020. See 505.8(B). The standard for pressurized enclosures was not included in Annex A. This PI adds UL 60079-2. The standard for pressurized rooms and ventilated rooms was published in 2020, This PI adds UL 60079-13 to Annex A.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2219-NFPA 70-2020 [New Section after 505.8(N)]	Relating product standard to method of protection.

Submitter Information Verification

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Committee: NEC-P01

Committee Statement

Resolution: FR-8321-NFPA 70-2021
Statement: This revision adds UL 60079-2 and 60079-13 to Informative Annex A as these are relevant and newly published standards associated with Article 505.

Informative Annex A Product Safety Standards

Article	Standard Number	Standard Title
505	UL 60079-11	Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection – Encapsulation "m"
	UL 60079-2	Explosive Atmospheres – Part 2: Equipment Protection by Pressurized Enclosure "p"
	UL 60079-13	Explosive Atmospheres – Part 13: Equipment Protection by Pressurized Room "p" and Artificially Ventilated Room "v"
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation "mD"

[Continue remainder of Annex without changes]

Public Input No. 2553-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses

	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits

	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials

UL Subject 267	Wire Pulling Compounds

UL 514B	Conduit, Tubing, and Cable Fittings

UL 635	Insulated Bushings

UL 1479	Fire Tests of Through-Penetration Firestops

UL 1565	Positioning Devices

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

UL 2239	Hardware for the Support of Conduit, Tubing and Cable

UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds

	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables

UL 66	Fixture Wire

UL 83	Thermoplastic-Insulated Wires and Cables

	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations	

UL 514A	Metallic Outlet Boxes	

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers	

	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables

	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
337	UL 1309A	Cable for use in Mobile Installations
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel

	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	

	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum

	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing
368	UL 1953	Power Distribution Blocks

	UL Subject 509	Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
	UL 98	Enclosed and Dead-Front Switches
	UL Subject 98A	Open-Type Switches
	UL 363	Knife Switches
	UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
	UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
	UL 917	Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards

	UL 891	Switchboards
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters

UL 588	Seasonal and Holiday Decorative Products
UL 935	Fluorescent-Lamp Ballasts
UL 1029	High-Intensity-Discharge Lamp Ballasts
UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
UL 1574	Track Lighting Systems
UL 1598	Luminaires
UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
UL 1993	Self-Ballasted Lamps and Lamp Adapters
UL 2388	Flexible Lighting Products
UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
UL 8752	Organic Light Emitting Diode (OLED) Panels
UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
UL Subject 8800	Horticultural Lighting Equipment
411 UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
UL 1838	Low-Voltage Landscape Lighting Systems

	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers

	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances

UL 834	Heating, Water Supply, and Power Boilers — Electric	
UL 873	Temperature-Indicating and -Regulating Equipment	
UL 1042	Electric Baseboard Heating Equipment	
UL 1673	Electric Space Heating Cables	
UL 1693	Electric Radiant Heating Panels and Heating Panel Sets	
UL 1995	Heating and Cooling Equipment	
UL 1996	Electric Duct Heaters	
UL 2021	Fixed and Location-Dedicated Electric Room Heaters	
426 UL Subject 1588	Roof and Gutter De-Icing Cable Units	
427 IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications	
UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications	
UL Subject 2049	Residential Pipe Heating Cable	
430 UL 508C	Power Conversion Equipment	
UL 845	Motor Control Centers	
UL 1004-1	Rotating Electrical Machines — General Requirements	
UL 1004-2	Impedance Protected Motors	
UL 1004-3	Thermally Protected Motors	
UL 2111	Overheating Protection for Motors	

	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations

	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors

	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment

	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors

UL 1047	Isolated Power Systems Equipment

	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs

UL 814	Gas-Tube-Sign Cable

UL 879	Electric Sign Components

UL 879A	LED Sign and Sign Retrofit Kits

UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice

	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings

	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment

UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements

UL 2231-2		Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
UL 2251		Plugs, Receptacles and Couplers for Electrical Vehicles
UL 2580		Batteries for Use in Electric Vehicles
UL 2594		Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
UL 1419		Professional Video and Audio Equipment
UL 1492		Audio-Video Products and Accessories
UL 1711		Amplifiers for Fire Protective Signaling Systems
UL 6500		Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
UL 60065		Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
UL 1778		Uninterruptible Power Systems
UL 60950-1		Information Technology Equipment Safety — Part 1: General Requirements
UL 60950-21		Information Technology Equipment Safety — Part 21: Remote Power Feeding

	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
UL Subject 3703	Solar Trackers
UL Subject 3730	Photovoltaic Junction Boxes
UL 4703	Photovoltaic Wire
UL 6703	Connectors for Use in Photovoltaic Systems
UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
UL Subject 9703	Distributed Wiring Harnesses
UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
UL 3003	Distributed Generation Cables
UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
UL 3741	Photovoltaic Hazard Control
694 UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
UL Subject 6140	Wind Turbine Generating Systems
UL 6141	Wind Turbines Permitting Entry of Personnel

	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers

	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems

UL 2196	Tests for Fire-Resistive Cables

750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems

UL 268A	Smoke Detectors for Duct Application

UL 497B	Protectors for Data Communication and Fire Alarm Circuits

UL 1424	Cables for Power-Limited Fire-Alarm Circuits

UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits

	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable

	UL 2024	Optical Fiber and Communication Cable Raceway
800	UL 444	Communications Cables

UL 489A	Circuit Breakers for Use in Communication Equipment

UL 497	Protectors for Paired-Conductor Communications Circuits

UL 497A	Secondary Protectors for Communications Circuits

UL 497C	Protectors for Coaxial Communications Circuits

UL Subject 497E	Protectors for Antenna Lead-In Conductors

UL Subject 523	Telephone Service Drop Wire

	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators

	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

The requirements for Type P cables are now contained in UL 1309A, Cable for use in Mobile Installations. Annex A has been updated to add this as the appropriate standard to reference for article 337.

Submitter Information Verification

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Committee: NEC-P01

Committee Statement

Resolution: FR-9160-NFPA 70-2021
Statement: This revision will update UL 2196 in Informative Annex A under Article 728 to properly reflect the title of this standard. "Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables."

Public Input No. 2658-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses

	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits

	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials

UL Subject 267	Wire Pulling Compounds

UL 514B	Conduit, Tubing, and Cable Fittings

UL 635	Insulated Bushings

UL 1479	Fire Tests of Through-Penetration Firestops

UL 1565	Positioning Devices

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

UL 2239	Hardware for the Support of Conduit, Tubing and Cable

UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds

	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables

UL 66	Fixture Wire

UL 83	Thermoplastic-Insulated Wires and Cables

	UL 1063	Machine-Tool Wires and Cables
311	UL 1072	Medium-Voltage Power Cables
	ANSI C119.4	Electric Connectors- Connectors for Use between Aluminum-to-Aluminum and Aluminum-to-Copper Conductors Designed for Normal Operation at or Below 93ºC and Copper-to-Copper Conductors Designed for Normal Operation at or Below 100ºC
	IEEE 48	IEEE Standard for test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV.
	IEEE 386	IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV
	IEEE 404	IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations

UL 514A	Metallic Outlet Boxes

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable

~~328 UL 1072 Medium-Voltage Power Cables~~

330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables

	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel

	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum

	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing
368	UL 1953	Power Distribution Blocks

UL Subject 509	Bus Drop Cable

	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables

UL 817	Cord Sets and Power-Supply Cords

	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches

UL 98	Enclosed and Dead-Front Switches

	UL Subject 98A	Open-Type Switches
	UL 363	Knife Switches
	UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
	UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
	UL 917	Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
	UL 891	Switchboards
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors

	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products
	UL 935	Fluorescent-Lamp Ballasts
	UL 1029	High-Intensity-Discharge Lamp Ballasts
	UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
	UL 1574	Track Lighting Systems
	UL 1598	Luminaires
	UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
	UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
	UL 1993	Self-Ballasted Lamps and Lamp Adapters

	UL 2388	Flexible Lighting Products
	UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
	UL 8752	Organic Light Emitting Diode (OLED) Panels
	UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
	UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
	UL Subject 8800	Horticultural Lighting Equipment
411	UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 1838	Low-Voltage Landscape Lighting Systems
	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers

UL 474	Dehumidifiers
UL 507	Electric Fans
UL 574	Electric Oil Heaters
UL 621	Ice Cream Makers
UL 705	Power Ventilators
UL 710B	Recirculating Systems
UL 749	Household Dishwashers
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427	IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications

	UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications
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	UL 1004-9	Medium Voltage and Form Wound Motors
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	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV

	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations

ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids

UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations

UL 844	Luminaires for Use in Hazardous (Classified) Locations

UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations

UL 2075	Gas and Vapor Detectors and Sensors

UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations

	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”

UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements

UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”

UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”

UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”

	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"

	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”

UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”

UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements

UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”

	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment

	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors

UL 1047	Isolated Power Systems Equipment

	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs

UL 814	Gas-Tube-Sign Cable

UL 879	Electric Sign Components

UL 879A	LED Sign and Sign Retrofit Kits

	UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings
	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment
	UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
	UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
	UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles
	UL 2580	Batteries for Use in Electric Vehicles
	UL 2594	Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
	UL 1419	Professional Video and Audio Equipment
	UL 1492	Audio-Video Products and Accessories
	UL 1711	Amplifiers for Fire Protective Signaling Systems

	UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
	UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
	UL 1778	Uninterruptible Power Systems
	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment

	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
	UL Subject 3703	Solar Trackers
	UL Subject 3730	Photovoltaic Junction Boxes
	UL 4703	Photovoltaic Wire
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
	UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
	UL Subject 9703	Distributed Wiring Harnesses
	UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements

	UL 3003	Distributed Generation Cables
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 3741	Photovoltaic Hazard Control
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	UL Subject 6140	Wind Turbine Generating Systems
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits

	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable

	UL 2024	Optical Fiber and Communication Cable Raceway
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL Subject 523	Telephone Service Drop Wire
	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

This is a companion PI to PI 2642 for the addition of type MV cable joints and terminations to article 311.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2642-NFPA 70-2020 [Article 311]	Companion
Public Input No. 2642-NFPA 70-2020 [Article 311]	

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Committee: NEC-P01

Committee Statement

Resolution: FR-8323-NFPA 70-2021

Statement: This revision adds Article 311 type MV cable joints and terminations to Informative Annex A as these are relevant standards associated with Article 311.

Public Input No. 2755-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses

UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses	
UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses	
UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses	
UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses	
UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses	
UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses	
UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses	
UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses	
UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses	
UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses	
UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses	
UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses	
UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses	
UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters	
UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses	
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures	
250 UL 467	Grounding and Bonding Equipment	
280 IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits	

	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials

UL Subject 267	Wire Pulling Compounds

UL 514B	Conduit, Tubing, and Cable Fittings

UL 635	Insulated Bushings

UL 1479	Fire Tests of Through-Penetration Firestops

UL 1565	Positioning Devices

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

UL 2239	Hardware for the Support of Conduit, Tubing and Cable

UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds

	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables

UL 66	Fixture Wire

UL 83	Thermoplastic-Insulated Wires and Cables

	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations	

UL 514A	Metallic Outlet Boxes	

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers	

	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables

	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel

	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	

	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum

	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing
368	UL 1953	Power Distribution Blocks

UL Subject 509		Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
UL 817		Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
UL 98		Enclosed and Dead-Front Switches
UL Subject 98A		Open-Type Switches
UL 363		Knife Switches
UL 773		Plug-In Locking Type Photocontrols for Use with Area Lighting
UL 773A		Nonindustrial Photoelectric Switches for Lighting Control
UL 917		Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
UL 891		Switchboards

	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products

UL 935	Fluorescent-Lamp Ballasts
UL 1029	High-Intensity-Discharge Lamp Ballasts
UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
UL 1574	Track Lighting Systems
UL 1598	Luminaires
UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
UL 1993	Self-Ballasted Lamps and Lamp Adapters
UL 2388	Flexible Lighting Products
UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
UL 8752	Organic Light Emitting Diode (OLED) Panels
UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
UL Subject 8800	Horticultural Lighting Equipment
411 UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
UL 1838	Low-Voltage Landscape Lighting Systems

	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers

	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances

UL 834	Heating, Water Supply, and Power Boilers — Electric	
UL 873	Temperature-Indicating and -Regulating Equipment	
UL 1042	Electric Baseboard Heating Equipment	
UL 1673	Electric Space Heating Cables	
UL 1693	Electric Radiant Heating Panels and Heating Panel Sets	
UL 1995	Heating and Cooling Equipment	
UL 1996	Electric Duct Heaters	
UL 2021	Fixed and Location-Dedicated Electric Room Heaters	
426 UL Subject 1588	Roof and Gutter De-Icing Cable Units	
427 IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications	
UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications	
UL Subject 2049	Residential Pipe Heating Cable	
430 UL 508C	Power Conversion Equipment	
UL 845	Motor Control Centers	
UL 1004-1	Rotating Electrical Machines — General Requirements	
UL 1004-2	Impedance Protected Motors	
UL 1004-3	Thermally Protected Motors	
UL 2111	Overheating Protection for Motors	

	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations

	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors

	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment

	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors

UL 1047	Isolated Power Systems Equipment

	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs

UL 814	Gas-Tube-Sign Cable

UL 879	Electric Sign Components

UL 879A	LED Sign and Sign Retrofit Kits

UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice

	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings

	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment

UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements

UL 2231-2		Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
UL 2251		Plugs, Receptacles and Couplers for Electrical Vehicles
UL 2580		Batteries for Use in Electric Vehicles
UL 2594		Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
UL 1419		Professional Video and Audio Equipment
UL 1492		Audio-Video Products and Accessories
UL 1711		Amplifiers for Fire Protective Signaling Systems
UL 6500		Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
UL 60065		Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
UL 1778		Uninterruptible Power Systems
UL 60950-1		Information Technology Equipment Safety — Part 1: General Requirements
UL 60950-21		Information Technology Equipment Safety — Part 21: Remote Power Feeding

UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors	

	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires

UL 676	Underwater Luminaires and Submersible Junction Boxes

UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment

UL 1081	Swimming Pool Pumps, Filters, and Chlorinators

UL 1241	Isolated Power Systems Equipment

UL 1261	Electric Water Heaters for Pools and Tubs

UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment

	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems

UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems

UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems

UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection

UL 1703	Flat-Plate Photovoltaic Modules and Panels

UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
UL Subject 3703	Solar Trackers
UL Subject 3730	Photovoltaic Junction Boxes
UL 4703	Photovoltaic Wire
UL 6703	Connectors for Use in Photovoltaic Systems
UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
UL Subject 9703	Distributed Wiring Harnesses
UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
UL 3003	Distributed Generation Cables
UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
UL 3741	Photovoltaic Hazard Control
694 UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
UL Subject 6140	Wind Turbine Generating Systems
UL 6141	Wind Turbines Permitting Entry of Personnel

	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables

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341	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL Subject 523	Telephone Service Drop Wire

	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators

	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

This Public Comment is submitted on behalf of a task group appointed by the Chairs of NEC® CMP-3 & CMP-6. This Task Group was appointed to review whether NEC® Article 727 should be relocated to Chapter 3 where it was originally proposed. Task Group members are Dennis Nielsen, George Zimmerman, Jerry Kent, Ron Tellas, Kelly Lamp and Keith Waters.

Task Group members noted that ITC tray cable was originally accepted by CMP-6 for Chapter 3, however, the correlating committee at the time chose to have it put in Chapter 7. This Task Group's work confirmed that the material should be moved, but changes needed to be made to meet the chapter 3 style manual requirements. this public input is listed as PI 2696.

Since the task group is recommending relocation of Article 727 to Article 341 then Annex A needs to reflect this change.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2696-NFPA 70-2020 [Article 727]	PI that creates the need for this change

Submitter Information Verification

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Submittal Date: Mon Aug 31 09:04:42 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8406-NFPA 70-2021

Statement: This revision to Informative Annex A is designed to bring it in line with the requirements for 2 parts in Informative Annex A in the 2020 NEC Style Manual, 4.2.1.1 and 4.2.1.2.

The first revisions for PIs 2253, 2265, 2553, 2658, 2755, 3011, 793, 2076, 2178, 2179 that have been accepted will be incorporated into Informative Annex A.

Work on the standards that may be included in Part II will be a work in progress.

