



First Revision No. 26-NFPA 79-2022 [Detail]

5.1.13.4

Where the excepted circuits are not disconnected by the machine supply circuit disconnecting means, all of the following requirements shall be met:

- (1) A permanent safety sign(s) shall be placed adjacent to the machine supply circuit disconnecting operating handle(s), indicating that it does not de-energize all exposed live parts when it is in the open (off) position as in 16.2.4.
- (2) A statement containing the information from 16.2.4 shall be included in the machine documentation.
- (3) A permanent safety sign shall be placed on a nonremovable part inside the control enclosure in proximity to each excepted circuit **or** **and** shall be identified by color as defined in 13.2.4

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Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 13:50:43 EST 2022

Committee Statement

Committee Statement: The word "or" was changed to "and" because the sign and color orange are both required.

Response Message: FR-26-NFPA 79-2022

[Public Input No. 18-NFPA 79-2021 \[Section No. 5.1.13.4\]](#)



First Revision No. 49-NFPA 79-2022 [New Section after 1.6]

1.7 Referenced Publication Dates.

Unless a publication referenced in the annex(es) includes a date, the reference shall be considered the latest edition of the publication.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 12:43:40 EST 2022

Committee Statement

Committee Statement: Revision years for standards or codes should be optional when referenced in annex(es). 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.

Response Message: FR-49-NFPA 79-2022

Public Input No. 117-NFPA 79-2022 [New Section after 1.6]



First Revision No. 50-NFPA 79-2022 [Section No. 2.3.6]

2.3.6 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 50, *Enclosures for Electrical Equipment, Non-Environmental Considerations*, ~~2015~~ 2020 .

UL 50E, *Enclosures for Electrical Equipment, Environmental Considerations*, ~~2015~~ 2018,
revised 2020 .

UL 508, *Industrial Control Equipment*, 2018, revised 2021 .

UL 508A, *Industrial Control Panels*, 2018, revised 2021 .

UL 870, *Wireways, Auxiliary Gutters, and Associated Fittings*, 2016, revised 2018 .

UL 1063, *Machine-Tool Wires and Cables*, 2017, revised ~~2018~~ 2020 .

UL 1581, *Electrical Wires, Cables, and Flexible Cords*, 2001, revised ~~2017~~ 2021 .

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 13:15:12 EST 2022

Committee Statement

Committee Statement: The date of publication has been updated to reflect the most recent edition of each standard

Response Message: FR-50-NFPA 79-2022

Public Input No. 65-NFPA 79-2021 [Section No. 2.3.6]



First Revision No. 84-NFPA 79-2022 [Section No. 2.4]

2.4 References for Extracts in Mandatory Sections.

NFPA 70[®], National Electrical Code[®], 2020 2023 edition.

NFPA 70E[®], Standard for Electrical Safety in the Workplace[®], 2018 2024 edition.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 30 10:44:52 EDT 2022

Committee Statement

Committee Statement: Updating references due to CW comments for updating edition year(s).

Response Message: FR-84-NFPA 79-2022



First Revision No. 1-NFPA 79-2022 [Section No. 3.3.1]

3.3.1 Accessible (as applied to equipment).

~~Admitting close approach; not guarded by locked doors, elevation, or other effective means~~ Capable of being reached for operation, renewal, and inspection . [70: , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:08:16 EST 2022

Committee Statement

Committee Statement: This definition is revised for correlation with NFPA 70.

Response Message: FR-1-NFPA 79-2022



First Revision No. 2-NFPA 79-2022 [Section No. 3.3.10]

3.3.10 Barrier.

A physical obstruction that is intended to prevent contact with equipment or energized electrical conductors and circuit parts ~~or to prevent unauthorized access to a work area .~~
[70E: , 400 2024]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:10:31 EST 2022

Committee Statement

Committee Statement: This definition is revised for correlation with NFPA 70E.

Response Message: FR-2-NFPA 79-2022



First Revision No. 86-NFPA 79-2022 [Section No. 3.3.12]

3.3.12 Bonded Bonding (Bonding Bonded).

Connected to establish electrical continuity and conductivity. [~~70~~: , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 07:49:26 EDT 2022

Committee Statement

Committee Statement: Revised per editorial correction in accordance with the manual of style.

Response Message: FR-86-NFPA 79-2022



First Revision No. 87-NFPA 79-2022 [Section No. 3.3.13]

3.3.13 Branch Circuit (Branch-Circuit) .

The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s). [~~70~~ : , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 07:52:27 EDT 2022

Committee Statement

Committee Statement: Revised for correlation to the NEC.

Response Message: FR-87-NFPA 79-2022



First Revision No. 3-NFPA 79-2022 [Section No. 3.3.15]

3.3.15 Cable Tray System.

A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways. [~~70:~~ , ~~392.2~~ 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:12:52 EST 2022

Committee Statement

Committee Statement: This definition is revised for correlation with NFPA 70.

Response Message: FR-3-NFPA 79-2022

**First Revision No. 4-NFPA 79-2022 [Section No. 3.3.21]****3.3.21 Conduit.****3.3.21.1 Conduit, Flexible Metal (FMC) — (Flexible Metal Conduit) ~~(FMC)~~ .**

A raceway of circular cross section made of helically wound, formed, interlocked metal strip. [70: , 348-2 2023]

3.3.21.2 Conduit, Intermediate Metal (IMC) (Intermediate Metal Conduit) ~~(IMC)~~ .

A steel threadable raceway of circular cross section designed for the physical protection and routing of conductors and ~~cables~~ cables when installed with its integral or associated coupling and appropriate fittings.

3.3.21.3 Conduit, Liquidtight Flexible (LFMC) (Liquidtight Flexible Metal Conduit) ~~(LFMC)~~ .

A raceway of circular cross section having an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core with associated couplings, connectors, and fittings for the installation of electric conductors. [70: , 350-2 2023]

3.3.21.4* Conduit, Liquidtight Flexible Nonmetallic (LFNC) (Liquidtight Flexible Nonmetallic Conduit) ~~(LFNC)~~ .

A raceway of circular cross section of various types as follows: (1) A smooth seamless inner core and cover bonded together and having one or more reinforcement layers between the core and covers, designated as ~~Type~~ LFNC-A; (2) A smooth inner surface with integral reinforcement within the raceway wall, designated as ~~Type~~ LFNC-B; (3) A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as LFNC-C. [70: , 356-2 2023]

A.3.3.21.4 Conduit, Liquidtight Flexible Nonmetallic (LFNC) (Liquidtight Flexible Nonmetallic Conduit) ~~(LFNC)~~ .

FNMC is an alternative designation for LFNC. [70: 356.2 Informational Note 70, 2023]

3.3.21.5 Conduit, Rigid Metal Conduit (RMC) (Rigid Metal Conduit) .

A threadable raceway of circular cross section designed for the physical protection and routing of conductors and ~~cables~~ cables when installed with its integral or associated coupling and appropriate fittings. ~~RMC is generally made of steel (ferrous) with protective coatings or aluminum (nonferrous). Special use types are silicon bronze and stainless steel.~~

3.3.21.6 ~~Rigid Nonmetallic Conduit (RNC)~~ Conduit, Rigid Polyvinyl Chloride (PVC) (Rigid Polyvinyl Chloride Conduit) .

A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:38:10 EST 2022

Committee Statement

Committee Statement: Added acronyms and searchable terms.

Correlated for use with the NEC.

Response Message: FR-4-NFPA 79-2022



First Revision No. 5-NFPA 79-2022 [Section No. 3.3.35]

3.3.53 Ground-Fault Current Path, Effective (Effective Ground-Fault Current Path) .

An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current ~~under~~ during ground-fault ~~conditions~~ events from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors. [70: , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:50:21 EST 2022

Committee Statement

Committee Statement: The definition is changed for correlation to NFPA 70.

Response Message: FR-5-NFPA 79-2022



First Revision No. 88-NFPA 79-2022 [Section No. 3.3.40]

3.3.39* 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. [~~70~~: , ~~400~~ 2023]

A.3.3.39 Enclosure.

See Table 110.28 in *NFPA 70* for examples of enclosure types. [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 07:55:31 EDT 2022

Committee Statement

Committee Statement: Revised to add the annex material.

Response Message: FR-88-NFPA 79-2022



First Revision No. 81-NFPA 79-2022 [New Section after 3.3.41]

3.3.41 Energized, Likely to Become (Likely to Become Energized).

Conductive material that could become energized because of the failure of electrical insulation or electrical spacing. [**70**, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submission Date: Wed Mar 02 17:53:29 EST 2022

Committee Statement

Committee Statement: The term Likely to Become Energized is used in NFPA 79 and is often misunderstood. Adding the term to Chapter 3 will help in the use and application of NFPA 79.

Response Message: FR-81-NFPA 79-2022

Public Input No. 118-NFPA 79-2022 [New Section after 3.3.41]



First Revision No. 14-NFPA 79-2022 [Section No. 3.3.52]

3.3.52 Ground Fault.

An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, ~~metallic metal~~ enclosures, ~~metallic metal~~ raceways, ~~metallic metal~~ equipment, or earth. [~~70~~; 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 11 11:03:52 EST 2022

Committee Statement

Committee Statement: The definition was revised to correlate with NFPA 70.

Response Message: FR-14-NFPA 79-2022



First Revision No. 89-NFPA 79-2022 [Section No. 3.3.54]

3.3.55* Grounded Conductor.

A system or circuit conductor that is intentionally grounded. [70: , 400 2023]

A.3.3.55 Grounded Conductor.

Although an equipment grounding conductor is grounded, it is not considered a grounded conductor. [70 , 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 07:59:37 EDT 2022

Committee Statement

Committee Statement: Revised to add the annex material.

Response Message: FR-89-NFPA 79-2022



First Revision No. 6-NFPA 79-2022 [Section No. 3.3.55]

3.3.56* Grounding Conductor, Equipment (EGC) (Equipment Grounding Conductor) .

The conductive path(s) that provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. [~~70~~ , 400 2023]

A.3.3.56 Grounding Conductor, Equipment (EGC) (Equipment Grounding Conductor).

It is recognized that the equipment grounding conductor also performs bonding. See 250.118 of NFPA 70 for a list of acceptable equipment grounding conductors. [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:53:12 EST 2022

Committee Statement

Committee Statement: The definition is revised for correlation to NFPA 70.

Added annex material.

Corrected per NEC SCR to align with NEC.

Response Message: FR-6-NFPA 79-2022



First Revision No. 90-NFPA 79-2022 [Section No. 3.3.59]

3.3.60* Identified (as applied to equipment).

Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular code ~~or standard~~ requirement. [~~70~~ , 400 2023]

A.3.3.60 Identified (as applied to equipment).

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. [~~70~~ : 400 Informational Note [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 08:07:58 EDT 2022

Committee Statement

Committee Statement: Deleted "or standard" as noted in the editorial comment.

Response Message: FR-90-NFPA 79-2022

**First Revision No. 16-NFPA 79-2022 [Section No. 3.3.60]****3.3.61* Industrial Control Panel.**

An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused ~~disconnect switches~~ disconnecting means , and circuit breakers; (2) control circuit components only, such as pushbuttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel. ~~The industrial control panel does not include the controlled equipment.~~
[70: , 400 2023]

A.3.3.61 Industrial Control Panel.

The industrial control panel does not include the controlled equipment. [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 10:42:46 EST 2022

Committee Statement

Committee Statement: The term "disconnect switches" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79. The reference to NFPA 70:100 has been deleted since the definition has been revised.

Annex material was added to align with NEC.

Response Message: FR-16-NFPA 79-2022

Public Input No. 86-NFPA 79-2022 [Section No. 3.3.60]



First Revision No. 7-NFPA 79-2022 [Section No. 3.3.61]

3.3.74 Machinery, Industrial (Industrial Machine) (Industrial Machinery (Machine).

A power-driven machine (or a group of machines working together in a coordinated manner), not portable by hand while working, that is used to process material by cutting; forming; pressure; electrical, thermal, or optical techniques; lamination; or a combination of these processes. It can include associated equipment used to transfer material or tooling, including fixtures, to assemble/disassemble, to inspect or test, or to package. [The associated electrical equipment, including the logic controller(s) and associated software or logic together with the machine actuators and sensors, are considered as part of the industrial machine.]
[70: , 670.2 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:56:53 EST 2022

Committee Statement

Committee Statement: This definition is revised for correlation to NFPA 70.

Response Message: FR-7-NFPA 79-2022



First Revision No. 8-NFPA 79-2022 [Section No. 3.3.66]

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

~~Where this standard specifies that one equipment shall be "in sight from," "within sight from," or "within sight of," and so forth, of another equipment, the specified equipment is to be~~ Where this code specifies that one equipment shall be "in sight from," "within sight from," or "within sight of" another equipment, the specified equipment shall be visible and not more than 15 m (50 ft) distant from the other. [~~70~~ , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 13:58:35 EST 2022

Committee Statement

Committee Statement: The definition is revised for correlation to NFPA 70.

Response Message: FR-8-NFPA 79-2022



First Revision No. 9-NFPA 79-2022 [Section No. 3.3.71.1]

3.3.71.1 Location, Dry (Dry Location) .

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.
[70: , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 14:06:15 EST 2022

Committee Statement

Committee Statement: The definition has been revised for correlation to NFPA 70.

Response Message: FR-9-NFPA 79-2022



First Revision No. 10-NFPA 79-2022 [Section No. 3.3.71.2]

3.3.71.2 Location, Wet (Wet Location) .

A location that is one or more of the following : Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather . (1) unprotected locations and exposed to weather, (2) subject to saturation with water or other liquids, (3) underground, and (4) in concrete slabs or masonry in direct contact with the earth. [70: , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 14:07:53 EST 2022

Committee Statement

Committee Statement: The definition is revised for correlation to NFPA 70.

Response Message: FR-10-NFPA 79-2022



First Revision No. 11-NFPA 79-2022 [Section No. 3.3.78]

3.3.79 Overcurrent Protective Device, Branch-Circuit (Branch-Circuit Overcurrent Protective Device).

A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes. [~~70~~, 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 14:15:20 EST 2022

Committee Statement

Committee Statement: The definition was revised for correlation with NFPA 70.

Response Message: FR-11-NFPA 79-2022

Public Input No. 106-NFPA 79-2022 [Section No. 3.3.78]



First Revision No. 91-NFPA 79-2022 [Section No. 3.3.80]

3.3.81* Overload.

Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated its ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ~~a~~ ground fault, is not an overload.
[70: , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 08:14:12 EDT 2022

Committee Statement

Committee Statement: Revised to align with NEC and per editorial comment.

Response Message: FR-91-NFPA 79-2022

**First Revision No. 59-NFPA 79-2022 [Section No. 3.3.85]****3.3.86* Raceway.**

An enclosed channel of metal or nonmetallic materials designed expressly for holding wires, conductors, cables, or busbars, with additional functions as permitted in this standard.

~~Raceways include, but are not limited to, rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible conduit, flexible metallic tubing, flexible metal conduit, electrical nonmetallic tubing, electrical metallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, wireways, and busways.~~

A.3.3.86 Raceway.

Raceways include, but are not limited to, rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible conduit, flexible metallic tubing, flexible metal conduit, electrical nonmetallic tubing, electrical metallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, wireways, and busways.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 14:15:36 EST 2022

Committee Statement

Committee Statement: The term “wires” was considered to be used in a colloquial connotation, and was replaced with the term “conductors” to make the terminology technically correct.

The committee notes that the definition of “Raceway” in NFPA 79 is not the same as the definition of “Raceway” in the NEC, and therefore not extracted material. As such, the revision does not create a conflict with the definition of “Raceway” in the NEC.

Response Message: FR-59-NFPA 79-2022

Public Input No. 38-NFPA 79-2021 [Section No. 3.3.85]

**First Revision No. 92-NFPA 79-2022 [Section No. 3.3.86]****3.3.87* Receptacle.**

A contact device installed at the outlet for the connection of an attachment plug, or for the direct connection of electrical utilization equipment designed to mate with the corresponding contact device. A single receptacle is a single contact device with no other contact device on the same yoke or strap. A multiple receptacle is two or more contact devices on the same yoke or strap. [~~70~~, 400 2023]

A.3.3.87 Receptacle.