Public Input No. 3011-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses

	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits

	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials

UL Subject 267	Wire Pulling Compounds

UL 514B	Conduit, Tubing, and Cable Fittings

UL 635	Insulated Bushings

UL 1479	Fire Tests of Through-Penetration Firestops

UL 1565	Positioning Devices

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

UL 2239	Hardware for the Support of Conduit, Tubing and Cable

UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds

	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables

UL 66	Fixture Wire

UL 83	Thermoplastic-Insulated Wires and Cables

	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations	

UL 514A	Metallic Outlet Boxes	

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers	

	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables

	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel

	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	

	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum

	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing
368	UL 1953	Power Distribution Blocks

UL Subject 509		Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
UL 817		Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
UL 98		Enclosed and Dead-Front Switches
UL Subject 98A		Open-Type Switches
UL 363		Knife Switches
UL 773		Plug-In Locking Type Photocontrols for Use with Area Lighting
UL 773A		Nonindustrial Photoelectric Switches for Lighting Control
UL 917		Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
UL 891		Switchboards

	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products

UL 935	Fluorescent-Lamp Ballasts
UL 1029	High-Intensity-Discharge Lamp Ballasts
UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
UL 1574	Track Lighting Systems
UL 1598	Luminaires
UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
UL 1993	Self-Ballasted Lamps and Lamp Adapters
UL 2388	Flexible Lighting Products
UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
UL 8752	Organic Light Emitting Diode (OLED) Panels
UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
UL Subject 8800	Horticultural Lighting Equipment
411 UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
UL 1838	Low-Voltage Landscape Lighting Systems

	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers

	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances

UL 834	Heating, Water Supply, and Power Boilers — Electric	
UL 873	Temperature-Indicating and -Regulating Equipment	
UL 1042	Electric Baseboard Heating Equipment	
UL 1673	Electric Space Heating Cables	
UL 1693	Electric Radiant Heating Panels and Heating Panel Sets	
UL 1995	Heating and Cooling Equipment	
UL 1996	Electric Duct Heaters	
UL 2021	Fixed and Location-Dedicated Electric Room Heaters	
426 UL Subject 1588	Roof and Gutter De-Icing Cable Units	
427 IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications	
UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications	
UL Subject 2049	Residential Pipe Heating Cable	
430 UL 508C	Power Conversion Equipment	
UL 845	Motor Control Centers	
UL 1004-1	Rotating Electrical Machines — General Requirements	
UL 1004-2	Impedance Protected Motors	
UL 1004-3	Thermally Protected Motors	
UL 2111	Overheating Protection for Motors	

	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers
445		
693	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers

	UL 1062	Unit Substations
	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
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696	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations

	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”

	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment

	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors

UL 1047	Isolated Power Systems Equipment

	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs

UL 814	Gas-Tube-Sign Cable

UL 879	Electric Sign Components

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UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use	
UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements	
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements	
UL 1690	Data-Processing Cable	645
UL 1778	Uninterruptible Power Systems	

	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
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	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection

UL 1703	Flat-Plate Photovoltaic Modules and Panels
UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
UL Subject 3703	Solar Trackers
UL Subject 3730	Photovoltaic Junction Boxes
UL 4703	Photovoltaic Wire
UL 6703	Connectors for Use in Photovoltaic Systems
UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
UL Subject 9703	Distributed Wiring Harnesses
UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
UL 3003	Distributed Generation Cables
UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing

	UL 3741	Photovoltaic Hazard Control
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines

UL Subject 6140		Wind Turbine Generating Systems
UL 6141		Wind Turbines Permitting Entry of Personnel
UL 6142		Wind Turbine Generating Systems — Small
~~695~~		
703	UL 218	Fire Pump Controllers
UL 448		Centrifugal Stationary Pumps for Fire-Protection Service
UL 448B		Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
UL 448C		Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
UL 1008		Transfer Switch Equipment
UL 1008A		Medium-Voltage Transfer Switches
UL 2200		Stationary Engine Generator Assemblies
~~706~~		
695	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
UL 13		Power-Limited Circuit Cables
UL 1012		Power Units Other Than Class 2
UL 1310		Class 2 Power Units
UL 1666		Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts

	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits

UL 497C	Protectors for Coaxial Communications Circuits	
UL Subject 497E	Protectors for Antenna Lead-In Conductors	
UL Subject 523	Telephone Service Drop Wire	
	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

This public input was prepared by the correlating committee task group focused on alternative energy requirements. This task group consisted of the following members: Derrick Atkins (CMP 5), Greg Ball (CMP 13) Ken Boyce (CMP 1), Bill Brooks (CMP 4), Bruce Campbell, Thomas Domitrovich (CMP 2, CMP 10), Jason Fisher (CMP 4), Scott Harding (CMP 5), Pete Jackson (CMP 8), David Kendall (CMP 8, CC), Chad Kennedy (CMP 13), Christine Porter (CMP 5, CC), Timothy Windey (CMP 13).

This change aligns with an effort to re-organize the alternative energy sources NEC Articles into a series of articles closely located together. This reorganization places all sources alternate sources as follows:

689 On-Site Energy Sources
690 Solar Photovoltaic (PV) Systems
691 Large-Scale Photovoltaic (PV) Systems
692 Fuel Cell Systems
693 Generators
694 Wind Electric Systems
695 Energy Storage Systems
696 Storage Batteries

This public input addresses the following changes / moving of articles.
Article 695 moving to Article 703
Article 445 moving to Article 693
Article 480 moving to Article 696
Article 706 moving to Article 695

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2692-NFPA 70-2020 [Article 705]	
Public Input No. 2984-NFPA 70-2020 [Article 445]	
Public Input No. 2985-NFPA 70-2020 [Article 480]	
Public Input No. 3006-NFPA 70-2020 [Article 706]	

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Committee: NEC-P01

Committee Statement

Resolution: FR-8406-NFPA 70-2021

Statement: This revision to Informative Annex A is designed to bring it in line with the requirements for 2 parts in Informative Annex A in the 2020 NEC Style Manual, 4.2.1.1 and 4.2.1.2.

The first revisions for PIs 2253, 2265, 2553, 2658, 2755, 3011, 793, 2076, 2178, 2179 that have been accepted will be incorporated into Informative Annex A.

Work on the standards that may be included in Part II will be a work in progress.

Public Input No. 3780-NFPA 70-2020 [Definition:]

Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits
	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials
	UL Subject 267	Wire Pulling Compounds
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 635	Insulated Bushings

Article	Standard Number	Standard Title
	UL 1479	Fire Tests of Through-Penetration Firestops
	UL 1565	Positioning Devices
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
	UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds
	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables
	UL 66	Fixture Wire
	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables
	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum
	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing

Article	Standard Number	Standard Title
368	UL 1953	Power Distribution Blocks
	UL Subject 509	Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
	UL 98	Enclosed and Dead-Front Switches
	UL Subject 98A	Open-Type Switches
	UL 363	Knife Switches
	UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
	UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
	UL 917	Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
	UL 891	Switchboards
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires

Article	Standard Number	Standard Title
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products
	UL 935	Fluorescent-Lamp Ballasts
	UL 1029	High-Intensity-Discharge Lamp Ballasts
	UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
	UL 1574	Track Lighting Systems
	UL 1598	Luminaires
	UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
	UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
	UL 1993	Self-Ballasted Lamps and Lamp Adapters
	UL 2388	Flexible Lighting Products
	UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
	UL 8752	Organic Light Emitting Diode (OLED) Panels
	UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
	UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
	UL Subject 8800	Horticultural Lighting Equipment
411	UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 1838	Low-Voltage Landscape Lighting Systems
	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers
	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings

Article	Standard Number	Standard Title
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances
	UL 834	Heating, Water Supply, and Power Boilers — Electric
	UL 873	Temperature-Indicating and -Regulating Equipment
	UL 1042	Electric Baseboard Heating Equipment
	UL 1673	Electric Space Heating Cables
	UL 1693	Electric Radiant Heating Panels and Heating Panel Sets
	UL 1995	Heating and Cooling Equipment
	UL 1996	Electric Duct Heaters
	UL 2021	Fixed and Location-Dedicated Electric Room Heaters
426	UL Subject 1588	Roof and Gutter De-Icing Cable Units
427	IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications
	UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications
	UL Subject 2049	Residential Pipe Heating Cable
430	UL 508C	Power Conversion Equipment
	UL 845	Motor Control Centers
	UL 1004-1	Rotating Electrical Machines — General Requirements
	UL 1004-2	Impedance Protected Motors
	UL 1004-3	Thermally Protected Motors
	UL 2111	Overheating Protection for Motors
	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers

Article	Standard Number	Standard Title
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations
	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”

Article	Standard Number	Standard Title
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment
	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors
	UL 1047	Isolated Power Systems Equipment
	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
520	UL Subject 334	Theater Lighting Distribution and Control Equipment
	UL 1573	Stage and Studio Luminaires and Connector Strips
	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs
	UL 814	Gas-Tube-Sign Cable
	UL 879	Electric Sign Components
	UL 879A	LED Sign and Sign Retrofit Kits
	UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings
	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment
	UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
	UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
	UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles
	UL 2580	Batteries for Use in Electric Vehicles
	UL 2594	Electric Vehicle Supply Equipment
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
	UL 1419	Professional Video and Audio Equipment

Article	Standard Number	Standard Title
	UL 1492	Audio-Video Products and Accessories
	UL 1711	Amplifiers for Fire Protective Signaling Systems
	UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
	UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 1690	Data-Processing Cable
	UL 1778	Uninterruptible Power Systems
	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
	UL Subject 3703	Solar Trackers
	UL Subject 3730	Photovoltaic Junction Boxes
	UL 4703	Photovoltaic Wire
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
	UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
	UL Subject 9703	Distributed Wiring Harnesses
	UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements

Article	Standard Number	Standard Title
	UL 3003	Distributed Generation Cables
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 3741	Photovoltaic Hazard Control
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	UL Subject 6140	Wind Turbine Generating Systems
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway

Article	Standard Number	Standard Title
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL Subject 523	Telephone Service Drop Wire
	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Additional Proposed Changes

File Name	Description	Approved
NFPA_70_NEC_Annex_Public_Input.docx	Public Input for Annex A	

Statement of Problem and Substantiation for Public Input

This revision to Annex A is a first step designed to bring it more in line with the proposed changes to the requirements for Annex A in the NEC Style Manual. The proposed changes state the following:

4.2.1.1 Part I. Part I shall contain the relevant product safety standard(s) for conductors and equipment that have an associated listing (certification) requirement in the document. The annex entry shall identify the document section requiring the listed (certified) product and the number and title of the related product safety standard. The edition dates are not mandatory.

4.2.1.2 Part II. Where conductors and equipment do not have an associated listing (certification) requirement in the document, a technical committee may include the relevant product safety standard(s) as additional information in Part II of Annex A. Each informational annex entry shall identify the relevant document section and the number and title of the related product safety standard. The edition dates are not mandatory.

This revision identifies all relevant product safety standards for conductors and equipment that have an associated listing as identified in 4.2.1.1. It is expected that this document will be revised for the Second Draft meeting based on the actions of the Code Panels at the First Draft Meeting and may be affected by the actions of the NFPA Standards Council at its December 2020 meeting relative to the proposed changes to the requirements for Annex A in the NEC Style Manual.

Submitter Information Verification

Submitter Full Name: Kenneth McKinney
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Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 12:34:40 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8406-NFPA 70-2021

Statement: This revision to Informative Annex A is designed to bring it in line with the requirements for 2 parts in Informative Annex A in the 2020 NEC Style Manual, 4.2.1.1 and 4.2.1.2.

The first revisions for PIs 2253, 2265, 2553, 2658, 2755, 3011, 793, 2076, 2178, 2179 that have been accepted will be incorporated into Informative Annex A.

Work on the standards that may be included in Part II will be a work in progress.

NEC 70: National Electrical Code, 2020 Edition

Annex A Product Safety Standards

A Product Safety Standards

Informative Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only.

This informative annex provides a list of product safety standards used for product listing where that listing is required by this *Code*. It is recognized that this list is current at the time of publication but that new standards or modifications to existing standards can occur at any time while this edition of the *Code* is in effect.

This informative annex does not form a mandatory part of the requirements of this *Code* but is intended to identify for the *Code* users the standards upon which *Code* requirements have been based.

Part I

Product Safety Standards for Conductors and Equipment that have an Associated Listing Requirement

Article	Standard Number	Standard Title
110	~~UL 310~~	~~Electrical Quick-Connect Terminals~~
	UL 305	Panic Hardware
	~~UL 486A-486B~~	~~Wire Connectors~~
	~~UL 486C~~	~~Splicing Wire Connectors~~
	UL 486D	Sealed Wire Connector Systems
	~~UL 486E~~	~~Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors~~
	~~UL 486F~~	~~Bare and Covered Ferrules~~
	~~UL 486G~~	~~Sealed Twist-On Connecting Devices~~
	~~UL 510~~	~~Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape~~

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Article	Standard Number	Standard Title
	~~UL Subject 546~~	~~Conductor Termination Compounds~~
	~~UL 2459~~	~~Insulated Multi-Pole Splicing Wire Connectors~~
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 10C	Positive Pressure Fire Tests of Door Assemblies
210	UL 943	Ground Fault Circuit Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
	UL 935	Fluorescent-Lamp Ballasts
	UL 1029	High-Intensity-Discharge Lamp Ballast
225	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1242	Electrical Intermediate Metal Conduit - Steel
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
230	UL 1053	Ground-Fault Sensing and Relaying Equipment

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Article	Standard Number	Standard Title
	UL 2735	Electric Utility Meters
	UL 1449	Surge Protective Devices
	UL 414	Meter Sockets
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1242	Electrical Intermediate Metal Conduit - Steel
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1953	Outline for Power Distribution Blocks
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 514B	Conduit, Tubing and Cable Fittings
	UL 67	Panelboards
	UL 98	Enclosed and Dead-Front Switches
	UL 218	Fire Pump Controllers
	UL 231	Power Outlets

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Article	Standard Number	Standard Title
	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
	UL 845	Motor Control Centers
	UL 857	Busways
	UL 869A	Reference Standard for Service Equipment
	UL 891	Switchboards
	UL 891A	Switchboards Rated 601 - 1000 V
	UL 977	Fused Power-Circuit Devices
	UL 1008	Transfer Switch Equipment
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 1008M	Meter-Mounted Transfer Switches
	UL 1008S	Solid-State Transfer Switches
	UL 1062	Unit Substations
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1429	Pullout Switches
	UL 1449	Surge Protective Devices

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Article	Standard Number	Standard Title
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 1740	Robots and Robotic Equipment
	UL 2011	Outline for Machinery
	UL 2200	Stationary Engine Generator Assemblies
	UL 2416	Audio/Video, Information and Communication Technology Equipment Cabinet, Enclosure and Rack Systems
	UL 2446	Outline for Unitary Boiler Room Systems
	UL 2565	Industrial Metalworking and Woodworking Machine Tools
	UL 2745	Outline for Meter Socket Adapters for Communications Equipment
	UL 2876	Outline for Remote Racking Devices for Switchgear and Controlgear
	UL 4248-1	UL 4248-1 Fuseholders - Part 1: General Requirements
	UL 60947-1	UL 60947-1 Low-Voltage Switchgear and Controlgear – Part 1: General Rules
	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy
240	~~UL 198M~~	~~Mine Duty Fuses~~
	~~UL 248-1~~	~~Low-Voltage Fuses — Part 1: General Requirements~~
	~~UL 248-2~~	~~Low-Voltage Fuses — Part 2: Class C Fuses~~
	~~UL 248-3~~	~~Low-Voltage Fuses — Part 3: Class CA and CB Fuses~~
	~~UL 248-4~~	~~Low-Voltage Fuses — Part 4: Class CC Fuses~~

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Article	Standard Number	Standard Title
	~~UL 248-5~~	~~Low-Voltage Fuses — Part 5: Class G Fuses~~
	~~UL 248-6~~	~~Low-Voltage Fuses — Part 6: Class H Renewable Fuses~~
	~~UL 248-7~~	~~Low-Voltage Fuses — Part 7: Class H Renewable Fuses~~
	~~UL 248-8~~	~~Low-Voltage Fuses — Part 8: Class J Fuses~~
	~~UL 248-9~~	~~Low-Voltage Fuses — Part 9: Class K Fuses~~
	~~UL 248-10~~	~~Low-Voltage Fuses — Part 10: Class L Fuses~~
	~~UL 248-11~~	~~Low-Voltage Fuses — Part 11: Plug Fuses~~
	~~UL 248-12~~	~~Low-Voltage Fuses — Part 12: Class R Fuses~~
	~~UL 248-13~~	~~Low-Voltage Fuses — Part 13: Semiconductor Fuses~~
	~~UL 248-14~~	~~Low-Voltage Fuses — Part 14: Supplemental Fuses~~
	~~UL 248-15~~	~~Low-Voltage Fuses — Part 15: Class T Fuses~~
	~~UL 248-16~~	~~Low-Voltage Fuses — Part 16: Test Limiters~~
	~~UL Subject 248-17~~	~~Low-Voltage Fuses - Part 17: Class CF Fuses~~
	~~UL Subject 248-18~~	~~Low-Voltage Fuses - Part 18: Class CD Fuses~~
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
~~242~~	~~IEEE C62.1~~	~~Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits~~

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Article	Standard Number	Standard Title
	~~IEEE C62.11~~	~~Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits~~
	~~UL 1449~~	~~Surge Protective Devices~~
250	UL 467	Grounding and Bonding Equipment
~~280~~242	~~IEEE C62.1~~	~~Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits~~
	~~IEEE C62.11~~	~~Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits~~
~~285~~242	~~UL 1449~~	~~Surge Protective Devices~~
300	UL 263	Fire Tests of Building Construction and Materials
	~~UL Subject 267~~	~~Wire Pulling Compounds~~
	~~UL 514B~~	~~Conduit, Tubing, and Cable Fittings~~
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
	UL 756C	Polymeric Materials - Use in Electrical Equipment Evaluations
	UL 2556	Standard for Wire and Cable Test Methods
	UL 44	Thermoset-Insulated Wires and Cables
	UL 83	Thermoplastic-Insulated Wires and Cables

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Article	Standard Number	Standard Title
	UL 83A	Fluoropolymer Insulated Wire
	~~UL 635~~	~~Insulated Bushings~~
	~~UL 1479~~	~~Fire Tests of Through-Penetration Firestops~~
	~~UL 1565~~	~~Positioning Devices~~
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	~~UL 2043~~	~~Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces~~
	~~UL 2239~~	~~Hardware for the Support of Conduit, Tubing and Cable~~
	~~UL Subject 2419~~	~~Electrically Conductive Corrosion Resistant Compounds~~
	~~UL 60730-1~~	~~Automatic Electrical Controls — Part 1: General Requirements~~
310	UL 44	Thermoset-Insulated Wires and Cables
	~~UL 66~~	~~Fixture Wire~~
	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 83A	Fluoropolymer Insulated Wire
	UL 224	Extruded Insulating Tubing
	UL 1063	Machine-Tool Wires and Cables
	UL 1441	Coated Electrical Sleeving
311	UL 1072	Medium Voltage Power Cables

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Article	Standard Number	Standard Title
312	~~UL 414~~	~~Meter Sockets~~
	UL 50	Enclosures for Electrical Equipment
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
314	UL 50	Enclosures for Electrical Equipment
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514A	Metallic Outlet Boxes
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
	UL 1953	Power Distribution Blocks
	UL 486D	Sealed Wire Connector Systems
	UL 498	Attachment Plugs and Receptacles
	UL 498B	Outline for Receptacles with Integral Switching Means
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection

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Article	Standard Number	Standard Title
	UL 486D	Sealed Wire Connector Systems
320	UL 4	Armored Cable
322	NEMA Publication No. UC2	Under-carpet Power Distribution Systems
324	NEMA Publication No. UC2	Under-carpet Power Distribution Systems
~~328~~	~~UL 1072~~	~~Medium-Voltage Power Cables~~
330	UL 1569	Metal-Clad Cables
	UL 2225	Cables and Cable-Fittings For Use In Hazardous (Classified) Locations
332	UL 504	Outline for Mineral-Insulated, Metal-Sheathed Cable
334	UL 719	Nonmetallic-Sheathed Cables
	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
337	UL 1309A	Cable for Use in Mobile Installations
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel

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Article	Standard Number	Standard Title
344	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
350	UL 360	Liquid-Tight Flexible Steel Conduit
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
358	UL 797A	Electrical Metallic Tubing — Aluminum
	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing

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Article	Standard Number	Standard Title
362	UL 1653	Electrical Nonmetallic Tubing
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
366	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
~~368~~	~~UL 1953~~	~~Power Distribution Blocks~~
	~~UL Subject 509~~	~~Bus Drop Cable~~
	~~UL 857~~	~~Busways~~
374	UL 209	Cellular Metal Floor Raceways and Fittings
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
376	~~UL 870~~	~~Wireways, Auxiliary Gutters, and Associated Fittings~~
	UL 1953	Power Distribution Blocks
378	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
~~380~~	~~UL Subject 111~~	~~Multioutlet Assemblies~~
382	UL183	Manufactured Wiring Systems
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
	UL 746C	Polymeric Materials - Use in Electrical Equipment Evaluations
	UL 1077	Supplementary Protectors for Use in Electrical Equipment

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Article	Standard Number	Standard Title
	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
	UL 991	Tests for Safety-Related Controls Employing Solid-State Devices
	UL 1998	Software in Programmable Components
	UL 467	Grounding and Bonding Equipment
	UL 498	Attachment Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 498M	Marine Shore Power Inlets
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
~~390~~	~~UL 884~~	~~Underfloor Raceways and Fittings~~
392	~~UL 568~~	~~Nonmetallic Cable Tray Systems~~
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
393	UL 2577	Suspended Ceiling Power Grid Systems and Equipment

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Article	Standard Number	Standard Title
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 13	Power-Limited Circuit Cables
	UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 1310	Class 2 and Class 3 Power Supplies
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
396	UL 1072	Medium-Voltage Power Cables
400	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
	UL 498	Attachment Plugs and Receptacles
	UL 498B	Outline for Receptacles with Integral Switching Means
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
402	UL 66	Fixture Wire
404	UL 20	General-Use Snap Switches

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Article	Standard Number	Standard Title
	UL 98	Enclosed and Dead-Front Switches
	UL Subject 98A	Open-Type Switches
	UL 363	Knife Switches
	UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
	UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
	UL 60730-1	Automatic Electrical Controls - Part 1: General Requirements
	UL 917	Clock-Operated Switches
	UL 60730-2-7	Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches
	UL 1429	Pullout Switches
	UL 60730-1	Automatic Electrical Controls - Part 1: General Requirements Pullout Switches
	UL 60730-2	Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches
	UL 489	Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1472	Solid-State Dimming Controls
406	UL 498	Attachment Plugs and Receptacles
	UL 498B	Receptacles with Integral Switching Means
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts

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Article	Standard Number	Standard Title
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 498M	Marine Shore Power Inlets
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
	UL 1691	Single Pole Locking-Type Separable Connectors
	UL 1310	Class 2 and Class 3 Power Units
	UL 1699	Arc-Fault Circuit-Interrupters
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
	UL 943	Ground-Fault Circuit-Interrupters
	UL 943B	Appliance Leakage-Current Interrupters
	UL 943C	Outline for Special Purpose Ground-Fault Circuit-Interrupters
	ANSI/NEMA WD 6–2016	Wiring Devices — Dimensional Specifications
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 970	Merchandising Displays
	UL 2999	Individual Commercial Office Furnishings
	UL 1286	Office Furnishings

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Article	Standard Number	Standard Title
408	UL 67	Panelboards
	UL 891	Switchboards
	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
	UL 44	Thermoset-Insulated Wires and Cables
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	~~UL 65~~	~~Wired Cabinets~~
	UL 153	Portable Electric Luminaires

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Article	Standard Number	Standard Title
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products
	UL 935	Fluorescent-Lamp Ballasts
	UL 970	Merchandising Displays
	UL 1029	High-Intensity-Discharge Lamp Ballasts
	UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
	UL 1574	Track Lighting Systems
	UL 1598	Luminaires
	UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
	UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
	UL 1993	Self-Ballasted Lamps and Lamp Adapters
	UL 2388	Flexible Lighting Products
	UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
	UL 8752	Organic Light Emitting Diode (OLED) Panels
	UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
	UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays

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Article	Standard Number	Standard Title
	UL Subject 8800	Horticultural Lighting Equipment
	UL 943	Ground-Fault Circuit-Interrupters
	UL 498	Attachment Plugs and Receptacles
	UL 498B	Outline for Receptacles with Integral Switching Means
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
411	UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 1838	Low-Voltage Landscape Lighting Systems
	UL 2108	Low-Voltage Lighting Systems
	UL 1310	Class 2 and Class 3 Power Units
	UL 5085-3	Class 2 and Class 3 Transformers
422	UL 22	Amusement and Gaming Machines
	UL 943	Ground-Fault Circuit-Interrupters
	UL 73	Motor-Operated Appliances
	UL 82	Electric Gardening Appliances
	UL 122	Photographic Equipment

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Article	Standard Number	Standard Title
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 499	Electric Heating Appliances
	UL 507	Electric Fans
	UL 561	Floor Finishing Machines
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers
	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 778	Standard for Motor-Operated Water Pumps

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Article	Standard Number	Standard Title
	UL 834	Heating, Water Supply, and Power Boilers - Electric
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings
	UL 962A	Furniture Power Distribution Units
	UL 979	Water Treatment Appliances
	UL 982	Motor-Operated Household Food Preparing Machines
	UL 987	Stationary and Fixed Electric Tools
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1086	Household Trash Compactors
	UL 1090	Electric Snow Movers
	UL 1206	Electric Commercial Clothes-Washing Equipment
	UL 1240	Electric Commercial Clothes-Drying Equipment
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1447	Electric Lawn Mowers

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Article	Standard Number	Standard Title
	UL 1450	Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1576	Flashlights and Lanterns
	UL 1594	Sewing and Cutting Machines
	UL 1647	Motor-Operated Massage and Exercise Machines
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 2157	Electric Clothes Washing Machines and Extractors
	UL 2158	Electric Clothes Dryers
	UL 2565	Industrial Metalworking and Woodworking Machine Tools
	60335-2-3	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electric Irons
	60335-2-8	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Shavers, Hair Clippers, and Similar Appliances
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
	UL 60335-2-67	Household and Similar Electrical Appliances - Safety - Part 2-67: Particular Requirements for Floor Treatment Machines, For Commercial Use
	UL 60335-2-68	Household And Similar Electrical Appliances - Safety - Part 2-68: Particular Requirements for Spray Extraction Machines, for Commercial Use

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Article	Standard Number	Standard Title
	UL 60335-2-72	Household And Similar Electrical Appliances - Safety - Part 2-68: Particular Requirements for Spray Extraction Machines, for Commercial Use
	UL 60335-2-79	Household and Similar Electrical Appliances - Safety - Part 2-79: Particular Requirements for High Pressure Cleaners and Steam Cleaners
	UL 60745-1	Hand-Held Motor-Operated Electric Tools - Safety - Part 1: General Requirements
	UL 60745-2-1	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-1: Particular Requirements for Drills and Impact Drills
	UL 60745-2-2	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches
	UL 60745-2-3	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-3: Particular Requirements for Grinders, Polishers, and Disk-Type Sanders
	UL 60745-2-4	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-4: Particular Requirements for Sanders and Polishers Other Than Disk Type
	UL 60745-2-5	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-5: Particular Requirements for Circular Saws
	UL 60745-2-6	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-6: Particular Requirements for Hammers
	UL 60745-2-8	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-8: Particular Requirements for Shears and Nibblers
	UL 60745-2-9	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-9: Particular Requirements for Tappers
	UL 60745-2-11	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-11: Particular Requirements for Reciprocating Saws
	UL 60745-2-12	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-12: Particular Requirements For Concrete Vibrators

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Article	Standard Number	Standard Title
	UL 60745-2-13	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-13: Particular Requirements For Chain Saws
	UL 60745-2-14	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-14: Particular Requirements for Planers
	UL 60745-2-15	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-15: Particular Requirements for Hedge Trimmers
	UL 60745-2-16	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-16: Particular Requirements for Tackers
	UL 60745-2-17	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-17: Particular Requirements for Routers and Trimmers
	UL 60745-2-18	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-18:Particular Requirements For Strapping Tools
	UL 60745-2-19	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-19:Particular Requirements for Jointers
	UL 60745-2-20	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-20: Particular Requirements for Band Saws
	UL 60745-2-21	Hand-Held Motor-Operated Electric Tools - Safety - Part 2-21: Particular Requirements For Drain Cleaners
	UL 60745-2-22	Hand-Held Motor-Operated electric Tools - Safety - Part 2-22: Particular Requirements for Cut-Off Machines
	UL 60745-2-23	Hand-Held Motor-Operated electric Tools - Safety - Part 2-23: Particular Requirements for Die Grinders and Small Rotary Tools
	UL 62841-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 1: General Requirements
	UL 62841-2-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-1: Particular Requirements For Hand-Held Drills and Impact Drills

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Article	Standard Number	Standard Title
	UL 62841-2-2	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-2: Particular Requirements For Screwdrivers And Impact Wrenches
	UL 62841-2-3	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-3: Particular Requirements For Hand-Held Grinders, Polishers, and Disk-Type Sanders
	UL 62841-2-4	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-4: Particular Requirements For Hand-Held Sanders And Polishers Other Than Disc Type
	UL 62841-2-5	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-5: Particular Requirements For Hand-Held Circular Saws
	UL 62841-2-8	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-8: Particular Requirements For Hand-Held Shears and Nibblers
	UL 62841-2-9	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-9: Particular Requirements For Hand-Held Tappers And Threaders
	UL 62841-2-10	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-10: Particular Requirements For Hand-Held Mixers
	UL 62841-2-11	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-11 Particular Requirements for Hand-Held Reciprocating Saws
	UL 62841-2-14	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-14: Particular Requirements For Hand-Held Planers
	UL 62841-2-17	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-17: Particular Requirements For Hand-Held Routers

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Article	Standard Number	Standard Title
	UL 62841-2-21	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-21: Particular Requirements For Hand-Held Drain Cleaners
	UL 62841-3-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-1: Particular Requirements For Transportable Table Saws
	UL 62841-3-4	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-4: Particular Requirements for Transportable Bench Grinders
	UL 62841-3-6	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-6: Particular Requirements For Transportable Diamond Drills with Liquid System
	UL 62841-3-9	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-9: Particular Requirements For Transportable Mitre Saws
	UL 62841-3-10	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-10: Particular requirements for Transportable Cut-Off Machines
	UL 62841-3-12	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-12: Particular requirements for Transportable Threading Machines
	UL 62841-3-13	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-13: Particular Requirements For Transportable Drills
	UL 62841-3-14	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-14: Particular requirements for Transportable Drain Cleaners
	UL 62841-3-1000	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-1000: Particular Requirements for Transportable Laser Engravers
	UL 62841-4-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 4-1 Particular Requirements for Chain Saws

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Article	Standard Number	Standard Title
	UL 62841-4-2	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 4-2 Particular Requirements for Hedge Trimmers
	UL 62841-4-1000	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - UL 62841-4-1000: Particular Requirements For Utility Machines
	UL 514A	Metallic Outlet Boxes
	UL 498	Attachment Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 515	Electric Resistance Trace Heating for Commercial Applications
424	UL 499	Electric Heating Appliances
	~~UL 834~~	~~Heating, Water Supply, and Power Boilers — Electric~~
	~~UL 873~~	~~Temperature-Indicating and -Regulating Equipment~~
	UL 1042	Electric Baseboard Heating Equipment
	UL 1673	Electric Space Heating Cables
	UL 1693	Electric Radiant Heating Panels and Heating Panel Sets
	UL 1995	Heating and Cooling Equipment
	UL 1996	Electric Duct Heaters

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Article	Standard Number	Standard Title
	UL 2021	Fixed and Location-Dedicated Electric Room Heaters
	UL 2683	Electric Heating Products for Floor and Ceiling Installation
425	UL 2021	Fixed and Location-Dedicated Electric Room Heaters
	UL 508	Industrial Control Equipment
426	UL Subject 1588	Roof and Gutter De-Icing Cable Units
	IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications
	UL Subject 2049	Residential Pipe Heating Cable
427	IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications
	UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications
	UL Subject 2049	Residential Pipe Heating Cable
430	~~UL 508C~~	~~Power Conversion Equipment~~
	UL 98	Enclosed and Dead-Front Switches
	UL 845	Motor Control Centers
	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 347A	Medium Voltage Power Conversion Equipment
	UL 1004-1	Rotating Electrical Machines — General Requirements
	UL 1004-2	Impedance Protected Motors
	UL 1004-3	Thermally Protected Motors

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Article	Standard Number	Standard Title
	UL 2111	Overheating Protection for Motors
	UL 60730-2-22	Automatic Electrical Controls - Part 2: Particular Requirements for Thermal Motor Protectors
	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
	UL 508	Industrial Control Equipment
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Low-Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers

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Article	Standard Number	Standard Title
	UL 705	Power Ventilators
	UL 1812	Ducted Heat Recovery Ventilators
	UL 1815	Nonducted Heat Recovery Ventilators
	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy
	UL 745-1	Portable Electric Tools
	UL 987	Stationary and Fixed Electric Tools
	UL 2565	Industrial Metalworking and Woodworking Machine Tools
	UL 60745-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 1: General Requirements
	UL 60745-2-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-1: Particular Requirements For Hand-Held Drills and Impact Drills
	UL 60745-2-2	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-2: Particular Requirements For Screwdrivers And Impact Wrenches
	UL 60745-2-3	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-3: Particular Requirements For Hand-Held Grinders, Polishers, and Disk-Type Sanders
	UL 60745-2-4	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-4: Particular Requirements For Hand-Held Sanders And Polishers Other Than Disc Type
	UL 60745-2-5	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-5: Particular Requirements For Hand-Held Circular Saws

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Article	Standard Number	Standard Title
	UL 60745-2-8	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-8: Particular Requirements For Hand-Held Shears and Nibblers
	UL 62841-2-9	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-9: Particular Requirements For Hand-Held Tappers And Threaders
	UL 62841-2-10	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-10: Particular Requirements For Hand-Held Mixers
	UL 62841-2-11	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-11 Particular Requirements for Hand-Held Reciprocating Saws
	UL 62841-2-14	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-14: Particular Requirements For Hand-Held Planers
	UL 62841-2-17	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-17: Particular Requirements For Hand-Held Routers
	UL 62841-2-21	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 2-21: Particular Requirements For Hand-Held Drain Cleaners
	UL 62841-3-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-1: Particular Requirements For Transportable Table Saws
	UL 62841-3-4	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-4: Particular Requirements for Transportable Bench Grinders
	UL 62841-3-6	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-6: Particular Requirements For Transportable Diamond Drills with Liquid System

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Article	Standard Number	Standard Title
	UL 62841-3-9	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-9: Particular Requirements For Transportable Mitre Saws
	UL 62841-3-10	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-10: Particular requirements for Transportable Cut-Off Machines
	UL 62841-3-12	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-12: Particular requirements for Transportable Threading Machines
	UL 62841-3-13	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-13: Particular Requirements For Transportable Drills
	UL 62841-3-14	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-14: Particular requirements for Transportable Drain Cleaners
	UL 62841-3-1000	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 3-1000: Particular Requirements for Transportable Laser Engravers
	UL 62841-4-1	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 4-1 Particular Requirements for Chain Saws
	UL 62841-4-2	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - Part 4-2 Particular Requirements for Hedge Trimmers
	UL 62841-4-1000	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery - Safety - UL 62841-4-1000: Particular Requirements For Utility Machines
	UL 4	Armored Cable
	UL 1569	Metal Clad Cables

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Article	Standard Number	Standard Title
440	~~UL 250~~	~~Household Refrigerators and Freezers~~
	~~UL 412~~	~~Refrigeration Unit Coolers~~
	UL 416	Refrigerated Medical Equipment
	~~UL 427~~	~~Refrigerating Units~~
	~~UL 471~~	~~Commercial Refrigerators and Freezers~~
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers
	UL 1995	Heating and Cooling Equipment
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
	UL 60335-2-89	Household and Similar Electrical Appliances - Safety - Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor
	UL 508	Industrial Control Equipment
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies

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Article	Standard Number	Standard Title
	UL 973	Ground-Fault Circuit-Interrupters
	UL 943C	Outline for Special Purpose Ground-Fault Circuit-Interrupters
	UL 508	Industrial Control Equipment
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations
	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
	UL 340	Tests for Comparative Flammability of Liquids
	UL 305	Panic Hardware
	UL 10C	Positive Pressure Fire Tests of Door Assemblies
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries

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Article	Standard Number	Standard Title
	UL 4127	Outline for Low Voltage Battery Cable
	UL 4128	Intercell and Intertier Connectors for use in Electrochemical Battery System Applications
	UL 305	Panic Hardware
	UL 10C	Positive Pressure Fire Tests of Door Assemblies
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 347A	Medium Voltage Power Conversion Equipment
	~~UL Subject 347A~~	~~Medium Voltage Power Conversion Controllers~~
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 1671	Medium Voltage Metal-Clad Switchgear
500	~~ANSI/ISA 12.12.01~~	~~Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations~~
	UL 121201	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	~~ANSI/ISA 12.27.01~~	~~Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids~~

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Article	Standard Number	Standard Title
	~~UL 698A~~	~~Industrial Control Panels Relating to Hazardous (Classified) Locations~~
	~~UL 844~~	~~Luminaires for Use in Hazardous (Classified) Locations~~
	~~UL 2075~~	~~Gas and Vapor Detectors and Sensors~~
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 60079-28	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation.
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
	UL 60079-30-1	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures - General, Testing, Marking, and Documentation Requirements
	NFPA 496	Standard for Purged and Pressurized Enclosures for Electrical Equipment
501	~~UL 60079-15~~	~~Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection "n"~~
	~~UL 60079-0~~	~~Explosive Gas Atmospheres — Part 0: Equipment — General Requirements~~
	~~UL 60079-7~~	~~Explosive Gas Atmospheres — Part 7: Increased Safety "e"~~
	~~UL 60079-1~~	~~Explosive Gas Atmospheres — Part 1: Type of Protection — Flameproof "d"~~
	~~UL 60079-5~~	~~Explosive Gas Atmospheres — Part 5: Type of Protection — Powder Filling "q"~~
	~~UL 60079-6~~	~~Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion "o"~~

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Article	Standard Number	Standard Title
	UL 674	Electric Motors and Generators for Use in Hazardous (Classified) Locations
	UL 783	Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations
	UL 823	Standard for Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 1389	Standard for Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations
	UL 1836	Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 2011 (Part 3)	Outline of Investigation for Machinery
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 2874	Outline of Investigation for Electric Motors for Use in Hazardous (Classified) Locations - Protection by Pressurized Atmosphere Maintained above the UFL
	UL 4300	Outline of Investigation for Electrically Heated Insulated Covers for Compressed Gas Cylinders for Use in Hazardous (Classified) Locations
	UL 60079-28	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation.
	UL 60079-30-1	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 121201	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	UL 121303	Guide for Combustible Gas Detection as a Method of Protection

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Article	Standard Number	Standard Title
	UL 122701	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	NFPA 496	Purged and Pressurized Enclosures for Electrical Equipment
	ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	UL 13	Power Limited Circuit Cables
	UL 1072	Medium-Voltage Power Cables
	UL 1272	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
	UL 1569	Metal-Clad Cables
	UL 2515A	Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 1309A	P-Cables
	UL 504	Outline for Mineral-Insulated, Metal-Sheathed Cable
	UL 1	Flexible Metal Conduit
	UL 467	Grounding and Bonding Equipment
	UL 248-2	Low-Voltage Fuses - Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses - Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses - Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses - Part 5: Class G Fuses

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Article	Standard Number	Standard Title
	UL 248-6	Low-Voltage Fuses - Part 6: Class H Non-Renewable Fuses
	UL 248-8	Low-Voltage Fuses - Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses - Part 9: Class K Fuses
	UL 248-12	Low-Voltage Fuses - Part 12: Class R Fuses
	UL 248-15	Low-Voltage Fuses - Part 15: Class T Fuses
502	UL 674	Electric Motors and Generators for Use in Hazardous (Classified) Locations
	UL 783	Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations
	UL 823	Standard for Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 1836	Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 2011 (Part 3)	Outline of Investigation for Machinery
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-28	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation.
	UL 60079-30-1	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 121201	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations

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Article	Standard Number	Standard Title
	NFPA 496	Purged and Pressurized Enclosures for Electrical Equipment
	UL 1309	Marine Shipboard Cable
	UL 13	Power Limited Circuit Cables
	UL 2250	Instrumentation Tray Cable
503	UL 823	Standard for Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1836	Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 121201	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 13	Power Limited Circuit Cables
	UL 2250	Instrumentation Tray Cable
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
	UL 698A	Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 120202	Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"

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Article	Standard Number	Standard Title
	UL 1389	Standard for Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations
	UL 2011 (Part 3)	Outline of Investigation for Machinery
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-2	Standard for Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure 'p'
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Standard for Explosive Atmospheres - Part 6: Equipment Protection by Liquid Immersion 'o
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-10-1	Part 10-1: Classification of Areas - Explosive Gas Atmospheres
	UL 60079-13	Standard for Explosive Atmospheres - Part 13: Equipment Protection by Pressurized Room 'p' and Artificially Ventilated Room 'v'
	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
	UL 60079-25	Explosive Atmospheres - Part 25: Intrinsically Safe Electrical Systems
	UL 60079-26	Standard for Explosive Atmospheres - Part 26: Equipment with Equipment Protection Level (EPL) Ga
	UL 60079-28	Standard for Explosive Atmospheres - Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation

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Article	Standard Number	Standard Title
	UL 60079-29-1	Explosive Atmospheres - Part 29-1: Gas Detectors - Performance Requirements of Detectors for Flammable Gases
	UL 60079-29-4	Explosive Atmospheres - Part 29-4: Gas Detectors - Performance Requirements of Open Path Detectors for Flammable Gases
	UL 60079-30-1	Standard for Explosive Atmospheres - Part 30-1: Electrical Resistance Trace Heating - General and Testing Requirements
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 674	Electric Motors and Generators for Use in Hazardous (Classified) Locations
	UL 2874	Outline for Electric Motors for Use in Hazardous (Classified) Locations - Protection by Pressurized Atmosphere Maintained above the UFL
	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures – General, Testing, Marking, and Documentation Requirements
	UL 1309	Marine Shipboard Cable
	UL 13	Power Limited Circuit Cables
	UL 2250	Instrumentation Tray Cable
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 122001	General Requirements for Electrical Ignition Systems for Internal Combustion Engines in Class I, Division 2 or Zone 2, Hazardous (Classified) Locations
	UL 122701	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids
506	~~UL 61241-18~~	~~Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation "mD"~~

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Article	Standard Number	Standard Title
	~~UL 61241-1~~	~~Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure "tD"~~
	~~UL 61241-0~~	~~Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements~~
	~~UL 61241-11~~	~~Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety "iD"~~
	~~UL 61241-2~~	~~Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization "pD"~~
	UL 2011 (Part 3)	Outline of Investigation for Machinery
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-2	Standard for Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure 'p'
	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation "m"
	UL 60079-28	Standard for Explosive Atmospheres - Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation
	UL 60079-30-1	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 60079-31	Explosive Atmospheres - Part 31: Equipment Dust Ignition Protection by Enclosure "t"
	UL 60079-10-2	Part 10-2: Classification of Areas - Combustible Dust Atmospheres
	UL 62784	Vacuum Cleaners and Dust Extractors Providing Equipment Protection Level Dc for the Collection of Combustible Dusts - Particular Requirements

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Article	Standard Number	Standard Title
	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures – General, Testing, Marking, and Documentation Requirements
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 13	Power Limited Circuit Cables
	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
511	~~UL 201~~	~~Garage Equipment~~
	~~UL 1564~~	~~Industrial Battery Chargers~~
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
514	UL 122701	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids
515	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
516	UL 844	Luminaires for Use in Hazardous (Classified) Locations
517	UL 1022	Line Isolation Monitors
	UL 1047	Isolated Power Systems Equipment
	UL 498	Attachment Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 2930	Cord-and-Plug-connected Health Care Facility Outlet Assemblies

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Article	Standard Number	Standard Title
	UL 60601-1	Medical Electrical Equipment — Part 1: General Requirements for Safety
	AAMI ES60601-1	Medical electrical equipment— Part 1: General requirements for basic safety and essential performance
	UL 467	Grounding and Bonding Equipment
	UL 5	Surface Metal Raceways and Fittings
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 122701	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids
518	UL 943	Ground-Fault Circuit-Interrupters
	UL 943C	Outline for Special Purpose Ground-Fault Circuit-Interrupters
	UL 498	Attachment Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
520	UL Subject 334	Theater Lighting Distribution and Control Equipment
	UL 1573	Stage and Studio Luminaires and Connector Strips
	UL 1640	Portable Power-Distribution Equipment
	UL 1691	Single Pole Locking-Type Separable Connectors

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Article	Standard Number	Standard Title
	UL 62	Flexible Cords and Cables
522	UL 13	Power Limited Circuit Cables
	UL 2250	Instrumentation Tray Cable
	UL 1063	Machine-Tool Wires and Cables
525	UL 62	Flexible Cords and Cables
	UL 1691	Single Pole Locking-Type Separable Connectors
	UL 943	Ground-Fault Circuit-Interrupters
	UL 943C	Outline for Special Purpose Ground-Fault Circuit-Interrupters
	UL 817	Cord Sets and Power-Supply Cords
530	UL 1691	Single Pole Locking-Type Separable Connectors
	UL 62	Flexible Cords and Cables
	UL 1573	Stage and Studio Luminaires and Connector Strips
	UL 1680	Outline for Stage and Lighting Cables
	UL 1479	Fire Tests of Penetration Firestops
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements
	UL 1836	Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations.
545	UL 5	Surface Metal Raceways and Fittings

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Article	Standard Number	Standard Title
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 5B	Strut-Type Channel Raceways and Fittings
	UL 5C	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits
	UL 209	Cellular Metal Floor Raceways and Fittings
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 498	Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 20	General Use Snap Switches
540	UL 62368-1	Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements
547	UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514A	Metallic Outlet Boxes
	UL 514B	Conduit, Tubing, and Cable Fittings

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Article	Standard Number	Standard Title
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 1598	Luminaires
	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 62	Flexible Cords and Cables
550	UL Subject 1462	Mobile Home Pipe Heating Cable
	UL 817	Cord Sets and Power-Supply Cords
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1242	Electrical Intermediate Metal Conduit - Steel
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 498	Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts

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Article	Standard Number	Standard Title
	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 1598	Luminaires
	UL 234	Low Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 467	Grounding and Bonding Equipment
	UL 307A	Liquid Fuel-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles
	UL 307B	Gas-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles
551	UL 231	Power Outlets
	UL 1598	Luminaires
	UL 1008	Transfer Switch Equipment
	UL 1008M	Outline for Transfer Switch Equipment, Meter Mounted
	UL 1008S	Solid-State Transfer Switches
	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit

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Article	Standard Number	Standard Title
	UL 1242	Electrical Intermediate Metal Conduit - Steel
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 62	Flexible Cords and Cables
	UL 498	Attachment Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 817	Cord Sets and Power-Supply Cords
	UL 943	Ground-Fault Circuit-Interrupters
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
	UL 467	Grounding and Bonding Equipment
	UL 1449	Surge Protective Devices
	UL 486C	Splicing Wire Connectors
552	SAE J1128-2015	Low Voltage Primary Cable, for Types GXL, HDT, and SXL

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Article	Standard Number	Standard Title
	SAE J1127-2015	Low Voltage Battery Cable, for Types SGT and SGR.
	UL 1598	Luminaires
	UL 231	Power Outlets
	UL 234	Low Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 467	Grounding and Bonding Equipment
	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1242	Electrical Intermediate Metal Conduit - Steel
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
	UL 67	Panelboards
	UL 916	Energy Management Equipment

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Article	Standard Number	Standard Title
	UL 430	Waste Disposers
	UL 943	Ground-Fault Circuit-Interrupters
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
555	UL 1650	Portable Power Cable
	UL 486D	Sealed Wire Connector Systems
	UL 231	Power Outlets
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
590	UL 588	Seasonal and Holiday Decorative Products
	UL 1377	Outline for Wire used in Low Voltage Seasonal Lighting Products In Circuits With a Maximum Available Power of 15W
	UL 1838	Low Voltage Landscape Lighting Systems

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Article	Standard Number	Standard Title
	UL 2108	Low Voltage Lighting Systems
	UL 943	Ground-Fault Circuit-Interrupters
	UL 514B	Conduit, Tubing, and Cable Fittings
	UL 496	Lampholders
	UL 817	Cord Sets
600	UL 48	Electric Signs
	UL 814	Gas-Tube-Sign Cable
	UL 879	Electric Sign Components
	UL 879A	LED Sign and Sign Retrofit Kits
	UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
	UL 2161	Neon Transformers and Power Supplies
	Ul 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 62109	Power Converters for use in Photovoltaic Power Systems - Part 1: General Requirements
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements For Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements For Testing
	UL 2703	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels

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Article	Standard Number	Standard Title
	UL 3703	Solar Trackers
	UL 4703	Photovoltaic Wire
	UL 3003	Outline for Distributed Generation Cables
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL 8703	Outline for Concentrator Photovoltaic Modules and Assemblies
	UL 7103	Outline for Investigation for Building-Integrated Photovoltaic Roof Coverings
	UL 98B	Outline for Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 248-19	Low-Voltage Fuses - Part 19: Photovoltaic Fuses
	UL 4248-18	Outline for Fuseholders - Part 18: Photovoltaic
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures For Use With Photovoltaic (PV) Systems
	UL 508I	Outline for Disconnect Switches Intended for Use in Photovoltaic Systems
	UL 1699B	Photovoltaic (PV) DC Arc-Fault Circuit Protection
	UL 9703	Outline for Distributed Generation Wiring Harnesses
	UL 8801	Outline for Photovoltaic-Powered Luminaire Systems
	UL 3001	Distributed Energy Generation and Storage Systems
	UL 943	Ground-Fault Circuit-Interrupters
	UL 1310	Class 2 and Class 3 Power Units

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Article	Standard Number	Standard Title
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 13	Power-Limited Circuit Cables
	UL 5	Surface Metal Raceways and Fittings
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 1	Flexible Metal Conduit
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 4703	Photovoltaic Wire
604	UL 183	Manufactured Wiring Systems
	UL 4	Armored Cable
	UL 1569	Metal-Clad Cables
	UL 5	Surface Metal Raceways and Fittings
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 5B	Strut-Type Channel Raceways and Fittings
	UL 5C	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits

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Article	Standard Number	Standard Title
	UL 209	Cellular Metal Floor Raceways and Fittings
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 857	Busways
	UL 1	Flexible Metal Conduit
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 62	Flexible Cords and Cables
605	UL 1286	Office Furnishings
	UL 962	Household and Commercial Furnishings
	UL 2999	Individual Commercial Office Furnishings
	UL 1310	Class 2 and Class 3 Power Units
	UL 5085	Class 2 and Class 3 Transformers
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements
610	UL Subject 2273	Festoon Cable
	UL 62	Flexible Cords and Cables
620	UL 104	Elevator Door Locking Devices and Contacts
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures

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Article	Standard Number	Standard Title
	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 2556	Wire and Cable Test Methods
	UL 508A	Industrial Control Panels
	UL 62	Flexible Cords and Cables
	UL 1310	Class 2 Power Units
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements
	UL 508	Industrial Control Equipment
	UL 1449	Surge Protective Devices
625	UL 2202	Electric Vehicle (EV) Charging System Equipment
	UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
	UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
	UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles
	UL 2580	Batteries for Use in Electric Vehicles
	UL 2594	Electric Vehicle Supply Equipment

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Article	Standard Number	Standard Title
	UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment
626	UL 1686	Pin and Sleeve Configurations
	UL 498	Attachment Plugs and Receptacles
	UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E	Attachment Plugs, Cord Connectors and Receptacles - Enclosure Types for Environmental Protection
	UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 231	Power Outlets
	UL 62	Flexible Cords and Cables
	UL 817	Cord Sets and Power-Supply Cords
630	UL 551	Transformer-Type Arc-Welding Machines
640	UL 813	Commercial Audio Equipment
	UL 1419	Professional Video and Audio Equipment
	UL 1492	Audio-Video Products and Accessories
	UL 1711	Amplifiers for Fire Protective Signaling Systems
	UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
	UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

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Article	Standard Number	Standard Title
	UL 1310	Class 2 Power Units
	UL 13	Power Limited Circuit Cables
	UL 2269	Outline for Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes
	UL 62	Flexible Cords and Cables
645	UL 1690	Data-Processing Cable
	UL 1778	Uninterruptible Power Systems
	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 38	Manual Signaling Boxes for Fire Alarm Systems
	UL 268	Smoke Detectors for Fire Alarm Systems
	UL 464	Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
	UL 497B	Protectors for Data Communications and Fire Alarm Circuits
	UL 833	Control Units and Accessories for Fire Alarm Systems
	UL 864	Control Units and Accessories for Fire Alarm Systems

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Article	Standard Number	Standard Title
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
	UL 1638	Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
	UL 1425	Cables for Power-Limited Fire-Alarm Circuits
	UL 1426	Cables for Non-Power-Limited Fire-Alarm Circuits
	UL 444	Communications Cables
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 1651	Optical Fiber Cable
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 1449	Surge Protective Devices
646	UL Subject 2755	Modular Data Centers
	UL 1449	Surge Protective Devices
	UL 67	Panelboards
	UL 98	Enclosed and Dead-Front Switches
	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels

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Article	Standard Number	Standard Title
	UL 845	Motor Control Centers
	UL 869A	Reference Standard for Service Equipment
	UL 891	Switchboards
	UL 891A	Switchboards Rated 601 - 1000 V
	UL 977	Fused Power-Circuit Devices
	UL 1008	Transfer Switch Equipment
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 1008M	Meter-Mounted Transfer Switches
	UL 1008S	Solid-State Transfer Switches
	UL 1008M	Meter-Mounted Transfer Switches
	UL 1008S	Solid-State Transfer Switches
	UL 1062	Unit Substations
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1429	Pullout Switches
	UL 62	Flexible Cords and Cables
	UL 924	Emergency Lighting and Power Equipment
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 1655	Community-Antenna Television Cables

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Article	Standard Number	Standard Title
	UL 1989	Standby Batteries
	UL 305	Panic Hardware
	UL 10C	Positive Pressure Fire Tests of Door Assemblies
647	UL 1598	Luminaires
650	UL 1310	Class 2 Power Units
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
	UL 508	Industrial Control Equipment
675	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 489G	Outline for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, 650 - 1000 Volts AC and 650 - 1500 Volts DC
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators

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Article	Standard Number	Standard Title
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
	UL Subject 2452	Outline of Investigation for Electric Swimming Pool and Spa Cover Operators
	UL 60335-2-1000	Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts
	UL 467	Grounding and Bonding Equipment
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1242	Electrical Intermediate Metal Conduit - Steel
	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A	Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 943	Ground-Fault Circuit-Interrupters
	UL 943C	Outline for Special Purpose Ground-Fault Circuit-Interrupters
	UL 1060	Circuit Breaker and Ground Fault Circuit Interrupters

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Article	Standard Number	Standard Title
	UL 486D	Sealed Wire Connector Systems
	UL 1569	Metal-Clad Cables
	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 1004-10	Pool Pump Motors
	UL 20	General Use Snap-Switches
	UL 62	Flexible Cords and Cables
	UL 2995	Lifts for Swimming Pools and Spas
682	UL 1650	Portable Power Cable
	UL 486D	Sealed Wire Connector Systems
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL ~~Subject~~ 1699B	Photovoltaic DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	~~UL Subject 2579~~	~~Low-Voltage Fuses — Fuses for Photovoltaic Systems~~

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Article	Standard Number	Standard Title
	UL 248-19	Low-Voltage Fuses — Photovoltaic Fuses
	UL Subject 3703	Solar Trackers
	UL Subject 3730	Photovoltaic Junction Boxes
	UL 4703	Photovoltaic Wire
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
	UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
	UL Subject 9703	Distributed Wiring Harnesses
	UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 3003	Distributed Generation Cables
	UL 3001	Distributed Energy Generation and Storage Systems
	UL 3005	Distributed Energy Resource Management Systems
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 3741	Photovoltaic Hazard Control
	UL 8801	Outline for Photovoltaic-Powered Luminaire Systems
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation

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Article	Standard Number	Standard Title
	UL 1569	Metal-Clad Cables
	UL 467	Grounding and Bonding Equipment
	UL 2703	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
	UL 7103	Outline for Investigation for Building-Integrated Photovoltaic Roof Coverings
692	UL 2262	Outline for Fuel Cell Modules for Use in Portable and Stationary Equipment
	UL 2262A	Outline for Borohydride Fuel Cartridges with Integral Fuel Processing for Use with Portable Fuel Cell Power Systems or Similar Equipment
	UL 2265	Fuel Cell Power Units and Fuel Storage Containers for Portable Devices
	UL 2265A	Outline for Hand-held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for use in Original Equipment Manufacturer's Information Technology Equipment
	UL 2265C	Outline for Hand-Held or Hand-Transportable Alkaline (Direct Borohydride) Fuel Cell Power Units And Borohydride Fuel Cartridges For Use With Consumer Electronics or Information Technology Equipment
	UL 2266	Electromagnetic Compatibility, Electrical Safety, and Physical Protection of Stationary and Portable Fuel Cell Power Systems for Use with Commercial Network Telecommunications Equipment
	UL 2267	Fuel Cell Power Systems for Installation in Industrial Electric Trucks
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	~~UL Subject 6140~~	~~Wind Turbine Generating Systems~~
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small

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Article	Standard Number	Standard Title
	UL 2227	Outline for Flexible Motor Supply Cable and Wind Turbine Tray Cable
	UL 2736	Outline for Single Pole Separable Interconnecting Cable Connectors for Use with Wind Turbine Generating Systems
	UL 4143	Wind Turbine Generator -Life Time Extension (LTE)
	UL 6171	Wind Turbine Converters and Interconnection Systems Equipment
	UL 467	Grounding and Bonding Equipment
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
	UL 2196	Tests for Fire Resistive Cables
	UL 1724	Outline for Fire Tests for Electrical Circuit Protective Systems
	UL 1569	Metal-Clad Cables
	UL 6	Electrical Rigid Metal Conduit - Steel
	UL 6A	Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel
	UL 1242	Electrical Intermediate Metal Conduit - Steel

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Article	Standard Number	Standard Title
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 2200	Stationary Engine Generator Assemblies
	UL 1449	Surge Protective Devices
	UL 2196	Tests for Fire Resistive Cables
	UL 1724	Outline for Fire Tests for Electrical Circuit Protective Systems
701	UL 1008	Transfer Switch Equipment
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 924	Emergency Lighting and Power Equipment
702	UL 1008	Transfer Switch Equipment
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 1008M	Meter-Mounted Transfer Switches
	UL 1008S	Solid-State Transfer Switches
705	UL 9540	Energy Storage Systems and Equipment
	UL 2200	Stationary Engine Generator Assemblies

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Article	Standard Number	Standard Title
	UL 3003	Outline for Distributed Generation Cables
	UL 6142	Small Wind Turbine Systems
	UL 6171	Wind Turbine Converters and Interconnection Systems Equipment
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 62109-2	Power Converters for Use in Photovoltaic Power Systems - Part 2: Particular Requirements for Inverters
	UL 62	Flexible Cords and Cables
	UL 486D	Sealed Wire Connector Systems
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
706	UL 9540	Energy Storage Systems and Equipment
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 489H	Outline for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, for Use with Direct Current (DC) Microgrids
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 248-2	Low-Voltage Fuses - Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses - Part 3: Class CA and CB Fuses

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Article	Standard Number	Standard Title
	UL 248-4	Low-Voltage Fuses - Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses - Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses - Part 6: Class H Non-Renewable Fuses
	UL 248-8	Low-Voltage Fuses - Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses - Part 9: Class K Fuses
	UL 248-12	Low-Voltage Fuses - Part 12: Class R Fuses
	UL 248-15	Low-Voltage Fuses - Part 15: Class T Fuses
708	UL 83	Thermoplastic-Insulated Wires and Cables
	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
	UL 1008	Transfer Switch Equipment
	UL 1008A	Transfer Switch Equipment, Over 1000 Volts
	UL 1008M	Meter-Mounted Transfer Switches
	UL 1008S	Solid-State Transfer Switches
	UL 4	Armored Cable
	UL 1569	Metal-Clad Cables
	UL 1	Flexible Metal Conduit
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 2196	Tests for Fire Resistive Cables

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Article	Standard Number	Standard Title
	UL 497A	Secondary Protectors for Communications Circuits
710	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
712	UL 498G	Outline for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, for Use with Direct Current (DC) Microgrids
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 248-2	Low-Voltage Fuses - Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses - Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses - Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses - Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses - Part 6: Class H Non-Renewable Fuses
	UL 248-8	Low-Voltage Fuses - Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses - Part 9: Class K Fuses
	UL 248-12	Low-Voltage Fuses - Part 12: Class R Fuses
	UL 248-15	Low-Voltage Fuses - Part 15: Class T Fuses
	UL 6142	Small Wind Turbine Systems
	UL 6171	Wind Turbine Converters and Interconnection Systems Equipment
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 62109-2	Power Converters for Use in Photovoltaic Power Systems - Part 2: Particular Requirements for Inverters
	UL 9540	Energy Storage Systems and Equipment

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Article	Standard Number	Standard Title
	UL 1670	Medium Voltage Circuit Breakers and Metal-Clad Switchgear
	UL 1671	Medium Voltage Metal-Clad Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear – Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starters
725	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 2196	Fire Test for Circuit Integrity of Fire -Resistive Power, Instrumentation, Control and Data Cables
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
	UL 444	Communications Cable
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems

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Article	Standard Number	Standard Title
	UL 2196	Tests for Fire-Resistive Cables
	UL 5	Surface Metal Raceways and Fittings
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 5B	Strut-Type Channel Raceways and Fittings
	UL 5C	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits
	UL 209	Cellular Metal Floor Raceways and Fittings
	UL 884	Underfloor Raceways and Fittings
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 568	Nonmetallic Cable Tray Systems
	UL 514A	Metallic Outlet Boxes
	514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 467	Grounding and Bonding Equipment
~~750~~	~~UL 916~~	~~Energy Management Equipment~~
	~~UL 60730-1~~	~~Automatic Electrical Controls - Part 1: General Requirements~~
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits

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Article	Standard Number	Standard Title
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 486C	Splicing Wire Connectors
	UL 2196	Tests for Fire Resistive Cables
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
	UL 467	Grounding and Bonding Equipment
	UL 568	Nonmetallic Cable Tray Systems
	UL 2196	Tests for Fire Resistive Cables
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits

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Article	Standard Number	Standard Title
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL Subject 523	Telephone Service Drop Wire
	UL 1863	Communication Circuit Accessories
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
	UL 467	Grounding and Bonding Equipment
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 723	Test for Surface Burning Characteristics of Building Materials
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 568	Nonmetallic Cable Tray Systems
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
805	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 444	Communications Cables
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors

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Article	Standard Number	Standard Title
	UL 1863	Communication Circuit Accessories
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 1310	Class 2 Power Units
	UL 62275	Cable Management Systems – Cable Ties for Electrical Installation
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL Subject 523	Telephone Service Drop Wire
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 719	Nonmetallic-Sheathed Cables
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL 467	Grounding and Bonding Equipment
820	UL 1655	Community-Antenna Television Cables
	UL Subject 497E	Protectors for Antenna Lead-In Conductors

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Article	Standard Number	Standard Title
	UL 444	Communications Cables
830	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 444	Communications Cables
840	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 467	Grounding and Bonding Equipment
	UL 498A	Current Taps and Adapters
	UL 1651	Optical Fiber Cable
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 444	Communications Cables
	UL 1310	Class 2 Power Units
	UL 1863	Communication Circuit Accessories
Tables 11(A) and 11(B)	UL 1310	Class 2 Power Units
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

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Article	Standard Number	Standard Title
	UL 5085-3	Class 2 and Class 3 Transformers
	UL 1434	Thermistor-Type Devices
Tables 12(A) and 12(B)	UL 1310	Class 2 Power Units
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
	UL 5085-3	Class 2 and Class 3 Transformers
	UL 1434	Thermistor-Type Devices
Part II		
Product Safety Standards for Conductors and Equipment that do not have an Associated Listing Requirement		

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Article	Standard Number	Standard Title
110	UL 310	Electrical Quick-Connect Terminals
	UL 305	Panic Hardware
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
	UL 486F	Bare and Covered Ferrules
	UL 486G	Sealed Twist-On Connecting Devices
	UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
	UL Subject 546	Conductor Termination Compounds
	UL 2459	Insulated Multi-Pole Splicing Wire Connectors
210	UL 943	Ground-Fault Circuit-Interrupters
	UL 1699	Arc-Fault Circuit-Interrupters
230	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 2735	Electric Utility Meters
240	UL 198M	Mine-Duty Fuses
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses

	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6	Low-Voltage Fuses — Part 6: Class H Renewable Fuses
	UL 248-7	Low-Voltage Fuses — Part 7: Class H Renewable Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-13	Low-Voltage Fuses — Part 13: Semiconductor Fuses
	UL 248-14	Low-Voltage Fuses — Part 14: Supplemental Fuses
	UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-16	Low-Voltage Fuses — Part 16: Test Limiters
	UL Subject 248-17	Low-Voltage Fuses – Part 17: Class CF Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
250	UL 467	Grounding and Bonding Equipment
280	IEEE C62.1	Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits

	IEEE C62.11	Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits
285	UL 1449	Surge Protective Devices
300	UL 263	Fire Tests of Building Construction and Materials