A duplex receptacle is an example of a multiple receptacle that has two receptacles on the same yoke or strap. [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 08:17:38 EDT 2022

Committee Statement

Committee Statement: Revised to align with NEC and added annex material.

Response Message: FR-92-NFPA 79-2022



First Revision No. 82-NFPA 79-2022 [New Section after 3.3.102]

3.3.100 Short Circuit.

An abnormal connection (including an arc) of relatively low impedance, whether made accidentally or intentionally, between two or more points of different potential. [70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 18:03:17 EST 2022

Committee Statement

Committee Statement: The definition is added from NFPA 70 because the term is used in NFPA 79.

Response Message: FR-82-NFPA 79-2022

Public Input No. 107-NFPA 79-2022 [New Section after 3.3.102]



First Revision No. 17-NFPA 79-2022 [Section No. 3.3.104]

3.3.106 Surge-Protective Device (SPD).

A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions current to the downstream equipment and is designated as follows: Type 1: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect disconnecting means overcurrent device. Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect disconnecting means overcurrent device, including SPDs located at the branch panel. Type 3: Point of utilization SPDs. Type 4: Component SPDs, including discrete components, as well as assemblies. [~~70:~~ 100]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 11:19:39 EST 2022

Committee Statement

Committee Statement: The definition of SPD has deleted the reference to "follow current" and added text to identify the purpose of surge protection devices. Follow current is used and defined in UL 1449 Edition 5 but is does not affect the proper selection of an SPD.

The term "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

The reference to NFPA 70:100 has been deleted since the definition has been revised.

Response Message: FR-17-NFPA 79-2022

[Public Input No. 87-NFPA 79-2022 \[Section No. 3.3.104\]](#)

[Public Input No. 31-NFPA 79-2021 \[Section No. 3.3.104\]](#)



First Revision No. 15-NFPA 79-2022 [Section No. 3.3.106]

3.3.108 System Isolation Equipment.

A redundantly monitored, remotely operated contactor-isolating system, packaged to provide the ~~disconnecting~~ disconnection /isolation function, capable of verifiable operation from multiple remote locations by means of lockout switches, each having the capability of being padlocked in the “off” (open) position. [~~70~~ , 430.2 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 11 11:16:53 EST 2022

Committee Statement

Committee Statement: The definition was revised for correlation to NFPA 70.

Response Message: FR-15-NFPA 79-2022



First Revision No. 12-NFPA 79-2022 [Section No. 3.3.107]

3.3.109 Tap Conductors.

~~As used in this standard, a tap conductor is defined as a conductor~~ A conductor , other than a service conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described elsewhere in this standard. ~~[70: 240-2]~~

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Fri Feb 04 14:18:42 EST 2022

Committee Statement

Committee Statement: Changes were made to correlate with NFPA 70 and extract reference was removed.

Response Message: FR-12-NFPA 79-2022



First Revision No. 93-NFPA 79-2022 [Section No. 3.3.112]

3.3.114 Ventilated.

Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors. [~~70~~ , 400 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 08:23:50 EDT 2022

Committee Statement

Committee Statement: Revised to align with NEC.

Response Message: FR-93-NFPA 79-2022



First Revision No. 60-NFPA 79-2022 [Section No. 3.3.114]

3.3.116 Wireway.

A sheet-metal or flame-retardant nonmetallic trough with hinged or removable covers for housing and protecting ~~electric wires and cable and in which conductors are electrical~~ conductors and cables that are laid in place after the wireway has been installed as a complete system.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 14:28:34 EST 2022

Committee Statement

Committee Statement: The term “wires” was considered to be used in a colloquial connotation, and was replaced with the term “conductors” to make the terminology technically correct. The sentence format and word usage was revised for clarity.

The committee notes that the definition of “Wireway” in NFPA 79 is not the same as the definition of “Wireway” in the NEC and not an extract. As such, the proposed revision does not create a conflict with the definition of “Wireway” in the NEC.

Response Message: FR-60-NFPA 79-2022

[Public Input No. 39-NFPA 79-2021 \[Section No. 3.3.114\]](#)



First Revision No. 18-NFPA 79-2022 [Section No. 5.1.2]

5.1.2 Machine Supply Circuit Conductor Separation.

Each set of machine supply circuit conductors on the line side of the machine supply circuit disconnecting means shall be separated from all other internal conductors, including conductors of other circuits, by either of the following:

- (1) Mounting the machine supply circuit ~~disconnect~~ disconnecting means as near as practicable to the top of the enclosure with dedicated wire bending space as required in 5.1.5
- (2) Mounting the machine supply circuit ~~disconnect~~ disconnecting means other than at the top of the enclosure and by separating the machine supply circuit conductors from other internal conductors with a barrier

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 11:30:18 EST 2022

Committee Statement

Committee Statement: The term "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-18-NFPA 79-2022

[Public Input No. 88-NFPA 79-2022 \[Section No. 5.1.2\]](#)



First Revision No. 61-NFPA 79-2022 [Section No. 5.1.5]

5.1.5 Wire-Bending Space.

The wire-bending space provided between the terminals of a supply circuit disconnecting means or terminals described in 5.1.3 and the wall of the enclosure shall not be less than what is required by 430.10(B) of *NFPA 70*. ~~The wire-bending space shall either be determined by the maximum wire size of the supply circuit conductors or be equal to or larger than the conductors required by 670.4(A) of *NFPA 70* . When the wire-bending space is based on more than one conductor per phase, the intended conductor size and number shall be so identified on interconnection diagrams as required in 17.5.7 .~~

5.1.5.1

The wire-bending space shall either be determined by the maximum ~~wire~~ size of the supply circuit conductors or be equal to or larger than the conductors required by 670.4(A) of *NFPA 70*.

5.1.5.2

When the wire-bending space is based on more than one conductor per phase, the intended conductor size and number shall be so identified on interconnection diagrams as required in 17.5.7

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 14:30:47 EST 2022

Committee Statement

Committee Statement: The use of the term “wire” is unnecessary as the term “conductors” which is the technically correct term as a replacement for “wire”, is used in the same sentence and removing the term “wire” does not affect the intent and interpretation of the requirement.

Response Message: FR-61-NFPA 79-2022

[Public Input No. 40-NFPA 79-2021 \[Section No. 5.1.5\]](#)



First Revision No. 19-NFPA 79-2022 [Section No. 5.1.6]

5.1.6 Protection of Line Side Live Parts.

All live parts on the line side of the machine supply circuit disconnecting means shall be protected from unintentional direct contact by use of ~~insulation or obstacle(s)~~ insulating barriers, covers, or obstacle(s) when the machine supply circuit disconnecting means is in the open (off) position and the enclosure door is open.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 11:32:31 EST 2022

Committee Statement

Committee Statement: “Insulation” has been revised to “insulating barrier, covers or obstacles(s)” as this better reflects methods use to protect live parts on the line side of the machine supply circuit disconnecting means from unintentional direct contact. Insulating tapes are not a suitable means of protection for the live parts on the line side of the machine supply circuit disconnect.

Response Message: FR-19-NFPA 79-2022

[Public Input No. 16-NFPA 79-2021 \[Section No. 5.1.6\]](#)



First Revision No. 20-NFPA 79-2022 [Section No. 5.1.9.3]

5.1.9.3

A machine supply circuit disconnecting means shall be marked as "Machine Supply Circuit Disconnect" if ~~additional disconnecting means are supplied from the supply circuit~~ disconnecting means Disconnecting Means on or adjacent to the device .

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 11:39:55 EST 2022

Committee Statement

Committee Statement: Requiring all machine supply circuit disconnecting means to be identified with a marking will improve safety. The terms "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-20-NFPA 79-2022

[Public Input No. 33-NFPA 79-2021 \[Section No. 5.1.9.3\]](#)

[Public Input No. 89-NFPA 79-2022 \[Section No. 5.1.9.3\]](#)



First Revision No. 21-NFPA 79-2022 [Section No. 5.1.9.4]

5.1.9.4

Where a machine is supplied by more than one supply circuit, a marking shall be installed at each machine supply ~~circuit disconnect~~ circuit disconnecting means location denoting the location of all the other machine supply circuit ~~disconnects~~ disconnecting means .

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 12:27:12 EST 2022

Committee Statement

Committee Statement: The terms "disconnect" and "disconnects" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-21-NFPA 79-2022

[Public Input No. 90-NFPA 79-2022 \[Section No. 5.1.9.4\]](#)



First Revision No. 22-NFPA 79-2022 [Section No. 5.1.10]

5.1.10 Type.

The machine supply circuit disconnecting means shall be one of the following types:

- (1) A listed motor circuit switch rated in horsepower
- (2) A listed general-use switch rated in amperes and horsepower
- (3) A listed molded case circuit breaker
- (4) A listed molded case switch
- (5) An instantaneous trip circuit breaker that is part of a listed combination motor controller limited to single motor applications
- (6) A listed, self-protected combination controller limited to single motor applications
- (7) An attachment plug and receptacle for cord connection

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 12:48:23 EST 2022

Committee Statement

Committee Statement: A listed general-use switch rated in amperes and horsepower was added. This product should be allowed to be used because it is intended to be used as a disconnecting means.

Response Message: FR-22-NFPA 79-2022

[Public Input No. 63-NFPA 79-2021 \[Section No. 5.1.10\]](#)

**First Revision No. 23-NFPA 79-2022 [Section No. 5.1.11.1]****5.1.11.1***

Where the machine supply circuit disconnecting means is one of the types in 5.1.10(1) through 5.1.10(6), it shall fulfill all of the following requirements:

- (1) Disconnect the electrical equipment from the machine supply circuit and have one off (open) and one on (closed) position only. Circuit breakers, instantaneous trip circuit breakers, molded-case switches, and self-protected combination motor controllers are permitted to have a reset (tripped) position between off (open) and on (closed).
- (2) Have an external operating means (e.g., handle) that complies with 5.1.12.
Exception: Power-operated switchgear need not be operable from outside the enclosure where there are other means to open it.
- (3) Be provided with a permanent means permitting it to be locked in the off (open) position only (e.g., by padlocks), independent of the enclosure door or enclosure cover position. When so locked, remote as well as local closing into the on position shall be prevented.
- (4) Simultaneously disconnect all ungrounded conductors of the supply circuit.
- (5) Be operable by qualified persons independent of the enclosure door or enclosure cover position without the use of accessory tools or devices.
- (6) Be rated for the application as follows:
 - (a) With an ampere rating at least 115 percent of the sum of the full-load currents required for all equipment that is in operation at the same time under normal conditions of use, design load, and duty cycle
 - (b) Where rated in horsepower, with a horsepower rating at least equal to that which is defined by Table 430.251(B) of *NFPA 70* for a locked rotor current equal to the largest sum resulting from the locked rotor currents of any combination of motors that can be started simultaneously and the full-load currents of the remaining motor and non-motor loads that can be operated at that time
 - (c) With a voltage rating at least equal to the nominal supply circuit voltage
- (7) Be of a type that indicates whether it is in the off (open) or on (closed) position.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
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Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 12:59:57 EST 2022

Committee Statement

Committee Statement: The wording “design load and duty cycle” was added to be consistent with the nameplate marking requirements in 16.4.

Response FR-23-NFPA 79-2022
Message:

[Public Input No. 126-NFPA 79-2022 \[Section No. 5.1.11.1\]](#)



First Revision No. 24-NFPA 79-2022 [Section No. 5.1.13.2]

5.1.13.2

Excepted circuits shall be provided with all of the following:

- (1) A disconnecting means, isolating transformer, and overcurrent protection mounted in an enclosure adjacent to or within the control enclosure containing the machine supply circuit disconnecting means
- (2) Line side (of the machine supply circuit disconnecting means) supply circuit conductors, when internal to the control enclosure, that are separate from and do not share a raceway with other conductors and that are encased in ~~rigid or flexible conduit~~ a raceway if they are longer than 460 mm (18 in.)

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 13:01:52 EST 2022

Committee Statement

Committee Statement: The word "conduit" is being changed to "raceway" to use a defined term.

The term raceway is defined in Section 3.3.85.

The terms flexible and rigid were removed as unnecessary.

Response Message: FR-24-NFPA 79-2022

Public Input No. 119-NFPA 79-2022 [Section No. 5.1.13.2]

**First Revision No. 25-NFPA 79-2022 [Section No. 5.1.13.4]**[Detail FR-26](#)**5.1.13.4**

Where the excepted circuits are not disconnected by the machine supply circuit disconnecting means, all of the following requirements shall be met:

- (1) A permanent safety sign(s) shall be placed adjacent to the machine supply circuit disconnecting means operating handle(s), indicating that it does not de-energize all the exposed live parts when it is in the open (off) position as in 16.2.4.
- (2) A statement containing the information from 16.2.4 shall be included in the machine documentation.
- (3) A permanent safety sign shall be placed on a nonremovable part inside the control enclosure in proximity to each excepted circuit, ~~or~~ and shall be identified by color as defined in 13.2.4.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 13:46:42 EST 2022

Committee Statement

Committee Statement: The word “means” was added for consistency and to use the term “disconnecting means” defined in NFPA 70 and NFPA 79.

Response Message: FR-25-NFPA 79-2022

[Public Input No. 91-NFPA 79-2022 \[Section No. 5.1.13.4\]](#)

**First Revision No. 80-NFPA 79-2022 [Section No. 5.2.2]****5.2.2***

The following devices shall be permitted to fulfill the function of 5.2.1:

- (1) Devices described in 5.1.10
- (2)* A listed manual motor controller additionally marked "suitable as motor disconnect" and in compliance with UL 508 where located on the load side of the last short-circuit protective device in the branch in a single motor branch circuit where located between the last motor branch-circuit short-circuit and ground-fault protective device and the motor.

A.5.2.2(2)

Listed manual motor controllers additionally marked "suitable as motor disconnect" are permitted as disconnecting means on the line side of the fuses permitted in 7.2.10.1.3 . In this case, the fuses permitted in 7.2.10.1.3 would be considered supplementary fuses and suitable branch-circuit short-circuit and ground-fault protective devices would be installed on the line side of the manual motor controller additionally marked "suitable as motor disconnect."

- (3) System isolation equipment that incorporates control lockout stations and is listed for disconnection purposes where located on the load side of the machine supply circuit disconnecting means and overcurrent protection overcurrent protection and its disconnecting means. The disconnecting means shall be one of the types permitted by 5.1.10(1) through (4).

A.5.2.2

A manual motor controller marked "suitable as motor disconnect" listed to UL 508 or UL 60947-4-1 meets the requirement in 5.2.2(2) . System isolation equipment listed to UL 6420 meets the requirement in 5.2.2(3) .

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR-80_Section_5.2.2_v2.docx	FR-80_Section 5.2.2	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 17:12:35 EST 2022

Committee Statement

Committee Statement: In (2): Added "listed", "additionally marked", and "single motor branch circuit" to clarify that a manual motor controller must be listed and marked "suitable as motor disconnect" and is only suitable as a disconnecting means for a single motor branch circuit. Revised text to clarify the location of the manual motor controller. Added text that suitable motor

branch-circuit short-circuit and ground-fault protective devices must be provided where semiconductors fuses are used to assure proper protection of the manual motor controller. These changes align with similar text in NEC 430.109(A)(6).

In (3): Revised and added text to better align with NEC 430.109(A)(7).

New list item (4) to 5.2.2 has been added for listed general-use switches as an acceptable disconnecting means, provided they are used within their ratings.

A new annex note has been added for 5.2.2 that indicates the appropriate standard for the manual motor controllers and system isolation equipment.