UL Subject 267	Wire Pulling Compounds

UL 514B	Conduit, Tubing, and Cable Fittings

UL 635	Insulated Bushings

UL 1479	Fire Tests of Through-Penetration Firestops

UL 1565	Positioning Devices

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

UL 2239	Hardware for the Support of Conduit, Tubing and Cable

UL Subject 2419	Electrically Conductive Corrosion Resistant Compounds

	UL 60730-1	Automatic Electrical Controls — Part 1: General Requirements
310	UL 44	Thermoset-Insulated Wires and Cables

UL 66	Fixture Wire

UL 83	Thermoplastic-Insulated Wires and Cables

	UL 1063	Machine-Tool Wires and Cables
312	UL 414	Meter Sockets
314	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations	

UL 514A	Metallic Outlet Boxes	

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers	

	UL 514D	Cover Plates for Flush-Mounted Wiring Devices
320	UL 4	Armored Cable
328	UL 1072	Medium-Voltage Power Cables
330	UL 1569	Metal-Clad Cables
334	UL 719	Nonmetallic-Sheathed Cables

	UL Subject 2256	Nonmetallic Sheathed Cable Interconnects
336	UL 1277	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
338	UL 854	Service-Entrance Cables
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 1242	Electrical Intermediate Metal Conduit — Steel
344	UL 6	Electrical Rigid Metal Conduit — Steel

	UL 6A	Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless Steel
348	UL 1	Flexible Metal Conduit
350	UL 360	Liquid-Tight Flexible Steel Conduit
352	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	

	UL 2515A	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
358	UL 797A	Electrical Metallic Tubing — Aluminum

	UL 797	Electrical Metallic Tubing — Steel
360	UL Subject 1652	Flexible Metallic Tubing
362	UL 1653	Electrical Nonmetallic Tubing
368	UL 1953	Power Distribution Blocks

UL Subject 509		Bus Drop Cable
	UL 857	Busways
374	UL 209	Cellular Metal Floor Raceways and Fittings
376	UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
380	UL Subject 111	Multioutlet Assemblies
384	UL 5B	Strut-Type Channel Raceways and Fittings
386	UL 5	Surface Metal Raceways and Fittings
388	UL 5A	Nonmetallic Surface Raceways and Fittings
390	UL 884	Underfloor Raceways and Fittings
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables
UL 817		Cord Sets and Power-Supply Cords
	UL Subject 1650	Portable Power Cable
404	UL 20	General-Use Snap Switches
UL 98		Enclosed and Dead-Front Switches
UL Subject 98A		Open-Type Switches
UL 363		Knife Switches
UL 773		Plug-In Locking Type Photocontrols for Use with Area Lighting
UL 773A		Nonindustrial Photoelectric Switches for Lighting Control
UL 917		Clock-Operated Switches
	UL 1429	Pullout Switches
406	UL 498	Attachment Plugs and Receptacles
	UL 1682	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
408	UL 67	Panelboards
UL 891		Switchboards

	UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2	Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 60947-7-1	Low-Voltage Switchgear And Controlgear — Part 7-1: Ancillary Equipment — Terminal Blocks for Copper Conductors
	UL 60947-7-2	Low-Voltage Switchgear and Controlgear — Part 7-2: Ancillary Equipment — Protective Conductor Terminal Blocks for Copper Conductors
	UL 60947-7-3	Low-Voltage Switchgear and Controlgear — Part 7-3: Ancillary Equipment — Safety Requirements for Fuse Terminal Blocks
409	UL 508	Industrial Control Equipment
	UL 508A	Industrial Control Panels
410	UL 65	Wired Cabinets
	UL 153	Portable Electric Luminaires
	UL 496	Lampholders
	UL 542	Fluorescent Lamp Starters
	UL 588	Seasonal and Holiday Decorative Products

UL 935	Fluorescent-Lamp Ballasts
UL 1029	High-Intensity-Discharge Lamp Ballasts
UL Subject 1029A	Ignitors and Related Auxiliaries for HID Lamp Ballasts
UL 1574	Track Lighting Systems
UL 1598	Luminaires
UL 1598B	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
UL 1993	Self-Ballasted Lamps and Lamp Adapters
UL 2388	Flexible Lighting Products
UL 8750	Light Emitting Diode (LED) Equipment for Use in Lighting Products
UL 8752	Organic Light Emitting Diode (OLED) Panels
UL 8753	Field-Replaceable Light Emitting Diode (LED) Light Engines
UL 8754	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
UL Subject 8800	Horticultural Lighting Equipment
411 UL 234	Low-Voltage Lighting Fixtures for Use in Recreational Vehicles
UL 1838	Low-Voltage Landscape Lighting Systems

	UL 2108	Low-Voltage Lighting Systems
422	UL 22	Amusement and Gaming Machines
	UL 73	Motor-Operated Appliances
	UL 122	Photographic Equipment
	UL 141	Garment Finishing Appliances
	UL 174	Household Electric Storage Tank Water Heaters
	UL 197	Commercial Electric Cooking Appliances
	UL 283	Air Fresheners and Deodorizers
	UL 399	Drinking Water Coolers
	UL 430	Waste Disposers
	UL 474	Dehumidifiers
	UL 507	Electric Fans
	UL 574	Electric Oil Heaters
	UL 621	Ice Cream Makers
	UL 705	Power Ventilators
	UL 710B	Recirculating Systems
	UL 749	Household Dishwashers

	UL 751	Vending Machines
	UL 763	Motor-Operated Commercial Food Preparing Machines
	UL 858	Household Electric Ranges
	UL 875	Electric Dry-Bath Heaters
	UL 921	Commercial Dishwashers
	UL 923	Microwave Cooking Appliances
	UL 962	Household and Commercial Furnishings
	UL 962A	Furniture Power Distribution Units
	UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026	Household Electric Cooking and Food Serving Appliances
	UL 1278	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1453	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1727	Commercial Electric Personal Grooming Appliances
	UL 1776	High-Pressure Cleaning Machines
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Heating and Cooling
	UL 60335-2-24	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
424	UL 499	Electric Heating Appliances

UL 834	Heating, Water Supply, and Power Boilers — Electric	
UL 873	Temperature-Indicating and -Regulating Equipment	
UL 1042	Electric Baseboard Heating Equipment	
UL 1673	Electric Space Heating Cables	
UL 1693	Electric Radiant Heating Panels and Heating Panel Sets	
UL 1995	Heating and Cooling Equipment	
UL 1996	Electric Duct Heaters	
UL 2021	Fixed and Location-Dedicated Electric Room Heaters	
426 UL Subject 1588	Roof and Gutter De-Icing Cable Units	
427 IEEE 515	Electrical Resistance Heat Tracing for Industrial Applications	
UL 515	Electrical Resistance Heat Tracing for Commercial and Industrial Applications	
UL Subject 2049	Residential Pipe Heating Cable	
430 UL 508C	Power Conversion Equipment	
UL 845	Motor Control Centers	
UL 1004-1	Rotating Electrical Machines — General Requirements	
UL 1004-2	Impedance Protected Motors	
UL 1004-3	Thermally Protected Motors	
UL 2111	Overheating Protection for Motors	

	UL 1004-6	Servo and Stepper Motors
	UL 1004-7	Electronically Protected Motors
	UL 1004-8	Inverter Duty Motors
	UL 1004-9	Medium Voltage and Form Wound Motors
	UL 60034-1	Rotating Electrical Machines
440	UL 250	Household Refrigerators and Freezers
	UL 412	Refrigeration Unit Coolers
	UL 416	Refrigerated Medical Equipment
	UL 427	Refrigerating Units
	UL 471	Commercial Refrigerators and Freezers
	UL 484	Room Air Conditioners
	UL 541	Refrigerated Vending Machines
	UL 563	Ice Makers
445	UL 1004-4	Electric Generators
	UL 2200	Stationary Engine Generator Assemblies
450	UL 506	Specialty Transformers
	UL 5085-1	Low Voltage Transformers — Part 1: General Requirements
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
	UL 1062	Unit Substations

	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 1562	Transformers, Distribution, Dry-Type — Over 600 Volts
460	UL 810	Capacitors
	UL 810A	Electrochemical Capacitors
480	UL 1642	Lithium Batteries
	UL 1973	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989	Standby Batteries
	UL 2054	Household and Commercial Batteries
490	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL Subject 347A	Medium Voltage Power Conversion Controllers
	UL Subject 347B	Medium Voltage Motor Controllers, Up to 15kV
	UL Subject 347C	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
500	ANSI/ISA 12.12.01	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	ANSI/ISA-12.27.01	Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids
	UL 698A	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 844	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 2075	Gas and Vapor Detectors and Sensors

	UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-29-1	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
501	UL 60079-15	Electrical Apparatus for Explosive Gas Atmospheres — Part 15: Type of Protection “n”
	UL 60079-0	Explosive Gas Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-7	Explosive Gas Atmospheres — Part 7: Increased Safety “e”
	UL 60079-1	Explosive Gas Atmospheres — Part 1: Type of Protection – Flameproof “d”
	UL 60079-5	Explosive Gas Atmospheres — Part 5: Type of Protection – Powder Filling “q”
	UL 60079-6	Explosive Gas Atmospheres — Part 6: Type of Protection – Oil Immersion “o”
504	UL 913	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
505	UL 60079-11	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection — Encapsulation “m”
506	UL 61241-18	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”
	UL 61241-1	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “tD”
	UL 61241-0	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements
	UL 61241-11	Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”
	UL 61241-2	Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”
511	UL 201	Garage Equipment

	UL 1564	Industrial Battery Chargers
517	UL 1022	Line Isolation Monitors

~~UL 60601~~

UL 1047	Isolated Power Systems Equipment

AAMI ES 60601 -1	Medical Electrical Equipment

~~— Part 1~~

- Part 1 : General Requirements for Basic Safety And Essential Performance

520	UL Subject 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

	UL 1640	Portable Power-Distribution Equipment
550	UL Subject 1462	Mobile Home Pipe Heating Cable
551	UL 231	Power Outlets
600	UL 48	Electric Signs

UL 814	Gas-Tube-Sign Cable

UL 879	Electric Sign Components

UL 879A	LED Sign and Sign Retrofit Kits

UL Subject 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice

	UL 2161	Neon Transformers and Power Supplies
604	UL 183	Manufactured Wiring Systems
605	UL 1286	Office Furnishings

	UL 962	Household and Commercial Furnishings
610	UL Subject 2273	Festoon Cable
625	UL 2202	Electric Vehicle (EV) Charging System Equipment

UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements	
UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems	
UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles	
UL 2580	Batteries for Use in Electric Vehicles	
UL 2594	Electric Vehicle Supply Equipment	
UL Subject 9741	Bidirectional Electric Vehicle (EV) Charging System Equipment	
626 UL 1686	Pin and Sleeve Configurations	
630 UL 551	Transformer-Type Arc-Welding Machines	
640 UL 813	Commercial Audio Equipment	
UL 1419	Professional Video and Audio Equipment	
UL 1492	Audio-Video Products and Accessories	
UL 1711	Amplifiers for Fire Protective Signaling Systems	
UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use	
UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements	
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements	
645 UL 1690	Data-Processing Cable	
UL 1778	Uninterruptible Power Systems	

	UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
646	UL Subject 2755	Modular Data Centers
670	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
680	UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 676	Underwater Luminaires and Submersible Junction Boxes
	UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241	Isolated Power Systems Equipment
	UL 1261	Electric Water Heaters for Pools and Tubs
	UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1795	Hydromassage Bathtubs
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems
	UL Subject 508I	Manual Disconnect Switches Intended for Use in Photovoltaic Systems
	UL Subject 1699B	Photovoltaic DC Arc-Fault Circuit Protection

UL 1703	Flat-Plate Photovoltaic Modules and Panels
UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
UL Subject 2579	Low-Voltage Fuses — Fuses for Photovoltaic Systems
UL Subject 3703	Solar Trackers
UL Subject 3730	Photovoltaic Junction Boxes
UL 4703	Photovoltaic Wire
UL 6703	Connectors for Use in Photovoltaic Systems
UL Subject 6703A	Multi-Pole Connectors for Use in Photovoltaic Systems
UL Subject 8703	Concentrator Photovoltaic Modules and Assemblies
UL Subject 9703	Distributed Wiring Harnesses
UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
UL 3003	Distributed Generation Cables
UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing

	UL 3741	Photovoltaic Hazard Control
694	UL Subject 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines

	UL Subject 6140	Wind Turbine Generating Systems
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small
695	UL 218	Fire Pump Controllers
	UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 1004-5	Fire Pump Motors
700	UL 924	Emergency Lighting and Power Equipment
	UL 1008	Transfer Switch Equipment
	UL 1008A	Medium-Voltage Transfer Switches
	UL 2200	Stationary Engine Generator Assemblies
706	UL 9540	Energy Storage Systems and Equipment
725	UL 5C	Surface Raceways and Fittings for Use with Data, Signal and Control Circuits
	UL 13	Power-Limited Circuit Cables
	UL 1012	Power Units Other Than Class 2
	UL 1310	Class 2 Power Units
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables

	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL Subject 9990	Information and Communication Technology (ICT) Power Cables
727	UL 2250	Instrumentation Tray Cable
728	UL Subject 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2196	Tests for Fire-Resistive Cables
750	UL 916	Energy Management Equipment
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
770	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway
800	UL 444	Communications Cables
	UL 489A	Circuit Breakers for Use in Communication Equipment
	UL 497	Protectors for Paired-Conductor Communications Circuits
	UL 497A	Secondary Protectors for Communications Circuits
	UL 497C	Protectors for Coaxial Communications Circuits
	UL Subject 497E	Protectors for Antenna Lead-In Conductors

UL Subject 523		Telephone Service Drop Wire
	UL 1863	Communication Circuit Accessories
810	UL 150	Antenna Rotators
	UL 452	Antenna-Discharge Units
820	UL 1655	Community-Antenna Television Cables

Statement of Problem and Substantiation for Public Input

UL 60601-1 is no longer being maintained by the SDO Underwriters Laboratories, Inc. UL 60601-1 was last revised in 2006. The current ANSI standard for electrical medical equipment is ANSI/AAMI ES60601-1, issued by the SDO Association for the Advancement of Medical Instrumentation (AAMI). AAMI ES 60601-1 contains the US national differences to IEC 60601-1, and those national differences include replacing referenced IEC standards with NFPA 70 and NFPA 99. The most recent revision to ES 60601-1 was in 2012, and the technical committee anticipates the next revision will be issued in the third quarter of 2020.

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Committee: NEC-P01

Committee Statement

Resolution: FR-8326-NFPA 70-2021
Statement: The Panel added the AAMI as a new relevant standard.

Public Input No. 2076-NFPA 70-2020 [New Definition after Definition:]

TITLE OF NEW CONTENT

Article 370 Standard Number ANSI/CSA C22.2 No. 273 Standard Title Cablebus

Statement of Problem and Substantiation for Public Input

In November, 2019 ANSI/CSA C22.2 No. 273 standard for Cablebus was published.
The scope of the standard covers:
1.1 This Standard applies to a complete cablebus system (termination to termination) and associated fittings rated at not more than 46 kV ac or dc, and intended for use in accordance with NFPA 70 (NEC), CSA C22.1 (CE Code, Part I), and CAN/CSA-C22.2 No. 0. These requirements do not apply to metal enclosed busways, as covered by CSA C22.2 No. 201 and CSA C22.2 No. 27/UL 857.
1.2 For the purpose of these requirements, a cablebus is an assembly of single conductors and/or cables designed as a system to transmit large magnitudes of electrical current and to withstand the effects of specified system requirements (i.e., short-circuit current, circuit loading, bonding, etc.) with fittings and conductor terminations in a completely enclosed, ventilated, or non-ventilated protective metal housing.
1.3 This Standard also applies to transition enclosures used for the transition between cablebus and adjoining equipment, where applicable.

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Committee: NEC-P01

Committee Statement

Resolution: FR-8327-NFPA 70-2021

Statement: This revision updates the standard number in Informative Annex A as a relevant ANSI/CSA standard to Article 370 as Part II in the SD.

Public Input No. 2176-NFPA 70-2020 [New Definition after Definition:]

TITLE OF NEW CONTENT

Article 410 Standard Number: CSA/ANSI C22.2 No. 184.2 Standard Title: Solid-State Controls for Lighting Systems (SSCLS)

Statement of Problem and Substantiation for Public Input

In February 2020, CSA/ANSI C22.2 No. 184.2 standard was published.
The scope of the standard covers:
1.1 This Standard applies to permanently connected, single or multi-branch circuit, multi-circuit output, solid-state lighting controls rated at 600 V and less, 50 or 60 Hz; single or three phase; with or without overcurrent protection on the load side; with or without integral load switching devices; designed to be used as a complete solid-state lighting control system for the purpose of controlling a single type or multiple types of lighting loads, such as
a) incandescent lamps;
b) magnetic ballasts;
c) fluorescent, compact fluorescent, and electric discharge lamps;
d) HID (pilot duty) and electronic ballasts;
e) LED and OLED lights and drivers; and
f) 0 to 10 V dc analog dimming and intended for installation in accordance with CSA C22.1, Canadian Electrical Code, Part I, and NFPA 70, National Electrical Code (NEC).
1.2 This Standard also applies to SSCLS products mounted in a portable manner. Note: “Mounted on wheels” can include wheel-mounted equipment that can be moved by one person, up to large truck- or trailer-mounted assemblies. Similarly, “mounted on skids” can include equipment that is small enough and light enough to be moved by one person, up to large or heavy units that can only be skidded with larger towing vehicles or lifted and moved with hoists or cranes.
1.3 This Standard applies to ac rated controls for which the load rating does not exceed 40 A per circuit at a maximum of 600 V.
1.4 SSCLS products may include receptacles of configuration 5-15R, 5-20R, and L5-20R, used as lighting load connection points, with access limited to qualified personnel only.
1.5 SSCLS products may include convenience receptacles, mechanical switches, dimming circuits, and other wiring devices on separate circuits.
1.6 SSCLS products may include NC (normally closed) or NO (normally open) contacts for the purpose of controlling other general-use loads rated inductive, resistive, and 2 hp or less.
1.7 SSCLS products may include a Class 2 power supply for the purpose of feeding power to analog or digital inputs, such as sensors.

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Committee: NEC-P01

Committee Statement

Resolution: FR-8328-NFPA 70-2021

Statement: This revision updates the standard number in Informative Annex A as a relevant ANSI/CSA standard to Article 410 as Part II in the SD.

Public Input No. 2177-NFPA 70-2020 [New Definition after Definition:]

TITLE OF NEW CONTENT

Article 422 Standard Number: CSA/ANSI C22.2 N0. 336 Standard Title: Particular requirements for rechargeable battery-operated commercial robotic floor treatment machines with traction drives

Statement of Problem and Substantiation for Public Input

In December 2017, CSA/ANSI S22.2 No. 336 standard was published.
The scope of the standard covers:
1 Scope This clause of Part 1* is replaced by the following
* For the purposes of this Standard, the term “Part 1” means “CAN/CSA-C22.2 No. 60335-1 (second edition)/ UL 60335-1 (sixth edition)”.
The machines covered in this Standard are intended for floors with an artificial surface and used for the following applications:
a) sweeping;
b) scrubbing;
c) wet or dry pickup;
d) polishing;
e) application of wax, sealing products, and powder-based detergents; and
f) shampooing.
Their cleaning motion is more linear than lateral or periodic. This Standard deals with the safety requirements of rechargeable battery-operated commercial robotic floor treatment machines with traction drive intended for indoor use in accordance with CSA C22.1, Canadian Electric Code, Part I, in Canada, and with the National Electrical Code, NFPA 70 in the U.S., the rated voltage of the battery being not more than 75 V dc.
NOTE 101 Commercial uses are, for example, in hotels, schools, hospitals, factories, shops, warehouses, and offices for other than normal housekeeping purposes.
This Standard covers machines that are powered by rechargeable batteries that are recharged by built- in battery chargers or off-board battery chargers which may be incorporated within the circuitry of the machine, or mounted on the machine and incorporated within the enclosure of the machine; or powered by batteries that need to be removed to be recharged with a charger that is external to the machine.
NOTE 102 When the term “machine” is used in this Standard, it is used to denote commercial robotic floor treatment machines.
This Standard does not apply to battery chargers. Off-board chargers are covered by separate applicable standards (see CSA C22.2 No. 107.1, CAN/CSA-C22.2 No. 107.2, CSA C22.2 No. 223, CAN/CSA-E60335-2-29, UL 1012, and UL 1310). This Standard covers the safe functioning of lithium-ion and non-lithium-ion battery systems used in commercial robotic floor treatment machines. Machines covered by this Standard may operate in autonomous or manual mode.
This Standard does not apply to
• machines designed for use on slopes with a gradient exceeding 20%;
• machines designed for use in corrosive or explosive environments (i.e., dust, vapour, or gas);
• machines designed for picking up hazardous dusts (as defined in CAN/CSA-E60335-2-69), inflammable substances, or glowing particles;
• powered ride-on and powered walk-behind machines intended for commercial indoor or outdoor use (those machines are covered by CAN/CSA-C22.2 No. 60335-2-72/UL 60335-2-72); and
• machines with robotic arms (end effectors).

Submitter Information Verification

Submitter Full Name: Leonard Letea
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Submittal Date: Thu Aug 06 15:04:07 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: CMP-1 does not consider Battery-Operated Commercial Robotic Machines to be under the purview of Article 422 and is not required in Informative Annex A. CMP-1 requests the Correlating Committee to review and refer to CMP-17.

Public Input No. 2178-NFPA 70-2020 [New Definition after Definition:]

TITLE OF NEW CONTENT

Article 422 Standard Number: CSA/ANSI C22.2 No. 339 Standard Title: Hand-held motor-operated electric tools — Safety — Particular requirements for chain beam saws

Statement of Problem and Substantiation for Public Input

In October 2018, CSA/ANSI C22.2 No. 339 standard was published.
The scope of the standard covers:
1 Scope
This clause of Part 1* is applicable, except as follows.
* For the purposes of this Standard, the term "Part 1" means "CAN/CSA-C22.2 No. 62841-1 (first edition)/ UL 62841-1 (first edition)".
Note: When this Standard states “addition”, “modification”, or “replacement”, the relevant text in Part 1 is to be adapted accordingly.
Addition:
This Standard applies to chain beam saws for cutting wood or similar material and designed for use by one person.
This Standard does not cover chain beam saws that can be installed with more than one guide bar length.
This Standard does not cover chain beam saw attachments that convert a circular saw or a chain saw into a chain beam saw.
This Standard does not cover
a) chain saws as defined in CAN/CSA-C22.2 No. 60745-2-13/UL 60745-2-13;
b) chain saws for tree service as defined in CSA Z62.1; or
c) pole cutters and pruners as defined in CSA C22.2 No. 147 or UL 82.

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Submittal Date: Thu Aug 06 15:06:13 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8330-NFPA 70-2021
Statement: This revision updates the standard number in Informative Annex A as a relevant ANSI/CSA standard to Article 422 as Part II in the SD.

Public Input No. 2179-NFPA 70-2020 [New Definition after Definition:]

TITLE OF NEW CONTENT

Article 670 Standard Number: CSA/ANSI C22.2 No. 19085-1 Standard Title: Woodworking machines — Safety — Part 1: Common requirements

Statement of Problem and Substantiation for Public Input

In November 2019, CSA/ANSI C22.2 No. 19085-1 standard was published.
The scope of the standard covers:
1. This document gives the safety requirements and measures to reduce risks related to woodworking machines arising during operation, adjustment, maintenance, transport, assembly, dismantling, disabling and scrapping and which are common to machines used in the woodworking industry. It is applicable to woodworking, stationary and displaceable machines when they are used as intended and under the conditions foreseen by the manufacturer.
NOTE 1 For relevant but not significant hazards, e.g. sharp edges of the machine frame, see ISO 12100:2010.
It is intended to be used in conjunction with the other parts of ISO 19085, applicable to specific machine types. It is not applicable to machines intended for use in potential explosive atmospheres or to machines manufactured prior to the date of its publication.
NOTE 2 Machines for capturing and extracting dust are covered by EN 12779 and EN 16770.
1DV.1 Modify Clause 1 by adding the following to the first paragraph:
This Standard applies to electrical woodworking machines rated 600 V or less that are intended to be installed and used in accordance with the National Electrical Code (NFPA 70) in the United States and the Canadian Electrical Code, Part I (CSA C22.1) in Canada. In Canada, general requirements applicable to these machines are provided in CAN/CSA-C22.2 No. 0.
1DV.2 Modify Clause 1 by replacing Note 2 with the following:
NOTE 2 Machines for capturing and extracting dust are not within the scope of this Standard.

Submitter Information Verification

Submitter Full Name: Leonard Letea
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Affiliation: CSA Group
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City:
State:
Zip:
Submittal Date: Thu Aug 06 15:07:31 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8331-NFPA 70-2021
Statement: This revision updates the standard number in Informative Annex A as a relevant ANSI/CSA standard to Article 670 as Part II in the SD.

Public Input No. 3607-NFPA 70-2020 [New Section after J.7.2]

Annex K: Use of Medical Electrical Equipment in Dwellings and Residential Board-and-Care Occupancies

In recent years there has been a significant increase in home or remote patient use of electrical dependent medical equipment. This trend is widely considered to increase in the coming years. This prompts the attention to properly investigate the appropriate interaction of this critical equipment with National Electrical Code installations both existing and new.

Medical electrical equipment (MEE) is in general considered as equipment having an applied part which transfers or detects energy to and from a patient. This equipment is provided with a single connection to electrical power and is intended for use by the manufacturer, either by marking on equipment or in instructions, to be used for diagnosis, treatment, or monitoring of a patient or for compensation or alleviation of disease, injury or disability. The environment for intended use can be best described as a place where the patient lives or is present without the existence of continuous supervision by professional workers or aid. The Social Security Administration for Medicare provides a definition for Durable Medical Equipment (DME) that is broader than electrical described as equipment that is primarily used to serve a medical purpose and is appropriate for use in the home.

Medical electrical equipment is generally divided into classes relating to means of protection (MOP). Class I equipment refers to equipment in which protection against electric shock relies on protective earth. Class II equipment does not rely on protective earth as a MOP but instead relies on double or reinforced insulation as mean of protection against electric shock. Class II equipment does not have provisions for protective earth or reliance upon installation conditions. From home use medical electrical equipment, Class I equipment includes a grounding connection and must be permanently installed. Medical Electrical equipment evaluated for compliance with the ES 60601-1 series of standards are typically Class II equipment unless they are permanently connected to the building power. While there are varying applications and intended uses of medical equipment one of the most critical is life support medical equipment. This equipment is intended to actively keep alive or resuscitate a patient. Due to the critical intent of this equipment interaction with a National Electrical Code installation is critical. Reliable supply of power and understanding of availability of electrical power should there be an outage are key parameters to consider. This type of medical equipment is often supplied with backup power appropriate for the intended use and critical nature of its function. Life support equipment should be on a circuit with limited or no other loads to prevent overloading and unintended removal of power. It is recommended to supply this equipment with an individual branch circuit. If this is not a feasible option due to current installation conditions, it is recommended to conduct the following analysis and labeling:

(1) Conduct an analysis of the circuit intended to supply the life support equipment including all lighting or other outlets that are on the circuit

(2) Follow the rules of 210.16 limiting MEE loads on this circuit to 50% or less

(3) Determine that adequate loading is available for the reliable supply of power to the life support equipment

(4) Conduct an analysis around the need for backup power given the availability of the patient to access an alternate supply source should they lose primary power in the intended location of the equipment. This will be affected by the distance to next available option for electrical power, the mobility of the patient, or access to others able to assist. If there is a concern in this area, then backup power at the primary location is suggested.

(5) In the absence of an alarm integral to the MEE, an audible alarm should be provided monitoring the circuit supplying power to the equipment to alarm when power is lost at the outlet supplying the MEE

(6) Investigate electrical devices and components in premise wiring system to ensure that remote control or switching are not allowed. Verify the overcurrent protective device(s) and other fault detection devices do not operate. Confirm continuity of power by energizing equipment and run through normal cycle of functions to ensure reliable supply of power

(7) Label all receptacles available to supply power to other loads on the circuit. The labeling should read as follows or similar language with same intent:

WARNING — Power Loss Risk to

Life-Support and Medical Equipment on same circuit.

DO NOT OVERLOAD

When using medical equipment, it is critical to understand the conditions and environment which it will be used. Locating the equipment in wet or damp locations or near other systems (such as water, gas, oxygen, sparks, etc.) can present hazards that need to be addressed in the installation. For wet and damp locations MEE will be marked for use in these locations with an ingress protection IPXX (such as IP22) rating on the equipment. In the absence of IP21 or higher markings the equipment should not be used in wet or damp locations. If the equipment is marked with an Umbrella (Keep Dry) symbol it is limited to dry locations only.

Additional Proposed Changes

File Name	Description	Approved
Annex_K_Final_Submittal.docx	Word file for new Annex K language	

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of the task group formed in accordance with the direction of the NFPA 70®/NEC® Correlating Committee to address health care delivery in the home using durable medical equipment (DME), specifically the installation of medical electrical equipment (MEE). Such applications fall outside the performance requirements and Scope of NFPA 99, Health Care Facilities Code. This task group was appointed to identify potential proposed changes, normative and informative, to the 2023 edition of the NEC® in the form of Public Inputs (PIs) that are within the Task Group's scope of activity as specified by the Correlating Committee.

These proposed PIs relate to new requirements and an Informative Annex covering the assessment and installation of MEE in dwellings and residential board-and-care occupancies including assisted living residences. These Public Inputs should not be misconstrued being applicable to hospitals, nursing homes, or limited care facilities wherein medical procedures are performed.

The task group members are: John McCamish – Co-Chair, Todd Lottmann – Co-Chair, Chad Beebe, Pamela Gwynn, David Hittinger, Alan Manche, Brodie Pedersen, Brian Rock, Dave Stiles, and Dave Williams. This task group of balanced interests provided the expertise to develop these public inputs covering the assessment and installation of MEE in dwellings and board-and-care residential occupancies.

Public Inputs are being submitted in the following sections: 210.16 and Annex K

Technical Substantiation

Increasingly, patient recovery and maintenance care is occurring within patients' residences, rather than in facilities addressed by NFPA 99, Health Care Facilities. "Health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory health care centers, whether permanent or movable." [99 2018: A.3.3.71; 99 2021: A.3.3.73]. Indeed, home care is explicitly outside the scope of NFPA 99. [99 2018: 1.3.1; 99 2021: 1.3.1].

The global COVID-19 pandemic and its associated need for shelter-in-place and for social distancing has exacerbated this need as a necessity for many. This Public Input is applicable to the installation requirements for Article 210 dwelling units, Article 550 manufactured homes, Article 550 mobile homes, Article 545 residential manufactured buildings (no permanent chassis), Article 555 residential floating buildings, Article 552 Park Trailers, and for residential board-and-care occupancies defined by NFPA 101, Life Safety Code, such as assisted living facilities (no nursing care), group housing, and the like. [101 2018: 3.3.196.12, A. 3.3.196.12; 101 2021: 3.3.198.12, A. 3.3.198.12].

This Public Input focuses upon notification of and risk avoidance of power interruptions to MEE resulting from hazards identified elsewhere on the same branch circuit such as circuit overload (particularly from casual connection of non-MEE appliances); OCPD, GFCI and AFCI events; caretaker electrical inexperience, et cetera. Although 210.21(B)(2) provides requirements for cord-and-plug-connected loads,

these ampere limits are not general knowledge. Further, there may be other hard-wired loads supplied by outlets on that same branch circuit that also supplies receptacle outlets. Duty-To-Warn becomes essential to assure uninterrupted availability of electric power to MEE, especially that which may be life-support equipment.
Consequently, supplying MEE from branch circuits where cord-and-plug-connected MEE is limited to 50% of total ampere capacity assures that there is still capacity available for non-MEE appliances and encourages supply of MEE by multiple branch circuits to reduce the likelihood of all MEE being interrupted concurrently when a complete power failure is not occurring.
It may not be obvious to occupants as to which receptacles outlets are on which branch circuits. Identification of receptacle outlets on the same branch becomes essential to providing knowledge to where additional loads might interrupt power to MEE. Further, some receptacle outlets may not be readily accessible due to large furnishings limiting such access; available electrical power may be accessible from convenience outlet receptacles of extension cords, relocatable power taps, or furniture power distribution units. The accessible and visible outputs of those extension cords, relocatable power taps, or furniture power distribution units must provide the visible warning location.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3605-NFPA 70-2020 [New Section after 210.15]	Companion PIs

Submitter Information Verification

Submitter Full Name: Todd Lottmann
Organization: Eaton Corporation
Street Address:
City:
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Zip:
Submittal Date: Wed Sep 09 08:50:19 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: FR-8333-NFPA 70-2021

Statement: The Panel added new Informative Annex K. The provision of medical care in the home is increasing along with the attendant use of medical electrical equipment (MEE). Informative Annex K covers the assessment and installation of MEE in dwellings and residential board-and-care occupancies, including assisted living residences. Such information will help ensure the electrical safety of those individuals who must utilize MEE.