Response FR-80-NFPA 79-2022
Message:

[Public Input No. 25-NFPA 79-2021 \[Section No. 5.2.2\]](#)

[Public Input No. 62-NFPA 79-2021 \[Section No. 5.2.2\]](#)

[Public Input No. 26-NFPA 79-2021 \[New Section after A.5.1.11.2\]](#)



First Revision No. 46-NFPA 79-2022 [Section No. 6.2 [Excluding any Sub-Sections]]

Live parts operating at or ~~above~~ greater than 50 volts rms ac rms or 60 volts dc shall be guarded against contact.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 10:59:52 EST 2022

Committee Statement

Committee Statement: Revisions were made to provide a consistent reference to live parts that are operating at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity. Using “at or greater than” is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

Response Message: FR-46-NFPA 79-2022



First Revision No. 47-NFPA 79-2022 [Section No. 6.2.1]

6.2.1 General.

The basic protection (see 3.3.11) requirements of 6.2.2 or 6.2.3 shall be applied to live parts operating at or ~~above~~ greater than 50 volts ~~rms~~ ac rms or 60 volts dc.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 11:02:39 EST 2022

Committee Statement

Committee Statement: Revisions were made to provide a consistent reference to live parts that are operating at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity. Using “at or greater than” is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

Response Message: FR-47-NFPA 79-2022



First Revision No. 71-NFPA 79-2022 [Section No. 6.2.3.1]

6.2.3.1* Enclosure Access.

Opening an enclosure (e.g., door, lid, cover) that contains live parts operating at or above greater than 50 volts rms ac rms or 60 volts dc shall be permitted only under one or more of the following conditions:

- (1) The use of a key or tool is necessary for access to live parts operating at or above 50 volts rms ac or 60 volts dc. ~~All live parts mounted on the inside of doors or covers that are operating at or above 50 volts rms ac or 60 volts dc shall be protected from unintentional direct contact by the inherent design of components or the application of barriers or obstacles such that a 50 mm (2 in.) sphere cannot contact any live parts. A safety sign shall be provided in accordance with 16.2.4 .~~
- (2) All the live parts mounted on the inside of doors or covers ~~that are operating at or above 50 volts rms ac or 60 volts dc shall be~~ are protected from unintentional direct contact by the inherent design of components or the application of barriers or obstacles such that a 50 mm (2 in.) sphere cannot contact any live parts them . ~~The disconnecting means supplying the enclosure is interlocked with the enclosure door(s) in accordance with 6.2.3.2 .~~
- (3) The disconnecting means supplying the enclosure is interlocked with the enclosure door(s) in accordance with 6.2.3.2. ~~Opening without the use of a key or a tool and without disconnection of live parts shall be permitted only when all live parts inside that are operating at or above 50 volts rms ac or 60 volts dc are separately enclosed or guarded such that there cannot be any contact with live parts. A safety sign shall be provided in accordance with 16.2.4 .~~

6.2.3.1.1

Opening an enclosure without the use of a key or ~~a~~ tool and without ~~disconnection~~ disconnecting of the live parts shall be permitted only when all the live parts inside that are operating at or above greater than 50 volts rms ac rms or 60 volts dc are separately enclosed or guarded ~~such that there cannot be any contact with live parts from direct contact by the inherent design of components or the application of barriers or obstacles such that a 12.5 mm (1/2 in.) jointed test finger, as shown in Figure 6.2.3 , cannot contact them~~ . A safety sign shall be provided in accordance with ~~16.2.4 .~~

6.2.3.1.2

A safety sign shall be provided on eclosures in accordance with 16.2.4.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 16:47:48 EST 2022

Committee Statement

Committee Statement: The committee improved clarity on requirements for protection requirements from live parts where an enclosure can be opened without the use of a key or tool. The public input provided information that was not accepted in (1) but was deemed necessary in (3).

Revisions were made to provide a consistent reference to live parts that are operating

at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity. Using “at or greater than” is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

Response FR-71-NFPA 79-2022
Message:

[Public Input No. 78-NFPA 79-2022 \[Section No. 6.2.3.1\]](#)



First Revision No. 48-NFPA 79-2022 [Section No. 6.2.3.3]

6.2.3.3 Excepted Circuits.

All parts operating at or ~~above~~ greater than 50 volts ~~rms~~ ac rms or 60 volts dc that are still energized after switching off the machine supply circuit disconnecting means (see 5.1.13) shall be protected from unintentional contact by the inherent design of components or the application of barriers or obstacles such that a 50 mm (2 in.) sphere cannot contact any live parts.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 11:21:00 EST 2022

Committee Statement

Committee Statement: Revisions were made to provide a consistent reference to live parts that are operating at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity. Using “at or greater than” is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

Response Message: FR-48-NFPA 79-2022

**First Revision No. 72-NFPA 79-2022 [Section No. 7.2.4.2]****7.2.4.2 Control Circuit Conductor Protection.****7.2.4.2.1**

Control circuit conductors, other than flexible cords and fixture wires, shall be protected against overcurrent in accordance with their ampacities as specified in Section 12.5, unless otherwise permitted in 7.2.4.2.2 through 7.2.4.2.6.

7.2.4.2.2

~~Control circuit conductors sizes of 18, 16, and 14 AWG shall be considered as protected by an overcurrent device(s) of not more than a 20-ampere rating.~~

7.2.4.2.2

Control circuit conductors that are tapped from the load side of a motor branch-circuit short-circuit and ground-fault protective device(s), that function to control the motor(s) connected to that branch circuit, and that do not extend beyond the control cabinet enclosure shall be considered protected by the load motor branch-circuit short-circuit and ground-fault protective device(s) where the rating of the protective device(s) is not more than 400 percent of the ampacity of the control circuit conductor for conductors 14 AWG and larger, or not more than 25 amperes for 18 AWG conductors and 40 amperes for 16 AWG conductors .

7.2.4.2.3

Control circuit conductors of 14 AWG and larger that are tapped from the load side of a motor branch-circuit short-circuit and ground-fault protective device(s), that function to control the motor(s) connected to that branch circuit, and that extend beyond the enclosure shall be considered protected by the load motor branch-circuit short-circuit and ground-fault protective device(s) where the rating of the protective device(s) is not more than 300 percent of the ampacity of the control circuit conductors.

7.2.4.2.4

Control circuit conductors supplied by the secondary side of a single-phase transformer having a 2-wire (single-voltage) secondary shall be considered protected by overcurrent protection provided on the primary (supply) side of the transformer, if this protection is in accordance with 7.2.7 and does not exceed the value determined by multiplying the secondary conductor ampacity by the secondary-to-primary voltage ratio. ~~Transformer secondary conductors (other than 2-wire) shall not be considered to be protected by the primary overcurrent protective device.~~

7.2.4.2.5

Transformer secondary conductors (other than 2-wire) shall not be considered to be protected by the primary overcurrent protective device.

7.2.4.2.6

Control circuits conductors that are tapped from the load side of a motor branch-circuit short-circuit and ground-fault protective device(s) and that function to control the motor(s) connected to that branch circuit shall be considered protected by the motor branch-circuit short-circuit and ground-fault protective device(s) where the opening of the control circuit would create a hazard (e.g., the control circuit of a magnetic chuck).

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR-72_PI-80_7.2.4.2.docx	FR-72_PI-80	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 18:10:49 EST 2022

Committee Statement

Committee Statement: The FR revises the requirements for control circuit conductors to improve alignment with NEC 430.72.

Response Message: FR-72-NFPA 79-2022

[Public Input No. 80-NFPA 79-2022 \[Section No. 7.2.4.2.2\]](#)



First Revision No. 73-NFPA 79-2022 [Section No. 7.2.10]

7.2.10 Rating and Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Overcurrent Protective Devices.

7.2.10.1*

Each motor controller and its associated wiring shall be protected as an individual branch circuit by a motor branch-circuit short-circuit and ground-fault protective device (SCPD) as specified by the controller manufacturer. The maximum rating of the designated SCPD shall be as shown in Table 7.2.10.1 or in accordance with 7.2.10.1 through 7.2.10.5.

Exception No. 1: Table 7.2.10.1 shall not apply to Design B energy efficient motor circuits. The provisions of NFPA 70 shall be observed for Design B energy efficient motor circuits.

Exception No. 2: Where the controller is an adjustable speed power conversion equipment drive that is listed and marked "Suitable for Output Motor Conductor Protection," the maximum rating of the designated SCPD motor branch-circuit short-circuit and ground-fault protective device shall be permitted to be determined by replacing the full-load current in Table 7.2.10.1 with the drive's power conversion equipment's rated input current. The SCPD selected rating shall not exceed the rating marked on the adjustable speed drive or in the manufacturer's instructions.

Table 7.2.10.1 Maximum Rating or Setting of Fuse and Circuit Breakers: Motor, Motor Branch-Circuit Short-Circuit, and Motor-Controller Ground-Fault Protective Devices

<u>Fuse Class with Non-Time Delay</u>	<u>Full-Load Current (%)</u>		
	<u>AC-2</u>	<u>AC-3</u>	<u>AC-4</u>
R	300	300	300
CF or J	300	300	300
CC	300	300	300
T	300	300	300
<u>Fuse Class with Time Delay^b</u>	<u>Type of Application^a</u>		
	<u>AC-2</u>	<u>AC-3</u>	<u>AC-4</u>
RK-5 ^c	150	175	175
RK-1	150	175	175
CF or J	150	175	225
CC	150	300	300
Instantaneous trip circuit breaker ^d	800	800	800
Inverse <u>trip time</u> circuit breaker ^e	150	250	250

Note: Where the values determined by this table do not correspond to the standard sizes or ratings, the next higher standard size, rating, or possible setting shall be permitted. Where a non-adjustable inverse time circuit breaker is used and the next higher standard ampere rating is less than 15 amperes, an ampere rating of 15 amperes shall be permitted.

^a Types of starting duty are as follows:

(1) AC-2: All light-starting duty motors, including slip-ring motors; starting, switching off

(2) AC-3: All medium starting duty motors including squirrel-cage motors; starting, switching off while running, occasional inching, jogging, or plugging but not to exceed 5 operations per minute or 10 operations per 10 minutes and all wye-delta and two-step autotransformer starting motors

(3) AC-4: All heavy starting duty motors including squirrel-cage motors; starting, plugging, inching, jogging

^b Where the rating of a time-delay fuse (other than CC type) specified by the table is not sufficient for the starting of the motor, it shall be permitted to be increased but shall in no case be permitted to exceed 225 percent. The rating of a time-delay Class CC fuse and non-time-delay Class CC, J, CF, or T fuse shall be permitted to be increased but shall in no case exceed 400 percent of the full-load current.

^cUnless a motor controller is listed for use with RK-5 fuses, Class RK-5 fuses shall be used only with NEMA-rated motor controllers.

^dInstantaneous trip circuit breakers shall be permitted to be used only if they comply with all of the following:

(1) They are adjustable.

(2) Part of the combination controller has motor-running protection, short-circuit protection, and ground-fault protection in each conductor.

(3) The combination is especially identified for use.

(4) It is installed per any instructions included in its listing or labeling.

(5) They are limited to single motor applications; circuit breakers with adjustable trip settings are to be set at the controller manufacturer's recommendation, but not greater than 1300 percent of the motor full-load current.

^eWhere the rating of an inverse time circuit breaker specified in this table is not sufficient for the starting current of the motor, it shall be permitted to be increased but in no case exceed 400 percent for full-load currents of 100 amperes or less or 300 percent for full-load currents greater than 100 amperes.

7.2.10.1.1

A listed self-protected combination controller shall be permitted in lieu of the devices specified in Table 7.2.10.1 for branch-circuit short-circuit ground fault and overload protection of a single motor circuit.

7.2.10.1.2

Where a listed self-protected combination controller has an adjustable, instantaneous trip setting, the setting shall not exceed 1300 percent of full-load motor current for other than Design B energy efficient motors and not more than 1700 percent of full-load motor current for Design B energy efficient motors.

7.2.10.1.3

Semiconductor fuses intended for the protection of electronic devices shall be permitted in lieu of the devices specified in Table 7.2.10.1 for power electronic devices, associated electromechanical devices (such as bypass contactors and isolation contactors), and conductors in a solid-state motor controller system, if the marking for replacement fuses is provided adjacent to the fuses.

7.2.10.1.4

Circuits containing power conversion equipment shall be protected by a motor branch-circuit short-circuit and ground-fault protective device selected in accordance with 7.2.10.1, 7.2.10.1.1, 7.2.10.1.3, or 19.1.1.

7.2.10.1.5

If maximum ratings are stipulated for specific device types in the manufacturer's instructions for the power conversion equipment or are otherwise marked on the equipment, they shall not be exceeded even if higher values are permitted by 7.2.10.1.

7.2.10.1.6

A self-protected combination motor controller, semiconductor fuses or an instantaneous trip circuit breaker shall only be permitted if specifically identified in the manufacturer's instructions for the power conversion equipment or if otherwise marked on the equipment.

7.2.10.1.7

If an instantaneous-trip circuit breaker or semiconductor fuses are permitted in accordance with the power conversion equipment manufacturer's instructions for use as the motor branch-circuit short-circuit and ground-fault protective device for listed power conversion equipment, they shall be provided as an integral part of a single listed assembly incorporating both the protective device and power conversion equipment.

7.2.10.1.8

Motor branch-circuit short-circuit and ground-fault protection shall also be provided for a bypass circuit/device(s).

7.2.10.1.9

Where a single motor branch-circuit short-circuit and ground-fault protective device is provided for circuits containing both power conversion equipment and a bypass circuit, the motor branch-circuit short-circuit and ground-fault protective device type and its rating or setting shall be in accordance with those determined for the power conversion equipment and for the bypass circuit/device(s) equipment.

7.2.10.2

Several motors, each not exceeding 1 hp in rating, shall be permitted on a nominal 120-volt branch circuit protected at not over 20 amperes or a 1000-volt nominal or less branch circuit, protected at not over 15 amperes, where all of the following conditions are met:

- (1) The full-load rating of each motor does not exceed 6 amperes.
- (2) The rating of the motor branch-circuit short-circuit and ground-fault protective device marked on any of the controllers is not exceeded. The motor branch-circuit short-circuit and ground-fault protection protective device ~~is provided by~~ a single inverse time circuit breaker or single set of fuses.
- (3) Individual overload protection conforms to Section 7.3.

7.2.10.3

Where the motor branch-circuit short-circuit and ground-fault protective device is selected not to exceed that allowed by 7.2.10.1 for the smallest rated motor, two or more motors or one or more motors and other loads, with each motor having individual overload protection, shall be permitted to be connected to a branch circuit where it can be determined that the motor branch-circuit short-circuit and ground-fault protective device will not open under severe normal conditions of service that might be encountered. ~~The short-circuit and ground-fault protection shall be provided by a single inverse time circuit breaker or single set of fuses.~~

7.2.10.3.1

The motor branch-circuit short-circuit and ground-fault protection protective device shall be ~~provided by~~ a single inverse time circuit breaker or single set of fuses.

7.2.10.4

Two or more motors, or one or more motors and other loads, and their control equipment shall be permitted to be connected to a single branch circuit where the motor branch-circuit short-circuit and ground-fault protection protective device is provided by a single inverse time circuit breaker or a single set of fuses, provided the following conditions under 7.2.10.4(1) and either 7.2.10.4(2) or 7.2.10.4(3) are met:

- (1) Each motor controller and overload device is either listed for group installation with specified maximum branch-circuit protection or selected such that the ampere rating of the motor branch short-circuit and ground-fault protective device does not exceed that permitted by 7.2.10.1 for that individual motor controller or overload device and corresponding motor load.
- (2) The rating or setting of the motor branch-circuit short-circuit and ground-fault protection protective device does not exceed the values in Table 7.2.10.4 for the smallest conductor in the circuit.

Exception: Where a controller is ~~an adjustable speed drive power conversion equipment~~ that is listed and marked "Suitable for Output Motor Conductor Protection," the conductors from the ~~drive power conversion equipment~~ to the motor shall not be required to be used when determining the smallest conductor in the circuit. The conductors from the drive to the motor shall have an ampacity in accordance with Sections 12.5 and 12.6.

- (3) The rating or setting of the motor branch-circuit short-circuit and ground-fault protection protective device does not exceed the value specified in 7.2.10.1 for the highest rated motor connected to the branch circuit plus an amount equal to the sum of the full-load current ratings of all other motors and the ratings of other loads connected to the circuit. ~~Where this calculation results in a rating less than the ampacity of the branch circuit conductors, it shall be permitted to increase the maximum rating of the fuses or circuit breaker to a value not exceeding that permitted by Sections 12.5 and 12.6. Overcurrent protection for loads other than motor loads shall be in accordance with 7.2.3, 7.2.4, and 7.2.11. Where 16 AWG or 18 AWG conductors are used for branch circuit conductors or tap conductors under 7.2.10.5, the rating and type of the branch short-circuit and ground-fault protection shall be in accordance with 12.6.1.~~
 - (a) Where this calculation results in a rating less than the ampacity of the branch circuit conductors, it shall be permitted to increase the maximum rating of the fuses or circuit breaker to a value not exceeding that permitted by Sections 12.5 and 12.6.
 - (b) Overcurrent protection for loads other than motor loads shall be in accordance with 7.2.3, 7.2.4, and 7.2.11.
 - (c) Where 16 AWG or 18 AWG conductors are used for branch circuit conductors or tap conductors under 7.2.10.5, the rating and type of the motor branch-circuit branch short-circuit and ground-fault protection protective device shall be in accordance with 12.6.1

Table 7.2.10.4 Relationship Between Conductor Size and Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protective Device for Power Circuits Group Installations

<u>Conductor Size</u> (AWG)	<u>Maximum Rating</u>
	<u>Fuse or Inverse Time^a *</u>
	<u>Circuit Breaker</u> (amperes)
18	See footnote.
16	See footnote.
14	60
12	80
10	100

<u>Conductor Size</u> (<u>AWG</u>)	<u>Maximum Rating</u> <u>Fuse or Inverse Time^a *</u> <u>Circuit Breaker</u> (<u>amperes</u>)
8	150
6	200
4	250
3	300
2	350
1	400
0	500
2/0	600
3/0	700
4/0	800

^a *~~Maximum~~ The maximum ratings and type types of motor branch-circuit short-circuit and ground-fault protective devices for 16 AWG and 18 AWG shall be determined in accordance with ~~42.6.4~~ 12.6.1.1 and 12.6.1.2 .

7.2.10.5

For group installations described in 7.2.10.4(3), the conductors of any tap supplying a single motor shall not be required to have an individual motor branch-circuit short-circuit and ground-fault protective device, provided they comply with one of the following:

- (1) No conductor to the motor shall have an ampacity less than that of the branch-circuit conductors.
- (2) No conductor to the motor shall have an ampacity less than one-third that of the branch-circuit conductors, with a minimum in accordance with Sections 12.5 and 12.6, the conductors to the motor overload device being not more than 7.5 m (25 ft) long and being suitably protected from physical damage in accordance with Chapter 13.
- (3) Conductors from the point of the tap from the branch-circuit to a listed manual motor controller additionally marked "Suitable for Tap Conductor Protection in Group Installations" or to a branch-circuit overcurrent protective device shall be permitted to have an ampacity not less than 1/10 the rating or setting of the motor branch-circuit short-circuit and ground-fault protective device. ~~The conductors from the controller to the motor shall have an ampacity in accordance with Sections 12.5 and 12.6 .The conductors from the point of the tap to the controller shall (1) be enclosed either by an enclosed controller or by a raceway and be not more than 3 m (10 ft) long or (2) have an ampacity not less than that of the branch-circuit conductors.~~
 - (a) The conductors from the controller to the motor shall have an ampacity in accordance with Sections 12.5 and 12.6.
 - (b) The conductors from the point of the tap to the controller shall meet one of the following: -
 - i. ~~(1) be Be~~ enclosed either by an enclosed controller or by a raceway and be not more than 3 m (10 ft) long or
 - ii. ~~(2) have Have~~ an ampacity not less than that of the branch-circuit conductors

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR-73_Section_7.2.10_v2.docx	FR-73 Section 7.2.10 v2	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 09:45:59 EST 2022

Committee Statement

Committee Statement: The revised text standardizes on use of “motor branch-circuit short-circuit and ground-fault protective device” throughout section to be consistent with other sections and NFPA 70 and deleted use of the acronym SCPD. The requirements for selecting protection for power conversion equipment (including use of semiconductor fuses) have been added and the use of the term “adjustable speed drive” with “power conversion equipment” used for consistency.

The FR also establishes that 15A will continue to be permitted for the minimum size inverse time circuit breaker to address the concern regarding the change to 10A in the NEC as a standard size.

The changes also standardizes on the use of the term “inverse time circuit breaker” rather than “inverse trip circuit breaker”. It also adds a reference to 19.1.1 in 7.2.10.4 which addresses servo drive systems which also fall under power conversion equipment.

Response Message: FR-73-NFPA 79-2022

[Public Input No. 108-NFPA 79-2022 \[New Section after 7.2.10.1.2\]](#)

[Public Input No. 109-NFPA 79-2022 \[New Section after 7.2.10.1.2\]](#)

[Public Input No. 124-NFPA 79-2022 \[Section No. 7.2.10.1\]](#)

[Public Input No. 61-NFPA 79-2021 \[Section No. 7.2.10.5\]](#)

[Public Input No. 28-NFPA 79-2021 \[New Section after 7.2.10.1.2\]](#)

[Public Input No. 59-NFPA 79-2021 \[Section No. 7.2.10.3\]](#)

[Public Input No. 58-NFPA 79-2021 \[Section No. 7.2.10.2\]](#)

[Public Input No. 60-NFPA 79-2021 \[Section No. 7.2.10.4\]](#)



First Revision No. 74-NFPA 79-2022 [Section No. 7.8.1]

7.8.1* Surge-Protective Devices (SPDs).

Industrial machinery with safety circuits ~~not effectively protected from~~ shall have SPD(s) to protect against the effects of overvoltages due to lightning hazardous transients or switching surges. shall have surge protection installed The type of SPD(s) shall be selected to protect, at a minimum, the safety circuit devices and shall be permitted to be integral to secondary derived voltage sources .

Exception: SPD(s) shall not be required where the risks associated with the effects of overvoltages are mitigated such that the safety performance determined by a risk assessment is met.

7.8.1.1

The type of SPD(s) shall be selected to protect, at a minimum, the safety circuit devices.

7.8.1.2

The type of SPD(s) shall be permitted to be integral to secondary derived voltage sources.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 09:59:18 EST 2022

Committee Statement

Committee Statement: The requirements have been revised to clarify that appropriate surge protection shall be provided to protect, at a minimum, the safety circuit devices in industrial machinery.

Response Message: FR-74-NFPA 79-2022

[Public Input No. 77-NFPA 79-2021 \[Section No. 7.8.1\]](#)

[Public Input No. 76-NFPA 79-2021 \[Section No. 7.8.1\]](#)



First Revision No. 28-NFPA 79-2022 [Section No. 7.8.3.1]

7.8.3.1 Type 1 SPD.

Where the SPD is located on the line side of the service ~~disconnect~~ disconnecting means overcurrent protection, a Type 1 SPD shall be provided, _

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:10:35 EST 2022

Committee Statement

Committee Statement: The term "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-28-NFPA 79-2022

[Public Input No. 92-NFPA 79-2022 \[Section No. 7.8.3.1\]](#)



First Revision No. 29-NFPA 79-2022 [Section No. 7.8.3.2]

7.8.3.2 Type 2 SPD.

Where the SPD is located on the load side of the service disconnect overcurrent protection, feeder circuit, or separately derived system, a Type 1 or Type 2 SPD shall be provided. Where Type 2 SPDs are provided, the SPD shall be on the load side of an overcurrent protective device.

7.8.3.2.1

Where the SPD is located on the load side of the service disconnect disconnecting means overcurrent protection, feeder circuit, or separately derived system, a Type 1 or Type 2 SPD shall be provided.

7.8.3.2.2

Where Type 2 SPDs are provided, the SPD shall be on the load side of an overcurrent protective device.

Submitter Information Verification

Committee: EEI-AAA

Submission Date: Mon Feb 28 15:11:35 EST 2022

Committee Statement

Committee Statement: The term "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-29-NFPA 79-2022

[Public Input No. 93-NFPA 79-2022 \[Section No. 7.8.3.2\]](#)



First Revision No. 30-NFPA 79-2022 [Section No. 7.8.3.3]

7.8.3.3 Type 3 SPD.

Where the SPD is located on the load side of the branch-circuit overcurrent protective device, a Type 1, Type 2, or Type 3 SPD shall be provided. Where Type 3 SPDs are provided and where included in the manufacturer's instructions, the Type 3 SPD connection shall be a minimum of 10 m (30 ft) of conductor distance from the service or separately derived system disconnect.

7.8.3.3.1

Where the SPD is located on the load side of the branch-circuit overcurrent protective device, a Type 1, Type 2, or Type 3 SPD shall be provided.

7.8.3.3.2

Where Type 3 SPDs are provided and where included in the manufacturer's instructions, the Type 3 SPD connection shall be a minimum of 10 m (30 33 ft) of conductor distance from the service or separately derived system ~~disconnect~~ disconnecting means .

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:13:18 EST 2022

Committee Statement

Committee Statement: The dimension of 30 ft to 33 ft for 10 m was made to use a correct value. An approximate conversion is appropriate in this case.

The terms "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-30-NFPA 79-2022

[Public Input No. 35-NFPA 79-2021 \[Section No. 7.8.3.3\]](#)

[Public Input No. 94-NFPA 79-2022 \[Section No. 7.8.3.3\]](#)



First Revision No. 77-NFPA 79-2022 [New Section after 8.2.1.2.3]

8.2.1.2.4

Electrical equipment that is internal to an industrial control panel, secured in accordance with 11.2.1.5 , and in electrical contact with a metal mounting panel, rack, or structure provided for its support shall be considered connected to an equipment grounding conductor if the metal mounting panel, rack, or structure is connected to a wire-type equipment grounding conductor.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 12:42:50 EST 2022

Committee Statement

Committee Statement: NFPA 79, Chapter 8 does not specifically address the bonding and grounding of electrical equipment when secured to a metallic mounting surface.

The proposed new Section 8.2.1.2.4 is intended to clarify that non-current-carrying metallic parts of electrical components internal to an industrial control panel are grounded when such parts are bonded to a metallic mounting panel, rack or structure if the metallic mounting panel, rack or structure itself is connected to an equipment grounding conductor.

The proposed text is based on 250.136 of NFPA 70

Response Message: FR-77-NFPA 79-2022

Public Input No. 57-NFPA 79-2021 [New Section after 8.2.1.2.3]



First Revision No. 78-NFPA 79-2022 [Section No. 8.2.1.3.4]

8.2.1.3.4

Where an auxiliary grounding electrode is specified by the industrial machinery manufacturer or provider, a an equipment grounding terminal shall accommodate this additional grounding electrode conductor.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 12:44:15 EST 2022

Committee Statement

Committee Statement: The added wording clarifies that if an auxiliary electrode is specified by the manufacturer, the terminal that is provided must be electrically connected to the equipment grounding or bonding terminations in the machine.

Response Message: FR-78-NFPA 79-2022

Public Input No. 14-NFPA 79-2021 [Section No. 8.2.1.3.4]

**First Revision No. 62-NFPA 79-2022 [Section No. 8.2.2.4]****8.2.2.4**

Equipment grounding conductors and bonding jumpers ~~of the wire type~~ shall not be smaller than is shown in Table 8.2.2.4, but shall not be required to be larger than the circuit conductors supplying the equipment.

Table 8.2.2.4 Minimum Size of Equipment Grounding Conductors and Bonding Jumpers

<u>Rating or Setting of Automatic Overcurrent Device in Circuit</u> <u>Ahead of the Equipment</u> <u>(Not Exceeding Amperes)</u>	<u>Copper Conductor</u> <u>Size</u> <u>(AWG or kcmil)</u>
10	16
15	14
20	12
30	10
40	10
60	10
100	8
200	6
300	4
400	3
500	2
600	1
800	1/0
1000	2/0
1200	3/0
1600	4/0
2000	250
2500	350
3000	400
4000	500
5000	700
6000	800

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 14:33:49 EST 2022

Committee Statement

Committee Statement: The use of the phrase “of the wire type” is unnecessary as the term “conductors” which is the technically correct term as a replacement for “wire”, is used in the same sentence and removing the phrase “of the wire type” does not affect the intent and

interpretation of the requirement.

Response FR-62-NFPA 79-2022
Message:

[Public Input No. 41-NFPA 79-2021 \[Section No. 8.2.2.4\]](#)



First Revision No. 31-NFPA 79-2022 [Section No. 10.7.3]

10.7.3 Emergency Stop Actuators.

Actuators of emergency stop devices shall be colored RED. The background immediately around pushbuttons and ~~disconnect switch~~ disconnecting means actuators used as emergency stop devices shall be colored YELLOW. The actuator of a pushbutton-operated device shall be of the palm or mushroom-head type and shall effect an emergency stop when depressed. The RED/YELLOW color combination shall be reserved exclusively for emergency stop applications.

Exception: The RED/YELLOW color combination shall be permitted for emergency stop actuators in accordance with 10.8.4.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:21:02 EST 2022

Committee Statement

Committee Statement: The term "disconnect switch" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-31-NFPA 79-2022

Public Input No. 95-NFPA 79-2022 [Section No. 10.7.3]



First Revision No. 32-NFPA 79-2022 [Section No. 10.7.4.3]

10.7.4.3

Disconnecting ~~(isolating) electrical devices~~ means as described in 5.2.2, where accessible to the operator, shall also be permitted to serve the function of emergency stop.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:39:56 EST 2022

Committee Statement

Committee Statement: The term "disconnecting" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

"(isolating) electrical devices" was deleted as this is not a defined term in the NEC or NFPA 79

Response Message: FR-32-NFPA 79-2022

[Public Input No. 96-NFPA 79-2022 \[Section No. 10.7.4.3\]](#)



First Revision No. 42-NFPA 79-2022 [Section No. 11.1.4]

11.1.4

Any door(s) that permits access to live parts operating at or greater than 50 volts ac (rms value) or 60 volts dc ~~or more~~ shall comply with 6.2.3.2 or 6.2.3.1.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 17:04:00 EST 2022

Committee Statement

Committee Statement: Revisions were made to provide a consistent reference to live parts that are operating at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity.

Using "at or greater than" is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

Response Message: FR-42-NFPA 79-2022

[Public Input No. 19-NFPA 79-2021 \[Section No. 11.1.4\]](#)



First Revision No. 43-NFPA 79-2022 [Section No. 11.2.1.3]

11.2.1.3 Air Space and Barriers.

~~Exposed, nonarcing, bare, live parts operating at 50 volts ac (rms value) or 60 volts dc or more within an enclosure or compartment shall have an air space of not less than 13 mm (1/2 in.) between them and the uninsulated walls of the enclosure or compartment, including conduit fittings. The air space for uninsulated doors of the enclosure shall be not less than 25 mm (1 in.). Where barriers between metal enclosures or compartments and arcing parts are required, they shall be of flame-retardant, noncarbonizing insulating materials.~~

11.2.1.3.1

Exposed, nonarcing, bare, live parts operating at or greater than 50 volts ac rms (~~rms value~~) or 60 volts dc ~~or more~~ within an enclosure or compartment shall have an air space of not less than 13 mm (1/2 in.) between them and the uninsulated walls of the enclosure or compartment, including conduit fittings.

11.2.1.3.2

The air space for uninsulated doors of the an enclosure shall be not less than 25 mm (1 in.).

11.2.1.3.3

Where barriers between metal enclosures or compartments and arcing parts are required, they shall be of flame-retardant, noncarbonizing insulating materials.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 17:42:05 EST 2022

Committee Statement

Committee Statement: Revisions were made to provide a consistent reference to live parts that are operating at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity. Using “at or greater than” is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

Response Message: FR-43-NFPA 79-2022

Public Input No. 20-NFPA 79-2021 [Section No. 11.2.1.3]



First Revision No. 44-NFPA 79-2022 [Section No. 11.5.1.1]

11.5.1.1

The depth of the working space in the direction of access to live parts shall not be less than is indicated in Table 11.5.1.1. Distances shall be measured from the control cabinet or compartment front or opening.