Annex K: Use of Medical Electrical Equipment in Dwellings and Residential Board-and-Care Occupancies

In recent years there has been a significant increase in home or remote patient use of electrical dependent medical equipment. This trend is widely considered to increase in the coming years. This prompts the attention to properly investigate the appropriate interaction of this critical equipment with National Electrical Code installations both existing and new.

Medical electrical equipment (MEE) is in general considered as equipment having an applied part which transfers or detects energy to and from a patient. This equipment is provided with a single connection to electrical power and is intended for use by the manufacturer, either by marking on equipment or in instructions, to be used for diagnosis, treatment, or monitoring of a patient or for compensation or alleviation of disease, injury or disability. The environment for intended use can be best described as a place where the patient lives or is present without the existence of continuous supervision by professional workers or aid. The Social Security Administration for Medicare provides a definition for Durable Medical Equipment (DME) that is broader than electrical described as equipment that is primarily used to serve a medical purpose and is appropriate for use in the home.

Medical electrical equipment is generally divided into classes relating to means of protection (MOP). Class I equipment refers to equipment in which protection against electric shock relies on protective earth. Class II equipment does not rely on protective earth as a MOP but instead relies on double or reinforced insulation as mean of protection against electric shock. Class II equipment does not have provisions for protective earth or reliance upon installation conditions. From home use medical electrical equipment, Class I equipment includes a grounding connection and must be permanently installed. Medical Electrical equipment evaluated for compliance with the ES 60601-1 series of standards are typically Class II equipment unless they are permanently connected to the building power. While there are varying applications and intended uses of medical equipment one of the most critical is life support medical equipment. This equipment is intended to actively keep alive or resuscitate a patient. Due to the critical intent of this equipment interaction with a National Electrical Code installation is critical. Reliable supply of power and understanding of availability of electrical power should there be an outage are key parameters to consider. This type of medical equipment is often supplied with backup power appropriate for the intended use and critical nature of its function. Life support equipment should be on a circuit with limited or no other loads to prevent overloading and unintended removal of power. It is recommended to supply this equipment with an individual branch circuit. If this is not a feasible option due to current installation conditions, it is recommended to conduct the following analysis and labeling:

1. Conduct an analysis of the circuit intended to supply the life support equipment including all lighting or other outlets that are on the circuit
2. Follow the rules of 210.16 limiting MEE loads on this circuit to 50% or less
3. Determine that adequate loading is available for the reliable supply of power to the life support equipment
4. Conduct an analysis around the need for backup power given the availability of the patient to access an alternate supply source should they lose primary power in the intended location of the equipment. This will be affected by the distance to next available option for electrical power, the mobility of the patient, or access to others able

to assist. If there is a concern in this area, then backup power at the primary location is suggested.

5. In the absence of an alarm integral to the MEE, an audible alarm should be provided monitoring the circuit supplying power to the equipment to alarm when power is lost at the outlet supplying the MEE
6. Investigate electrical devices and components in premise wiring system to ensure that remote control or switching are not allowed. Verify the overcurrent protective device(s) and other fault detection devices do not operate. Confirm continuity of power by energizing equipment and run through normal cycle of functions to ensure reliable supply of power
7. Label all receptacles available to supply power to other loads on the circuit. The labeling should read as follows or similar language with same intent:

WARNING — Power Loss Risk to
Life-Support and Medical Equipment on same circuit.
DO NOT OVERLOAD

When using medical equipment, it is critical to understand the conditions and environment which it will be used. Locating the equipment in wet or damp locations or near other systems (such as water, gas, oxygen, sparks, etc.) can present hazards that need to be addressed in the installation. For wet and damp locations MEE will be marked for use in these locations with an ingress protection IPXX (such as IP22) rating on the equipment. In the absence of IP21 or higher markings the equipment should not be used in wet or damp locations. If the equipment is marked with an Umbrella (Keep Dry) symbol it is limited to dry locations only.

Public Input No. 2064-NFPA 70-2020 [New Part after I.]

TITLE OF NEW CONTENT New Definition Industrial Establishments;

Industrial Establishments: Buildings or other Structures for improvement thereon, and maintained or utilized for the mechanical or chemical transformation of organic or inorganic substances into new products, Machinery and equipment used in manufacturing research and development of products, power-driven machines and equipment involving the fabrication, manufacture, or production of durable or nondurable goods. These Buildings or Structures are Identified and constructed as an "F" and/or "H" Building Occupancy classification per the International Building Code or Building Code adopted by the AHJ. ...

Statement of Problem and Substantiation for Public Input

This proposal will provide a definition to assist the AHJ with enforcement of the NEC, Articles Such as 392, Section 392.10 (B) and Article 501 and 502 exceptions. Currently the NEC does not define what is an Industrial Establishment. Providing a definition that refers to the International Building Code or Building Code adopted by the AHJ. for Buildings or Structures that are Identified and constructed as an "F" and/or "H" Building Occupancy classification will help the electrical industry for design, installation and enforcement of the National Electrical Code.

Submitter Information Verification

Submitter Full Name: Haywood Kines
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City:
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Submittal Date: Mon Jul 27 11:30:09 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: These types of installations are not restricted to only buildings or structures. They could include areas without buildings or structures.

Public Input No. 3908-NFPA 70-2020 [New Part after I.]

Absence of Voltage Tester

Absence of Voltage Tester (AVT) - permanently mounted tester that is used to test for absence of voltage prior to opening an electrical enclosure without exposure to shock or arc flash hazards.

Informational Note 1: NFPA 70E-2021 Standard for Electrical Safety in the Workplace provides guidance for safely verifying the absence of voltage including the use of devices like a permanently mounted absence of voltage tester.

Informational Note 2: An absence of voltage tester is permanently mounted and tests for absence of voltage phase-to-phase and phase-to-ground, uses a known voltage source to verify the tester is functional before and after the test, has a means to confirm connectivity between the tester and the test point before and after the test, and displays results with an active indication in accordance with acceptable industry practices. For additional information on rating and design requirements for permanently mounted absence of voltage testers, refer to UL 1436, Outlet Circuit Testers and Other Similar Indicating Devices.

Statement of Problem and Substantiation for Public Input

A new definition for Absence of Voltage Testers is proposed to support PI #3835, 3908, 3912, 3934, 3941, 3980, 3994, and 4000. The proposed definition is based on the descriptions in NFPA 70E-2021 and UL 1436.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3835-NFPA 70-2020 [New Section after 110.25]	
Public Input No. 3912-NFPA 70-2020 [New Section after 440.14]	
Public Input No. 3934-NFPA 70-2020 [New Section after 409.110]	
Public Input No. 3941-NFPA 70-2020 [New Section after 430.99]	
Public Input No. 3980-NFPA 70-2020 [New Section after 408.8(B)]	
Public Input No. 3994-NFPA 70-2020 [Section No. 625.43]	
Public Input No. 4000-NFPA 70-2020 [Section No. 670.4(B)]	

Submitter Information Verification

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Zip:
Submittal Date: Wed Sep 09 15:18:05 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: This definition is not necessary since it does not appear in the NEC.

Public Input No. 233-NFPA 70-2020 [Part I.]

Part I. General

Add definition

Emergency disconnect- a disconnecting means that has a Red Lever handle and will disconnect all grounded and ungrounded conductors . This disconnect will meet all lockout standards in NFPA 70e

Statement of Problem and Substantiation for Public Input

This will allow all first responders to properly lock out and isolate all energy in system for the team.

Submitter Information Verification

Submitter Full Name: Joseph Bednarik
Organization: IBEW 223
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City:
State:
Zip:
Submittal Date: Wed Jan 01 18:27:19 EST 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed text includes requirements which are not allowed in definitions per the 2020 NEC Style Manual, 2.2.2.2.

Public Input No. 908-NFPA 70-2020 [Part I.]

Part I. General

Basement. Any story of a building wholly or partly below grade plane that is not considered the first story above grade plane.

Grade Plane. A reference plane upon which vertical measurements of a building are based representing the average of the finished ground level adjoining the building at all exterior walls.

First Story Above Grade Plane. Any story having its finished floor surface entirely above grade plane, except that a basement is to be considered as a first story above grade plane where the finished surface of the floor above the basement is

(1) more than 6 ft (1830 mm) above grade plane or

(2) more than 12 ft (3660 mm) above the finished ground level at any point

Additional Proposed Changes

File Name	Description	Approved
2012_ibc_handbook_p42-44.pdf	International Building Code handbook commentary	

Statement of Problem and Substantiation for Public Input

The term “basement” now appears in at least nine sections in the NEC: damp location definition, 210.8(A), 210.8(B), 210.52(G), 210.70(C), 334.15(C), 382.12, 760, 41(B), and 760.121(A). To ensure uniform design, installation, and enforcement of installation requirements called out in the referenced sections I am recommending new definitions be added for “basement”, “grade plane”, and “first story above grade plane”. These three terms already exist in NFPA 101 Life Safety Code and NFPA 5000 Building Construction and Safety Code. In addition please see the attached commentary from the IBC handbook which provides examples of various configurations of structures and grade that effect basement considerations.
I think the Correlating Committee, CMP1, CMP2, CMP3, and CMP6 should consider this proposed action due to the existing term “basement” appearing in the referenced sections and being under the purview of the respective CMP.
I would also note that a definition for “dormitory unit” was added to the 2017 NEC and I applaud CMP2 for providing that guidance to industry. It appears in six sections in the NEC: 210.12(B), 210.12(D), 210.60, Table 220.12, 240.24(E), and 406.12. “Basement” appears in at least nine code sections, as referenced earlier, which I think notes a significant gap that needs to be addressed to provide consistency and clarity for users of the document.

Submitter Information Verification

Submitter Full Name: Vincent Dellacroce
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Mon Apr 27 12:13:23 EDT 2020
Committee: NEC-P01

Committee Statement

Resolution: The proposed definitions could create correlation issues in other areas of the Code. A one story home can be built wholly or partially below grade and qualify as a basement under the proposed defined term. Some of the proposed Public Inputs also include a requirement which is not allowed for definitions by the 2020 NEC Style Manual, 2.2.2.2.

STORY ABOVE GRADE PLANE. Throughout the code, the number of qualifying stories in a building is a contributing factor to the proper application of the provisions. As an example, a building's allowable types of construction are based partly on the limits in story height placed on various occupancy groups. In this case, the code is limiting construction type based on the number of stories above grade plane. The code defines a story above grade plane as any story having its finished floor surface entirely above grade plane. However, floor levels partially below the grade at the building's exterior may also fall under this terminology. The critical part of the definition involves whether or not a floor level located partially below grade is to be considered a story above grade plane. There are two criteria that are important to the determination if a given floor level is to be considered a story above grade plane:

If the finished floor level above the level under consideration is more than 6 feet (1829 mm) above the grade plane as defined in Section 502.1, the level under consideration is a story above grade plane, or

If the finished floor level above the level under consideration is more than 12 feet (3658 mm) above the finished ground level at any point, the floor level under consideration shall be considered a story above grade plane.

Where either one of these two conditions exists, the level under consideration is to be considered a story above grade plane.

Conversely, if the finished floor level above the level under consideration is 6 feet (1829 mm) or less above the grade plane, and does not exceed 12 feet (3658 mm) at any point, the floor level under consideration is not considered a story above grade plane. By definition, it is regulated as a basement. Figures 202-20 and 202-21 illustrate the definitions of "Story," "Basement," and "Story above grade plane."

Although the criteria for establishing the first story above grade plane in Item 2 indicates that such a condition occurs where the 12-foot (3658-mm) limitation is exceeded, the application of this provision is not that simple. It is not the intent of the code to classify a story that is completely below grade except for a small entrance ramp or loading dock as a *story above grade plane*, provided there is no adverse effect on fire department access and staging. An analysis of the impact of such limited elevation differences is necessary to more appropriately apply the code's intended result.

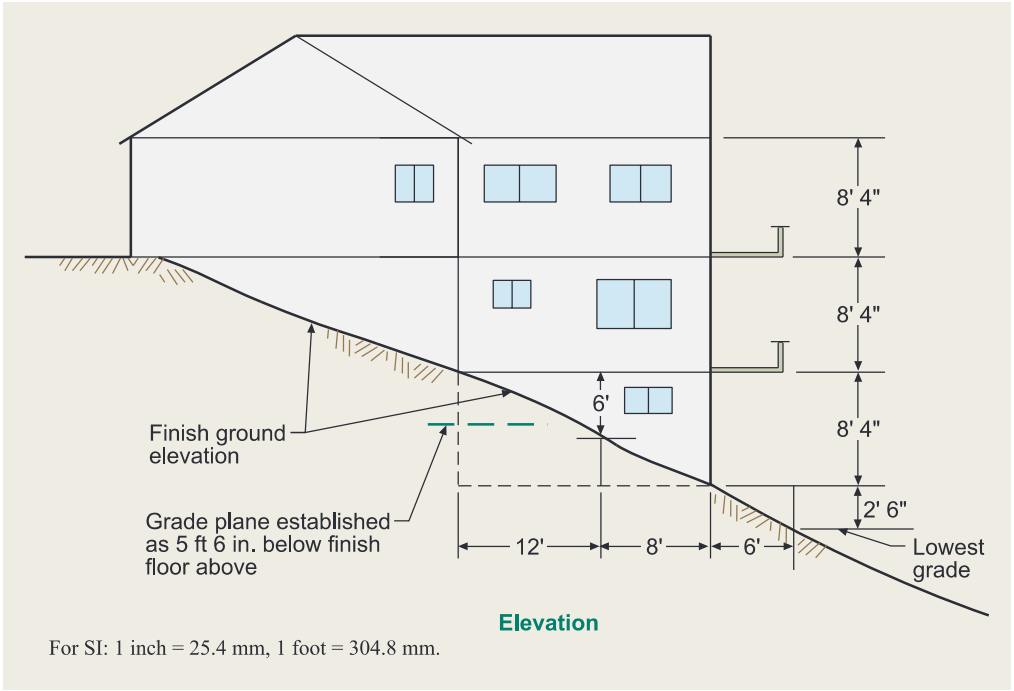


Figure 202-20
Building with two stories above grade plane and one basement level.

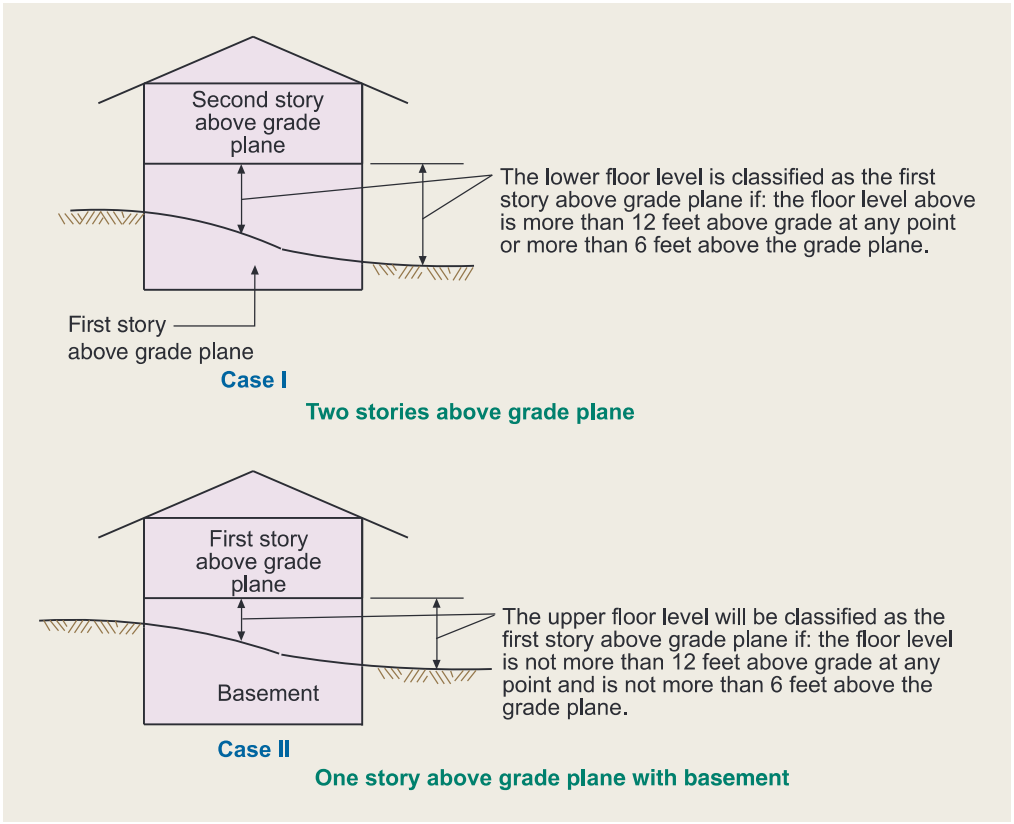


Figure 202-21
Multistory building.