Table 11.5.1.1 Working Space Depth

<u>Nominal Voltage to Ground</u>	<u>Minimum Clear Distance</u>		
	<u>Condition 1</u>	<u>Condition 2</u>	<u>Condition 3</u>
0–150	900 915 mm (3 ft)	900 915 mm (3 ft)	900 915 mm (3 ft)
151–600	900 915 mm (3 ft)	1.0 m 1067 mm (3½ ft)	1.2 m 1220 mm (4 ft)
601–1000	900 915 mm (3 ft)	1.2 1220 mm m (4 ft)	1.5 m 1524 mm (5 ft)

Note: Where the conditions are as follows:

Condition 1 — Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by insulating materials. Insulated ~~wire~~ conductors or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.

Condition 2 — Exposed live parts on one side and a grounded surface on the other side. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the working space (not guarded as provided in Condition 1) with the operator between.

Exception No. 1: Working space shall not be required in the back or sides of control cabinets or compartments, where there are no renewable or adjustable parts on the back or sides and where all the connections are accessible from locations other than the back or sides. Where rear access is required to work on de-energized parts on the back of the enclosed control cabinet and compartment, a minimum working space of 762 mm (2½ ft) horizontally shall be provided.

Exception No. 2: By special permission, working space clearance depth of 762 mm (2½ ft) or less shall be permitted where all uninsulated parts are at ~~a voltage no~~ not greater than 50 volts ~~rms~~ ac rms or 60 volts dc.

Exception No. 3: Condition 2 working clearance depth shall be permitted between control cabinets or compartments located across the aisle from each other or across from non-machinery-associated switchgear, panelboards, or motor control centers where the conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit the affected equipment doors on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

Exception No. 4: Condition 1 working clearance depth shall be permitted between control cabinets or compartments located across the aisle from each other, or across from a grounded surface, where all the associated control cabinet or compartment devices and equipment operating at or greater than 50 volts ~~rms~~ ac rms or 60 volts dc are separately enclosed, guarded, or constructed so that openings to live parts of the devices and equipment will not permit the entry of a 12.5 mm (0.5 in.) diameter rod.

Exception No. 5: By special permission, the minimum working space clearance depth of 762 mm (2½ ft) shall be permitted where all of the following conditions are met:

- (1) *The control cabinet or compartment is operating at not over 150 volts line-to-line or line-to-ground.*
- (2) *The conditions of maintenance and supervision ensure that only qualified persons will service the installation.*
- (3) *The control cabinet and compartment require a tool to open.*

- (4) ~~Where only~~ Only diagnostic troubleshooting and testing on live parts are involved.
- (5) The door(s) of the control cabinet and compartment open at least 90 degrees or are removable.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 17:46:52 EST 2022

Committee Statement

Committee Statement: Revisions were made to provide a consistent reference to live parts that are operating at or greater than 50 volts ac rms or 60 volts dc throughout the Standard which adds clarity. Using “at or greater than” is consistent with other electrical documents such as NFPA 70, the National Electrical Code.

The term “wire” was considered to be used in a colloquial connotation and was replaced with the term “conductor(s)” to make the terminology technically correct.

The metric measurements in the Table were revised to soft conversions as using hard conversions may have had a negative impact on safety. No matter which measurement is used, the distance should be the same.

The unit millimeter was selected for consistency across the table. The value more precisely reflects the value of inch-pound requirements. When necessary the value was rounded up to above the inch-pound requirements because the table contains minimum clear distances.

Response Message: FR-44-NFPA 79-2022

[Public Input No. 43-NFPA 79-2021 \[Section No. 11.5.1.1\]](#)

[Public Input No. 21-NFPA 79-2021 \[Section No. 11.5.1.1\]](#)



First Revision No. 63-NFPA 79-2022 [Section No. 12.6.1.1]

12.6.1.1

16 AWG shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord, or part of individual conductors used in a cabinet or enclosure, under the following conditions:

- (1) ~~Non-motor~~ In non-motor power circuits of 8 amperes or less, provided all the following conditions are met:
 - (a) ~~Circuit~~ The circuit is protected in accordance with Chapter 7.
 - (b) Overcurrent protection does not exceed 10 amperes.
 - (c) Overcurrent protection is provided by one of the following:
 - i. A listed molded-case circuit breaker marked for use with 16 AWG wire conductors
 - ii. Listed fuses marked for use with 16 AWG wire conductors
 - iii. Class CC, Class J, Class CF, or Class T fuses
- (2) ~~Motor~~ In motor power circuits supplying a motor having a full-load current rating of 8 amperes or less, provided all the following conditions are met:
 - (a) ~~Circuit~~ The circuit is protected in accordance with Chapter 7.
 - (b) ~~Circuit~~ The circuit is provided with Class 10 overload protection.
 - (c) Overcurrent protection is provided by one of the following:
 - i. A listed molded-case circuit breaker marked for use with 16 AWG wire conductors
 - ii. Listed fuses marked for use with 16 AWG wire conductors
 - iii. Class CC, Class J, ~~or~~ Class CF, or Class T fuses
- (3) ~~Motor~~ In motor power circuits supplying a motor having a full-load current rating of 5.5 amperes or less, provided all the following conditions are met:
 - (a) ~~Circuit~~ The circuit is protected in accordance with Chapter 7.
 - (b) ~~Circuit~~ The circuit is provided with Class 20 overload protection.
 - (c) Overcurrent protection is provided by one of the following:
 - i. A listed molded-case circuit breaker marked for use with 16 AWG wire conductors
 - ii. Listed fuses marked for use with 16 AWG wire conductors
 - iii. Class CC, Class J, ~~or~~ Class CF, or Class T fuses

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
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Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 15:13:02 EST 2022

Committee Statement

Committee Statement: The term“ wire” was considered to be used in a colloquial connotation, and was replaced with the term “conductors” to make the terminology technically correct.

Response Message: FR-63-NFPA 79-2022

[Public Input No. 46-NFPA 79-2021 \[Section No. 12.6.1.1\]](#)



First Revision No. 64-NFPA 79-2022 [Section No. 12.6.1.2]

12.6.1.2

18 AWG shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord, or part of individual conductors used in a cabinet or enclosure, under the following conditions:

- (1) ~~Non-motor~~ In non-motor power circuits of 5.6 amperes or less, provided all the following conditions are met:
 - (a) ~~Circuit~~ The circuit is protected in accordance with Chapter 7.
 - (b) Overcurrent protection does not exceed 7 amperes.
 - (c) Overcurrent protection is provided by one of the following:
 - i. A listed molded-case circuit breaker marked for use with 18 AWG wire conductors
 - ii. Listed fuses marked for use with 18 AWG wire conductors
 - iii. Class CC, Class J, or Class CF, Class T fuses
- (2) ~~Motor power~~ In motor power circuits supplying a motor having a full-load current rating of 5 amperes or less, provided all the following conditions are met:
 - (a) ~~Circuit~~ The circuit is protected in accordance with Chapter 7.
 - (b) ~~Circuit~~ The circuit is provided with Class 10 overload protection.
 - (c) Overcurrent protection is provided by one of the following:
 - i. A listed molded-case circuit breaker marked for use with 18 AWG wire conductors
 - ii. Listed fuses marked for use with 18 AWG wire conductors
 - iii. Class CC, Class J, ~~or~~ Class CF, or Class T fuses
- (3) ~~Motor~~ In motor power circuits supplying a motor having a full-load current rating of 3.5 amperes or less, provided all the following are met:
 - (a) ~~Circuit~~ The circuit is protected in accordance with Chapter 7.
 - (b) ~~Circuit~~ The circuit is provided with Class 20 overload protection.
 - (c) Overcurrent protection is provided by one of the following:
 - i. A listed molded-case circuit breaker marked for use with 18 AWG wire conductors
 - ii. Listed fuses marked for use with 18 AWG wire conductors
 - iii. Class CC, Class J, ~~or~~ Class CF, or Class T fuses

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR-64_PI_56_12.6.1.2_v2.docx	FR-64 Section 12.6.1.2	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 15:20:14 EST 2022

Committee Statement

Committee Statement: The term “wire” was considered to be used in a colloquial connotation, and was replaced with the term “conductors” to make the terminology technically correct.

Response Message: FR-64-NFPA 79-2022

[Public Input No. 56-NFPA 79-2021 \[Section No. 12.6.1.2\]](#)



First Revision No. 76-NFPA 79-2022 [New Section after 12.6.1.3]

12.6.1.4

16 AWG and 18 AWG conductors shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord or part of individual conductors used in a cabinet or enclosure under the following conditions:

- (1) The conductors are supplied by power conversion equipment that is listed and marked "Suitable for Output Motor Conductor Protection."
- (2) The power conversion equipment is marked suitable for protecting the size of the conductor used.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 11:41:50 EST 2022

Committee Statement

Committee Statement: UL 61800-5-1 requirements for listed power conversion equipment marked "Suitable for Output Motor Conductor Protection" will include provisions for protection of 16AWG and 18AWG motor conductors. The proposed text is needed to clarify that use with this equipment is permitted.

Response Message: Only individual conductors are constrained for use in a cabinet or enclosure.
FR-76-NFPA 79-2022

**First Revision No. 65-NFPA 79-2022 [Section No. 12.9.2]****12.9.2**

Appliance wiring material (AWM) shall be permitted under any of the following conditions:

- (1) Where part of an assembly that has been identified for the intended use
- (2) Where the AWM has been identified for use with approved equipment and is used in accordance with the equipment manufacturer's instructions
- (3) Where its construction meets all the applicable requirements of Section 12.2 through Section 12.6 with modifications as follows:
 - (a) Stranded conductors ~~with wire sizes~~ smaller than those listed in 12.2.2 shall have a minimum of seven strands.
 - (b) Conductor insulation and cable jacket materials not specified in 12.3.1 shall have flame-resistant properties in compliance with the applicable standards for their intended use, such as the FT2 (horizontal wire) flame test or the VW-1 (vertical wire) flame test in accordance with UL 1581.
 - (c) Minimum insulation thicknesses for single-conductor AWM shall be as specified in 12.3.2. Minimum insulation thickness for conductors that are part of a multiconductor jacketed AWM cable shall be as specified by the AWM style number and by the marked voltage rating of the cable.
 - (d) AWM shall be marked in accordance with 12.4.1, 12.4.3, and 12.4.4. The legend shall include the manufacturer's name or trademark, AWM style number, voltage rating (unless marking is prohibited by 12.4.2), wire gauge(s), temperature rating, and flame resistance. Additional markings for properties such as oil, water, UV, and chemical resistance identifiers shall be permitted where in compliance with the applicable standards for the intended use. Where markings alone are insufficient to identify for the intended application, suitable information shall be included with the machine technical documentation.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR-65_PI-49_12.9.2_v2.docx	FR-65 Section 12.9.2	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 15:46:40 EST 2022

Committee Statement

Committee Statement: The use of the phrase "with wire sizes" is unnecessary as the term "conductors" which is the technically correct term as a replacement for "wire", is used in the same sentence and removing the phrase "with wire sizes" does not affect the intent and interpretation of the requirement.

Response Message: FR-65-NFPA 79-2022

[Public Input No. 49-NFPA 79-2021 \[Section No. 12.9.2\]](#)



First Revision No. 66-NFPA 79-2022 [Section No. 13.1.2.1]

13.1.2.1*

Conductors and cables shall be run from terminal to terminal without splices or joints. Connections using plug and receptacle combinations with protection against accidental disconnection shall not be considered to be joints for this requirement.

Exception No. 1: Splices shall be permitted to leads attached to electrical equipment, such as motors, solenoids, and solenoids. ~~Such splices shall be insulated with oil-resistant electrical tape or proximity switches. Splicing wire connectors shall be listed, have an insulation equivalent to that of the conductors, and be installed in a suitable enclosure.~~

Exception No. 2: Where it is impracticable to provide terminals in a junction box (e.g., on mobile machines, on machines having long flexible cables), the use of splices or joints shall be permitted.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 15:51:54 EST 2022

Committee Statement

Committee Statement: Proximity switches were added for further clarity as an example of a product having leads that are permitted to be spliced. A requirement for splicing wire connectors to be listed was added to improve the integrity of the connection. The term “oil resistant electrical tape” was deleted as the required electrical tape performance depends on too many variables.

The addition of “permanent” as a type of insulation was not accepted as the term “permanent” is vague and unenforceable.

Response Message: FR-66-NFPA 79-2022

[Public Input No. 68-NFPA 79-2021 \[Section No. 13.1.2.1\]](#)

[Public Input No. 69-NFPA 79-2021 \[Section No. 13.1.2.1\]](#)



First Revision No. 33-NFPA 79-2022 [Section No. 13.1.4]

13.1.4 Equipment Supplied from Separate Supply Circuit Disconnects Disconnecting Means or Two or More Sources of Power.

Where equipment is supplied from two or more sources of power or from two or more independent supply circuit disconnecting means, the power wiring from each supply source or from each supply circuit disconnecting means shall be run in separate raceways and shall not terminate in or pass through common junction boxes.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:48:56 EST 2022

Committee Statement

Committee Statement: The term "disconnects" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-33-NFPA 79-2022

[Public Input No. 97-NFPA 79-2022 \[Section No. 13.1.4\]](#)



First Revision No. 67-NFPA 79-2022 [Section No. 13.1.6.8]

13.1.6.8

Cables subjected to physical damage shall be protected as follows:

- (1) By alternative routing
- (2) With additional guarding or railings
- (3) When supported by flooring or decking, with walk over or drive over cable protective devices
- (4) By installation in a ~~wire way~~ wireway
- (5) By installation in a floor or deck covering trapezoidal walk over raceway specifically designed for cable protection

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 16:06:02 EST 2022

Committee Statement

Committee Statement: "Wire way" is changed to "Wireway" which is the correct term.

Response Message: FR-67-NFPA 79-2022

Public Input No. 47-NFPA 79-2021 [Section No. 13.1.6.8]



First Revision No. 68-NFPA 79-2022 [Section No. 13.2.3.2]

13.2.3.2

The use of other colors for the following applications shall be as follows:

- (1) WHITE with BLUE stripe for grounded (current-carrying) dc circuit conductor
- (2) WHITE with ORANGE stripe for grounded (current-carrying) ac or dc conductor, which remains energized when the main supply circuit disconnecting means is in the off position
- (3) Whichever color stripe is selected, that color stripe shall be consistent with the ungrounded conductor of the excepted circuit described in 5.1.13.

Exception No. 1: Multiconductor cables shall be permitted to be permanently reidentified at the time of installation.

Exception No. 2: Where the identification of machine power and control wiring is such that compliance with the mandatory color codes is too restrictive for specific applications, it shall be permitted to use additional identification at selected locations as an alternative. This means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means and shall be permanently posted on the inside of the main electrical control panel enclosure in a visible location.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 16:29:27 EST 2022

Committee Statement

Committee Statement: The requirement to use the colors WHITE with ORANGE stripe for the grounded (current-carrying) conductor has been clarified that it applies to both AC and DC conductors.

Response Message: FR-68-NFPA 79-2022



First Revision No. 69-NFPA 79-2022 [Section No. 13.2.4.1]

13.2.4.1*

~~The color ORANGE shall be used to identify ungrounded conductors that remain energized when the main supply circuit disconnecting means is in the off position. This color identification shall be strictly reserved for this application only. Ungrounded conductors that remain energized shall be identified with the following:~~

- ~~(1) The color ORANGE shall be used to identify ungrounded ac conductors that remain energized when the main supply circuit disconnecting means is in the off position.~~
- ~~(2) The color ORANGE with BLUE stripe shall be used to identify ungrounded dc conductors that remain energized when the main supply circuit disconnecting means is in the off position. This color identification shall be strictly reserved for this application only.~~

Exception No. 1: Internal wiring on individual devices purchased completely wired

Exception No. 2: Where the insulation used is not available in the colors required (e.g., high temperature insulation, chemically resistant insulation)

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 16:34:33 EST 2022

Committee Statement

Committee Statement: The color orange has been designated to specifically identify ungrounded ac conductors. The color orange with blue stripe has been added to specifically identify ungrounded dc conductors. These changes will allow for identification of the circuit in which a conductor is located, when that conductor is energized with the main supply circuit disconnecting means in the off position.

Response Message: FR-69-NFPA 79-2022

Public Input No. 15-NFPA 79-2021 [Section No. 13.2.4.1]



First Revision No. 34-NFPA 79-2022 [Section No. 14.2]

14.2 Conductors Supplied from Separate Disconnects Disconnecting Means .

Where the equipment has two or more sources of power or two or more independent disconnecting means, power wiring from each disconnecting means shall be run in separate raceways and shall not terminate in or pass through common junction boxes.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:52:49 EST 2022

Committee Statement

Committee Statement: The term "disconnects" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-34-NFPA 79-2022

[Public Input No. 98-NFPA 79-2022 \[Section No. 14.2\]](#)



First Revision No. 35-NFPA 79-2022 [Section No. 15.1.1]

15.1.1 Receptacles for Accessory Equipment.

Where the machine or its associated equipment is provided with receptacle outlets to be used for accessory equipment (e.g., handheld power tools, test equipment), the following conditions shall apply:

- (1) Receptacles mounted externally or internally to the enclosure shall be ground-fault circuit-interrupter (GFCI)— _ protected.
- (2) Receptacles shall be supplied from a grounded 120-volt ac source.
- (3) Receptacles shall be of the parallel blade grounding type, 125-volt, single-phase, 15- or 20-ampere configuration, and listed for the applied voltage.
- (4) Receptacles with their associated attachment plugs (plug/sockets) shall be in accordance with 13.4.5.3.
- (5) The continuity of the equipment grounding circuit to the receptacle outlet shall be verified by Section 18.2.

Exception: Verification is not required for PELV circuits in accordance with Section 18.2.

- (6) All ungrounded (unearthed) conductors connected to the receptacle outlet shall be protected against overcurrent in accordance with the provisions of 7.2.5, and these circuits shall not be connected to other machine circuits.
- (7) Where the power supply to the receptacle outlet is not disconnected by the supply disconnecting ~~device~~ means for the machine or section of the machine, the safety sign requirements of 5.1.13.4 shall apply.
- (8) Receptacles shall be suitable for the environment, and those mounted external to the enclosure and subject to dirt, dust, oil, or other contaminants shall be provided with a means to cover the receptacle when the plug is removed.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:53:54 EST 2022

Committee Statement

Committee Statement: The word “device” was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-35-NFPA 79-2022

[Public Input No. 99-NFPA 79-2022 \[Section No. 15.1.1\]](#)



First Revision No. 36-NFPA 79-2022 [Section No. 15.2.2.2]

15.2.2.2

Lighting circuits shall have overcurrent protection in accordance with 7.2.6 and shall be supplied from one of the following sources:

- (1) A separate isolating transformer connected to the load side of the supply disconnecting means. Overcurrent protection shall be provided in the secondary circuit.
- (2) A separate isolating transformer connected to the line side of the supply disconnecting means. This shall be permitted for the supply of a maintenance lighting circuit in control enclosures only. Overcurrent protection shall be provided in the secondary circuit.
- (3) A grounded machine circuit that has separate overcurrent protection and does not exceed 150 volts to ground ~~shall be permitted~~ .
- (4) An isolating transformer connected to the line side of the supply disconnecting ~~device means~~ where a separate primary disconnecting means and secondary overcurrent protection are provided and mounted either externally immediately adjacent to the control enclosure or within the control enclosure adjacent to the supply disconnecting ~~device means~~ .
- (5) An externally supplied lighting circuit (e.g., factory lighting supply). This shall be permitted in control enclosures ~~and for the machine work light(s) where the total power rating does not exceed 3 kW with proper overcurrent protection~~ .

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:55:51 EST 2022

Committee Statement

Committee Statement: In (2) The word "This" is added in (2) for clarity.

In (3) "shall be permitted" has been deleted as this is required.

In (4) The word "device" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

In (5) "machine work light(s)" has been deleted as it is vague and can cause confusion. The limitation of 3 kW has been deleted as there is no reason to limit the wattage of the externally supplied lighting.

Response Message: FR-36-NFPA 79-2022

[Public Input No. 36-NFPA 79-2021 \[Section No. 15.2.2.2\]](#)

[Public Input No. 100-NFPA 79-2022 \[Section No. 15.2.2.2\]](#)



First Revision No. 45-NFPA 79-2022 [Section No. 16.2.1]

16.2.1*

Enclosures that ~~do not clearly show that they~~ contain electrical devices operating at or greater than 50 volts ac rms and 60 volts dc shall be marked with a safety sign in accordance with the ANSI Z535 series, which deals with product safety signs.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 10:49:39 EST 2022

Committee Statement

Committee Statement: The term “clearly” was removed as it is vague and unenforceable.

The addition of the word “terminals” is not necessary as they are included in the definition of the term “device” in Section 3.3.30.

The reference to operating at or greater than 50 volts ac rms or 60 volts dc was added to clarify when a safety sign is required.

Response Message: FR-45-NFPA 79-2022

[Public Input No. 67-NFPA 79-2021 \[Section No. 16.2.1\]](#)

[Public Input No. 113-NFPA 79-2022 \[Section No. 16.2.1\]](#)



First Revision No. 37-NFPA 79-2022 [Section No. 16.2.3 [Excluding any Sub-Sections]]

Electrical equipment for industrial machines, such as industrial control panels and the enclosures of disconnecting devices means ; operating at or greater than 50 volts ac rms or 60 volts dc, shall be marked with a safety sign in accordance with ANSI Z535.4 to warn qualified persons of potential electric shock and arc flash hazards.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 15:59:19 EST 2022

Committee Statement

Committee Statement: The word "devices" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

The reference to operating at or greater than 50 volts ac rms or 60 volts dc was added to clarify when the arc flash or shock safety sign is required.

Response Message: FR-37-NFPA 79-2022

[Public Input No. 101-NFPA 79-2022 \[Section No. 16.2.3 \[Excluding any Sub-Sections\]\]](#)



First Revision No. 38-NFPA 79-2022 [Section No. 16.2.4]

16.2.4

A safety sign shall be provided adjacent to the disconnecting means operating handle(s) where the disconnecting means ~~disconnect(s)~~ that is interlocked with the enclosure door or cover does not de-energize all the exposed live parts when the ~~disconnect(s)~~ disconnecting means is in the open (off) position.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 16:04:18 EST 2022

Committee Statement

Committee Statement: The word "means" was added after "disconnecting" and the word "disconnect(s)" was changed to "disconnecting" means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-38-NFPA 79-2022

[Public Input No. 102-NFPA 79-2022 \[Section No. 16.2.4\]](#)



First Revision No. 79-NFPA 79-2022 [Section No. 16.4.1]

16.4.1

Control equipment shall be legibly and durably marked in a way that is visible after the equipment is installed. A nameplate giving the following information shall be attached to the outside of the enclosure, or on the machine immediately adjacent to the enclosure:

- (1) Name or trademark of supplier
- (2) Model, serial number, or other designation
- (3)* Rated voltage, number of phases and frequency (if ac), and full-load current for each supply
- (4)* Ampere rating of the largest motor or load

A.16.4.1(4)

The ampere rating of the largest motor is used for calculation of the supply conductors for the machine per 670.4(A) of NFPA 70 .

- (5)* Maximum ampere rating of the branch-circuit short-circuit and ground-fault protective device, where provided

A.16.4.1(5)

The maximum ampere rating of the branch-circuit short-circuit and ground-fault protective device is required to determine the rating or setting of the overcurrent protective device for the circuit supplying the machine per 670.4(C) of NFPA 70 .

- (6)* Short-circuit current rating of the industrial control panel

A.16.4.1(6)

The short-circuit current rating of the industrial control panel of the machine might include additional industrial control panels supplied from the industrial control panel containing the machine supply circuit disconnecting means. The short-circuit current rating of the industrial control panel of the machine as marked on the nameplate considers the short-circuit current ratings of these additional industrial control panels.

- (7) Electrical diagram number(s) or the number of the index to the electrical drawings

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 15:24:46 EST 2022

Committee Statement

Committee In (4) An Annex note has been added to provide guidance on the use of this

Statement: nameplate value.

In (5) the term “branch-circuit short-circuit and ground-fault protective device” is used for consistency with the NEC. An Annex note has been added to provide guidance on the use of this nameplate value.

In (6) an additional Annex note has been added to guidance on the short-circuit current rating of industrial machinery with industrial control panels supplied by the industrial control panel containing the machine supply circuit disconnect.

**Response
Message:** FR-79-NFPA 79-2022

[Public Input No. 110-NFPA 79-2022 \[Section No. 16.4.1\]](#)

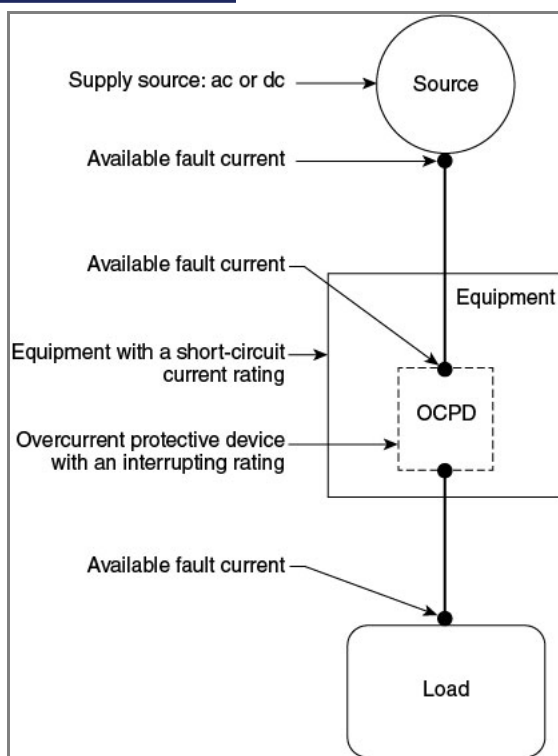


First Revision No. 94-NFPA 79-2022 [Section No. A.3.3.47]

A.3.3.47 Fault Current, Available (Available Fault Current).

A short circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See [Figure A.3.3.47](#).

Figure A.3.3.47 Available Fault Current.



Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 08:27:20 EDT 2022

Committee Statement

Committee Statement: Adding Figure A.3.3.47.

Response Message: FR-94-NFPA 79-2022



First Revision No. 95-NFPA 79-2022 [Section No. A.3.3.84]

A.3.3.85 Qualified Person.

Refer to ~~NFPA 70E~~ See NFPA 70E -2021, Standard for Electrical Safety in the Workplace , for electrical safety training requirements. [~~70:~~ 100-Informational Note 70, 2023]

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Apr 20 08:29:40 EDT 2022

Committee Statement

Committee Statement: Revised for editorial correction.

Response Message: FR-95-NFPA 79-2022



First Revision No. 70-NFPA 79-2022 [Section No. A.4.5.2]

A.4.5.2

The electrical interferences generated by the equipment itself should not exceed the levels specified in the relevant equipment standards and others dealing with electromagnetic compatibility (EMC) levels. The levels allowed should be determined for the specific application.

Generated interference signals can be kept to a minimum ~~by~~ with the following:

- (1) Suppression at the source by using capacitors, inductors, diodes, Zener diodes, varistors, ~~or~~ active devices, or a combination of these
- (2) Equipment screening in a bonded electrically conductive enclosure to provide segregation from other equipment

~~The undesirable~~ Undesirable effects of electrostatic discharge, radiated electromagnetic energy, and supply conductor (mains borne) interference should be avoided (e.g., ~~use~~ Use of the appropriate filters ~~and~~ , time delays, ~~choice of certain~~ power levels, ~~suitable and~~ wiring types and practices should be ensured).

The effects of interference on equipment can be reduced ~~by~~ with the following:

- (1) *Use of surge protective devices and filters.* The installation of surge protection devices and/or filters for equipment sensitive to electromagnetic influences is recommended to improve electromagnetic compatibility with regard to conducted electromagnetic phenomena.
- (2) *Reference potential circuit or common connections.* Each common connection should be treated as a single circuit and connected to one of several central reference points that are connected to ground (~~wired to~~ earth) by insulated conductors of a large cross-sectional area.
- (3) *Frame connections.* In each piece of equipment, all the frame connections ~~are~~ should to be taken to a common point with a conductor of a large cross-sectional area (e.g., braided conductors, foil strips having a width much greater than the thickness) used between slides and enclosures. The connections to the frame ~~are to~~ should be as short as possible.
- (4) *Transmission of signals.* Electrostatic screens, electromagnetic shields, twisted conductors, and signal orientation (i.e., crossing cable runs at as near to 90 degrees as is practicable) ~~as necessary to can help~~ ensure that the low-level signal wiring is not affected by interference from control or power cables, ~~or as can~~ running the connections parallel to the ground plane ~~as if~~ necessary.
- (5) *Separation of equipment.* Separating and/or shielding sensitive equipment (e.g., units working with pulses and/or at low signal levels) from switching equipment (e.g., electromagnetic relays, thyristors); ~~and separation separating of~~ low-level signal wiring from control and power cables can help prevent interference .
- (6) *Electromagnetic disturbances.* Measures ~~to that can~~ limit the generation of electromagnetic disturbances — that is, conducted and radiated emissions — include the following:
 - (a) Power supply filtering
 - (b) Cable shielding
 - (c) Enclosures designed to minimize RF radiation
 - (d) RF suppression techniques.
- (7) *Enhance immunity.* Measures ~~to that can~~ enhance the immunity of ~~the~~ equipment against conducted and radiated RF disturbance using the designs of a functional bonding system include the following:
 - (a) Connection of sensitive electrical circuits to the chassis. Such terminations should be marked or labeled with the IEC Symbol 5020 from IEC 60417-1. [See Figure A.4.5.2(a).]
 - (b) Connection of the chassis to earth (PE) using a conductor with low RF impedance

and that is as short as is practicable.

- (c) Connection of sensitive electrical equipment or circuits directly to the PE circuit or to a functional earthing conductor (FE), to minimize common mode disturbance. This latter terminal should be marked or labeled with the IEC Symbol 5018 from IEC 60417-1 . [See Figure A.4.5.2(b).]
- (d) Separation of sensitive circuits from disturbance sources.
- (e) Enclosures designed to minimize RF transmission.
- (f) EMC wiring practices as follows:
 - i. Using twisted conductors to reduce the effect of differential mode disturbances
 - ii. Keeping distance between conductors emitting disturbances and sensitive conductors
 - iii. Using cable orientation as close to 90° degrees as possible when cables cross
 - iv. Running the conductors as close as possible to the ground plane
 - v. Using electrostatic screens and/or electromagnetic shields with a low RF impedance termination

Figure A.4.5.2(a) Symbol that Represents Functional Equipotential Bonding — IEC Symbol Number 5020.

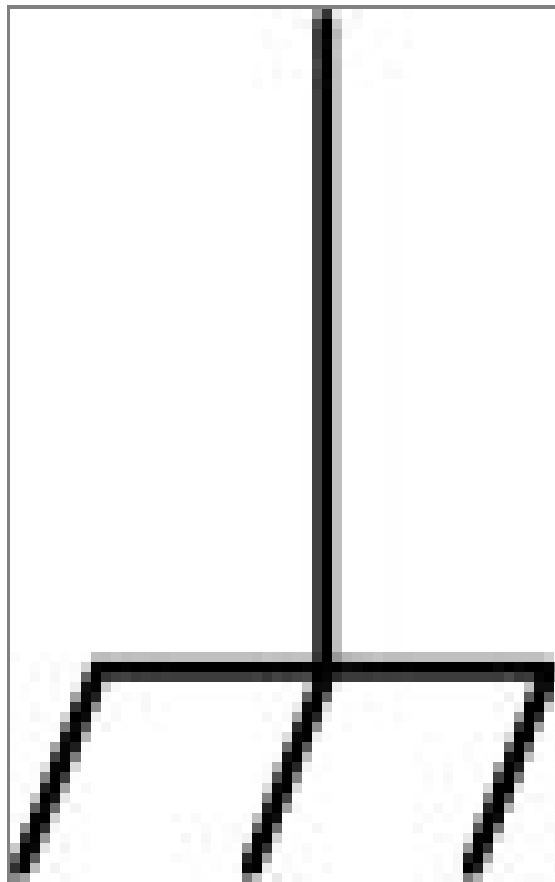
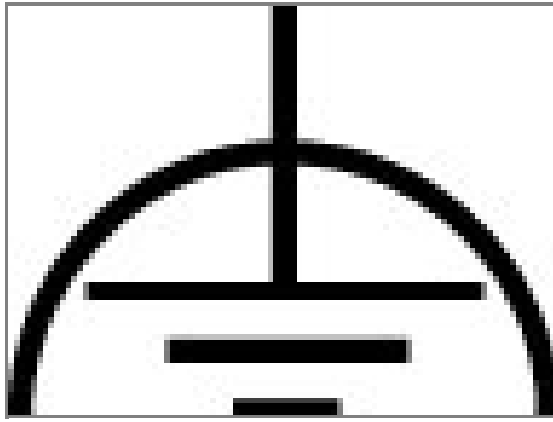


Figure A.4.5.2(b) Symbol that Represents Functional Earthing — IEC Symbol Number 5018.



Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR-70_A.4.5.2_v2.docx	FR-70 Section A.4.5.2	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Tue Mar 01 16:39:58 EST 2022

Committee Statement

Committee Statement: The use of the term “wired to” in the parenthetical phrase in the second “(2)” paragraph is unnecessary as the term “conductors” which is the technically correct term as a replacement for “wire”, is used in the same sentence and removing the term “wired to” does not affect the intent and interpretation of the annex material

Response Message: FR-70-NFPA 79-2022

[Public Input No. 48-NFPA 79-2021 \[Section No. A.4.5.2\]](#)



First Revision No. 39-NFPA 79-2022 [Section No. A.5.1.9.2]

A.5.1.9.2

When a single disconnecting means is provided, a marking such as “~~main machine disconnect~~” “Machine Supply Circuit Disconnecting Means” is sufficient to convey the purpose. Where multiple supplies are present, a descriptive marking is necessary to clearly indicate the controlled supply voltage or equipment that is disconnected, such as “~~main disconnect~~ disconnecting means — 480V, 3ph,” or “~~main disconnect~~ disconnecting means — drive motors.”

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 16:12:45 EST 2022

Committee Statement

Committee Statement: The term “main machine disconnect” has been revised to “machine supply circuit disconnect means” since this is the defined term. The term “main disconnect” has been revised to “disconnecting means ” for consistency and to use the term defined in NFPA 70 and NFPA 79.

Response Message: FR-39-NFPA 79-2022

[Public Input No. 103-NFPA 79-2022 \[Section No. A.5.1.9.2\]](#)



First Revision No. 75-NFPA 79-2022 [Section No. A.7.8.1]

A.7.8.1

The manufacturer of the industrial machinery can determine what specific type of SPD, if any, and what circuit location is to be used to provide the needed protection based on the installation location in the electrical distribution system, the electrical component overvoltage category rating, and the equipment design. For example, power supplies or other devices might include integral surge protection.

A risk assessment can be used to identify if the overvoltage protection for safety circuits is sufficient or if additional surge protection devices are needed.

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Wed Mar 02 10:51:52 EST 2022

Committee Statement

Committee Statement: The note has been revised to align with committee actions taken on Section 7.8.1.

Response Message: FR-75-NFPA 79-2022



First Revision No. 40-NFPA 79-2022 [Section No. D.1]

D.1

Figure D.1(a) through Figure D.1(q) are not intended to be design guidelines. They are included only to illustrate documentation methods.

Figure D.1(a) Cover Sheet and Sheet Index.

Company emblem Designed by: Machine Supplier, Inc. Address 1 Address 2 Address 3 Postal code(s) E-mail address		Customer: Customer Project: Project number, Name Subject: Sample drawings
Utility Usage — Ratings Electrical xx fa Compressed air xx pps Plant water xx gpm Electric chill water xx gpm Steam xx t/hr Natural gas xx pps Other xx pps	Sheet # Description of Sheet 1 Machine cover sheet & sheet index 2 System layout & installation diagram 3 Block system diagram 4 Interconnection diagram 5 Elementary schematic 6 PLC input diagram 7 PLC output diagram 8 Sample enclosure layout 9 Sample parts list 10 Sequence of operations — graphical 11 Sequence of operations — descriptive 12 Sample wiring diagram 13 Sample PLC network — station layout 14 Sample operator station 15 Sample parts list 16 ISO 245 drawing standard framework 17 (Selected) ANSI Y32.2 / IEEE 315 symbol table 18 19 20 21 22 23 24 25	Doc. # Reference to Additional Technical Documents 1 Operating manual — manual number 2 Maintenance manual — manual number 3 PLC programming manual — manual name and number 4 Network installation manual — manual number 5 AC servo drive manual — manual number
Electrical Characteristics 3-phase, + earth 60 Hz Main line voltage 480 V Control voltage 115 V AC Total motor full load xx kW Full load current xxx A Over or circuit breaker rating Main line rated bus capacity Machine serial number Manufactured in year 2 xxx Electrical diagram number		

Figure D.1(b) System Layout and Installation Diagram.

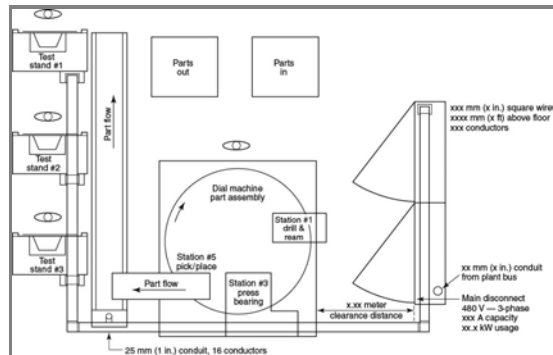


Figure D.1(c) Block (System) Diagram.

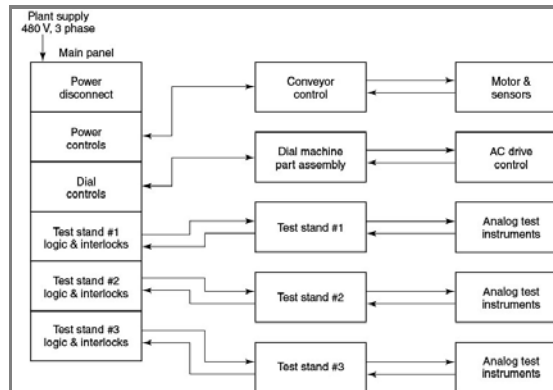


Figure D.1(d) Interconnection Diagram.

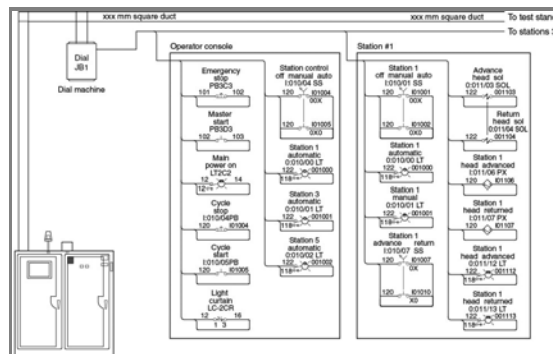
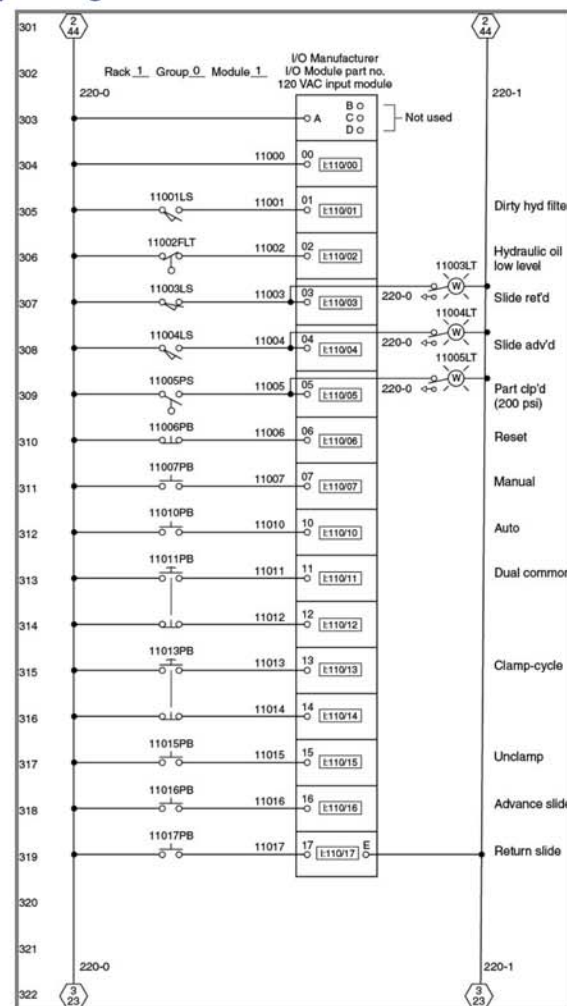


Figure D.1(e) Elementary Schematic.



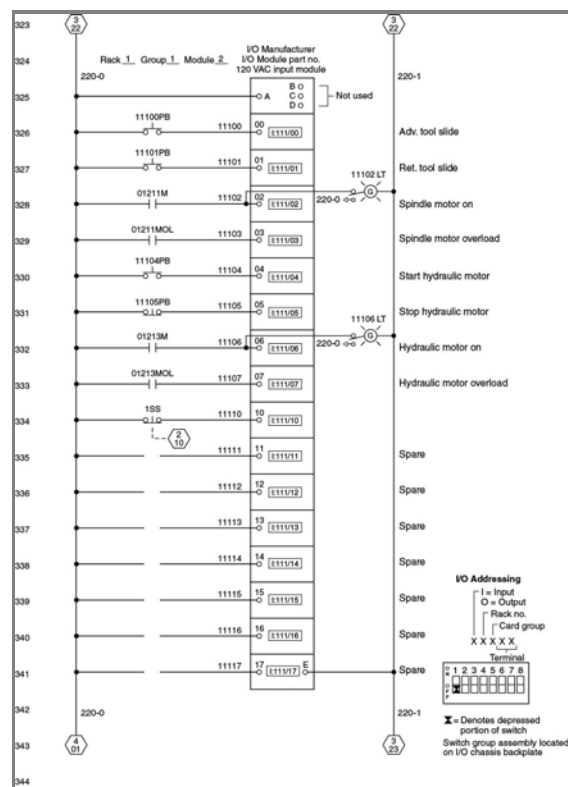
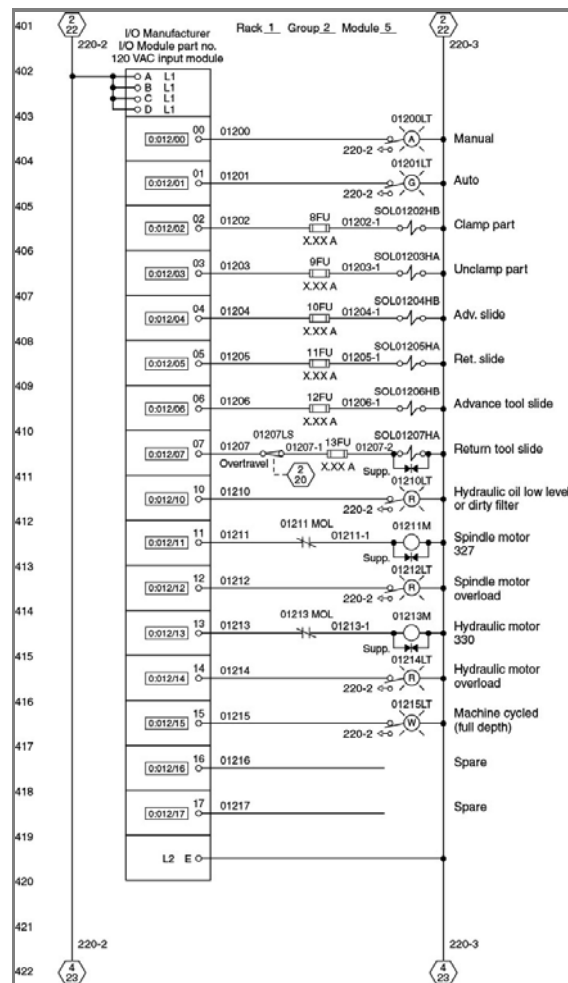


Figure D.1(g) PLC Output Diagram.



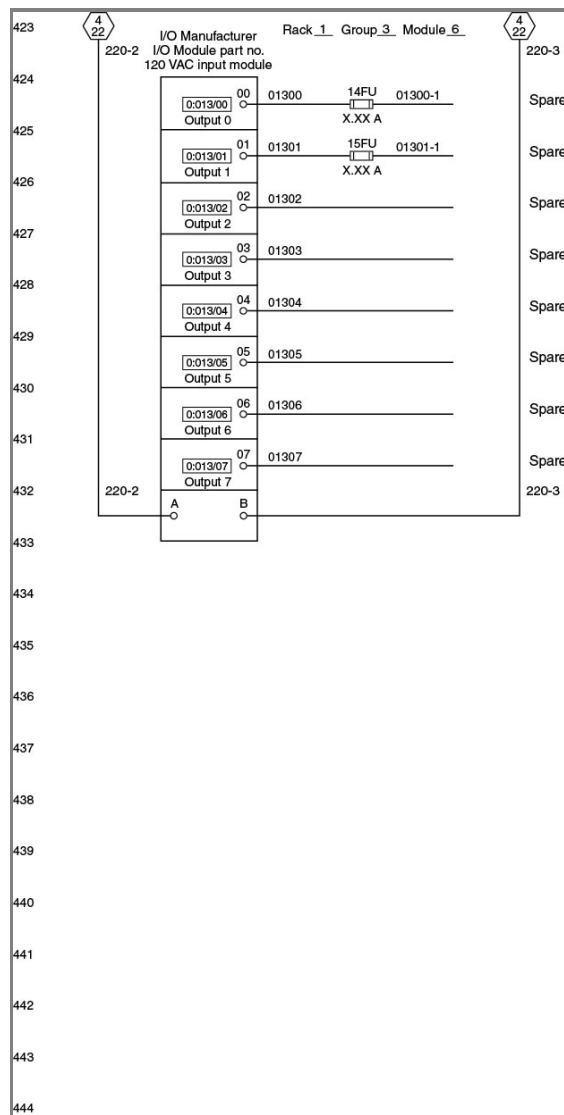


Figure D.1(h) Sample Enclosure Layout — Interior.

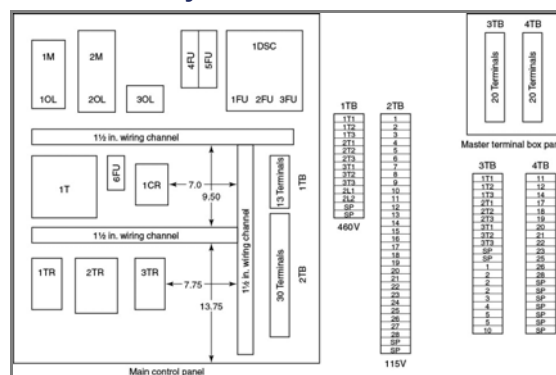


Figure D.1(i) Sample Enclosure Layout — Exterior.

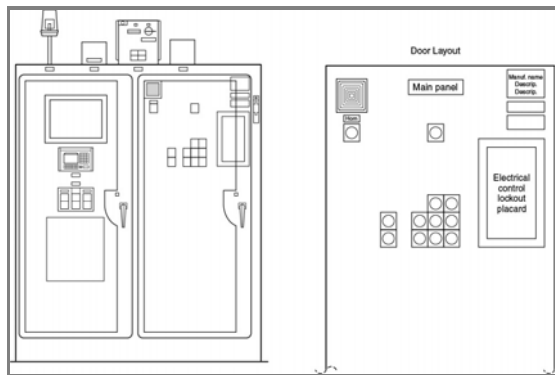


Figure D.1(j) Sequence of Operations — Graphical.

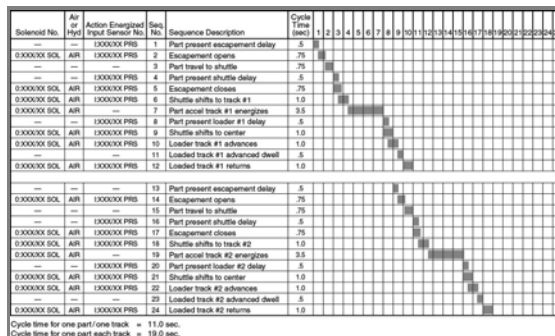


Figure D.1(k) Sequence of Operations — Descriptive Graphical.

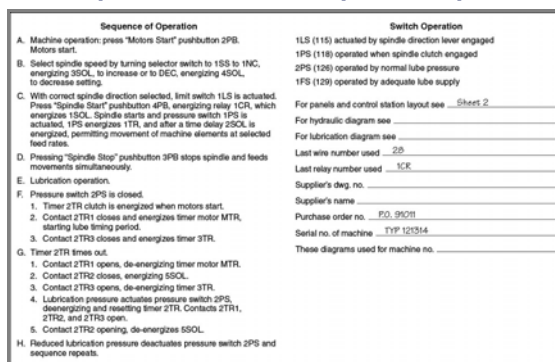


Figure D.1(l) Sample Servo Diagram.

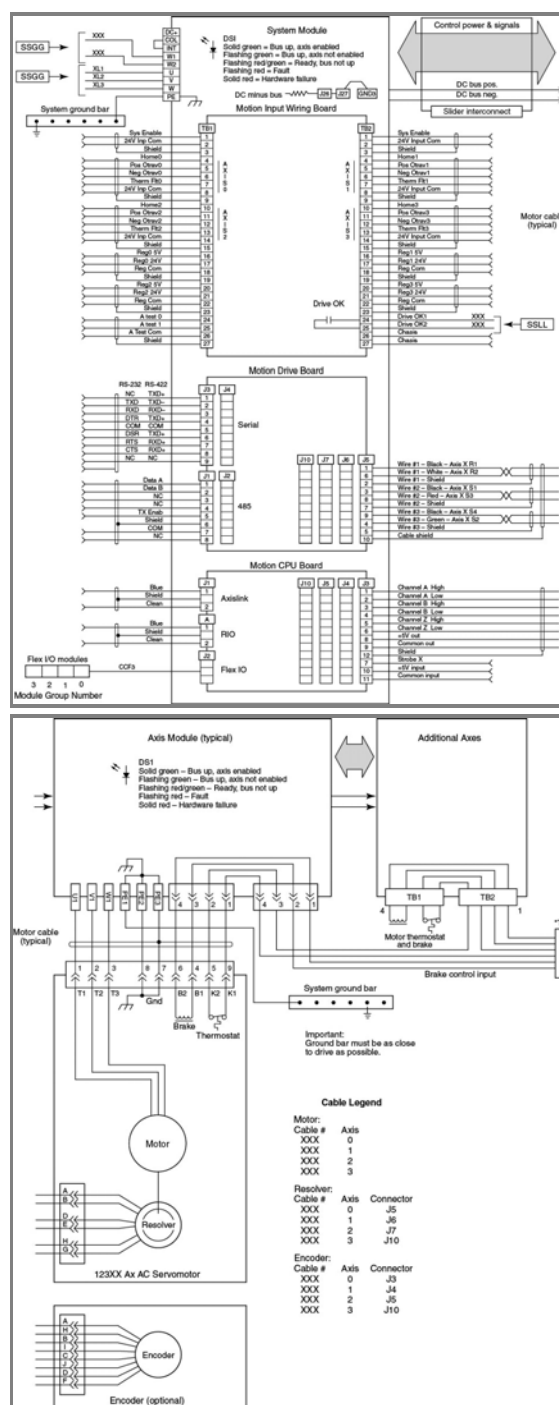


Figure D.1(m) Sample PLC Network — Station Layout.

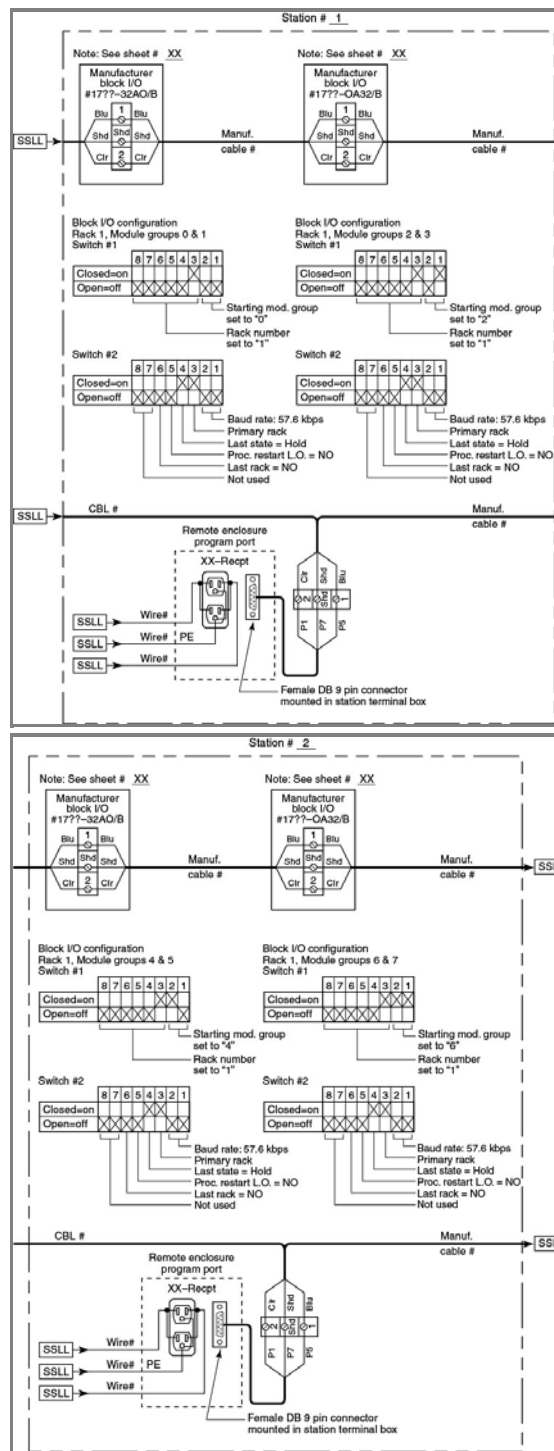


Figure D.1(n) Sample Operator Station.

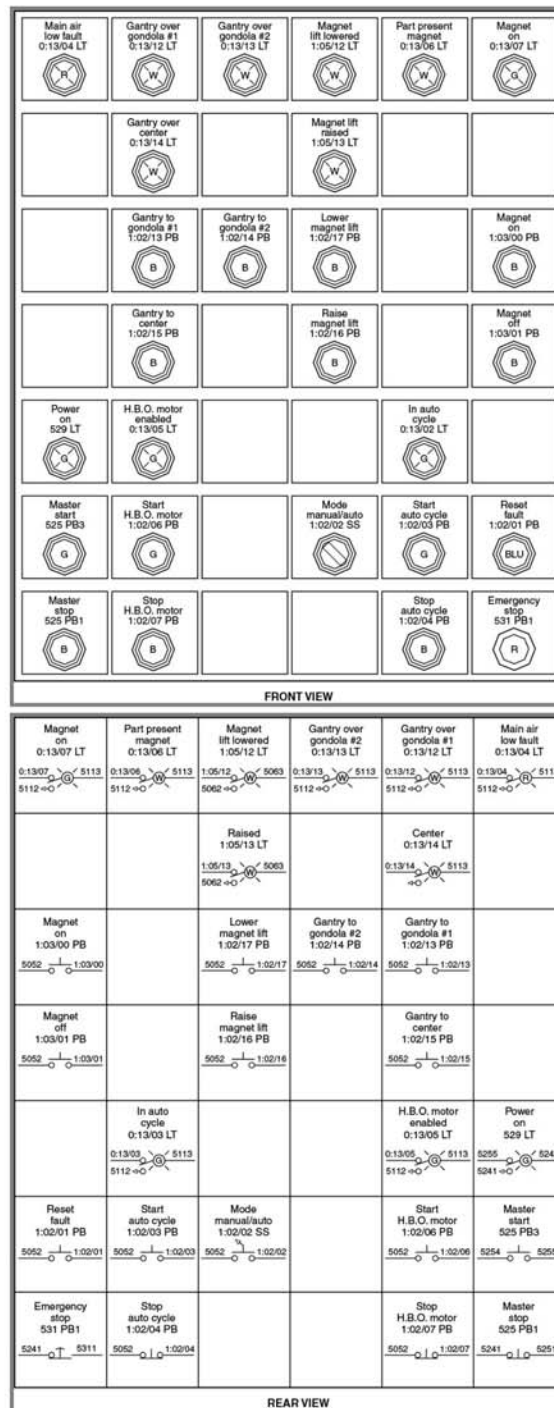


Figure D.1(o) Sample Parts List.

Parts List					
Detail	Qty	Identifier	Location	Manufacturer	Part Number
0001	1	Enclosure	—	Supplier name	A-72X731BLP
0002	1	Panel 1	—	Supplier name	A-72X73
0003	1	206M	Panel	Supplier name	9KE200LBI03520
0004	1	1PWPLG	—	Supplier name	GE-0100-60
0005	1	204CB	—	Supplier name	SELASAT0060
0006	1	206M	—	Supplier name	CL06A311M1
0007	1	211TDS	—	Supplier name	TF1000-JPB
0008	12	XXFU	—	Supplier name	Type AGT
0009	2	502A3 502B3	Machine	Supplier name	301AEP115
Description					
2-door enclosure, 72 1/2x73 1/2x18 1/2					
72x73 sub-panel					
Motor 200W, 1200 RPM, Fl. 200L, B3 mount					
Bus fuse — Fushie, 100A, 600V					
3 pole/100A circuit breaker, SE 100 frame					
FVNR controller, 200V-600V, 48 1/2A, 100VAC coil					
Lighting disconnecting means, 1000VA, 480/120V enclosed					
Fuse, 600V, XX AMP					
Proximity switch, 115VAC, 2 pin					

Figure D.1(p) ISO (A2) Drawing Standard Framework.

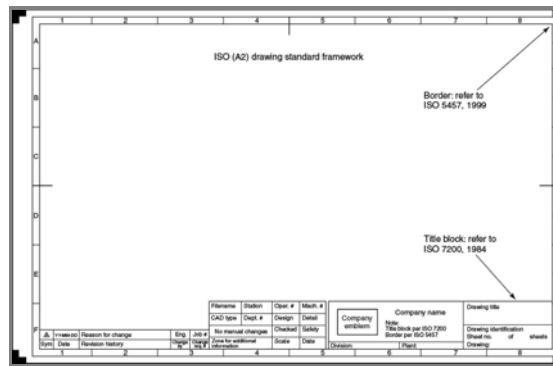


Figure D.1(q) Selections from ANSI Y32.2/IEEE 315 Symbol Table.

ANSI Symbol	ANSI Code	IEC 60617 Symbol	IEC 81346-2 Code	Description
	CON		KM	Contactor contact open
	CON		KM	Contactor contact closed
	CR		KA	Relay contact open
	CR		KA	Relay contact closed
	TR		KT	Timed contact, N.O. - on delay (TDE)
	TR		KT	Timed contact, N.C. - on delay (TDE)
	TR		KT	Timed contact, N.O. - off delay (TDD)
	TR		KT	Timed contact, N.C. - off delay (TDD)
	SS		SA	Selector switch
	PB		SB	Pushbutton N.O.
	PB		SB	Pushbutton N.C.
	PB		SB	Pushbutton mushroom head
	FL		SL	Liquid level switch
	FLS		SF	Flow switch
	PS		SP	Pressure switch
	TS		ST	Temperature switch
	LS		SQ	Limit switch
	PRS		SQ	Proximity switch
	LT		HL	Indicating light
	CR		KA	Control relay coil
	CON		KM	Contactor coil
	M		KM	Motor starter coil
	TR		KA	Timer coil
	SOL		YV	Solenoid coil
	CTR		EC	Electromechanical counter
	CB		QF	Circuit breaker
	T1		X1	Terminals (reference)
			XT	Fused terminals (reference)
	FU		FU	Fuse, protective

ANSI Symbol	ANSI Code	IEC 61346-2 Symbol	IEC Code	Description
	COH		KM	Contactor contact open
	COH		KM	Contactor contact closed
	CR		KA	Relay contact open
	CR		KA	Relay contact closed
	TR		KT	Timed contact, N.O. - on delay (TDE)
	TR		KT	Timed contact, N.C. - on delay (TDE)
	TR		KT	Timed contact, N.O. - off delay (TDO)
	TR		KT	Timed contact, N.C. - off delay (TDO)
	SS		SA	Selector switch
	PB		SB	Pushbutton N.O.
	PB		SB	Pushbutton N.C.
	PB		SB	Pushbutton mushroom head
	FL		SL	Liquid level switch
	FLS		SF	Flow switch
	PS		SP	Pressure switch
	TS		ST	Temperature switch
	LS		SQ	Limit switch
	PRS		SQ	Proximity switch
	LT		HL	Indicating light
	CR		KA	Control relay coil
	COH		KM	Contactor coil
	M		KM	Motor starter coil
	TR		KA	Timer coil
	SOL		YV	Solenoid coil
	CTR		EC	Electromechanical counter
	CB		QF	Circuit breaker
	T1		X1	Terminal (reference)
			XT	Fused terminal (reference)
	FU		FU	Fuse, protective

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NFPA_79_Annex_D_Markup.pdf	Annex D Markup	

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 16:23:20 EST 2022

Committee Statement

Committee Statement: In Figure D.1(o) the term "disconnect" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

In Figure D.1(e) the word "conduit" is being changed to "raceway" to be consistent with the change made in 5.1.13.2

In Figure D.1(q) IEC standard numbers were revised to reflect current IEC Standard for IEC Symbols and Codes.

Response Message: FR-40-NFPA 79-2022

[Public Input No. 24-NFPA 79-2021 \[Section No. D.1\]](#)

[Public Input No. 104-NFPA 79-2022 \[Section No. D.1\]](#)

[Public Input No. 121-NFPA 79-2022 \[Section No. D.1\]](#)



First Revision No. 41-NFPA 79-2022 [Section No. E.1]

E.1 Device and Compound Designations.

The device and component designations given in Table E.1 are intended for use on diagrams in connection with the corresponding graphical symbols to indicate the function of the particular device. These device and component designations are based on the assignment of a standard letter or letters to the fundamental function that is performed by a component or device. Suitable numbers (1, 2, 3, etc.) and letters (A, B, C, etc.) can be added to the basic designation to differentiate between devices performing similar functions.

The assignment of a designation to a device on specific equipment is governed by the function of that device on that equipment and not by the type or nature of the device or its possible use for other functions on other equipment. The same type of device can perform different functions on different equipment or even on the same equipment and, consequently, can be identified by different designations.

Table E.1 Device and Component Designations

<u>Designation</u>	<u>Device</u>
ABE	Alarm or Annunciator Bell
ABU	Alarm or Annunciator Buzzer
AH	Alarm or Annunciator Horn
AM	Ammeter
AT	Autotransformer
CAP	Capacitor
CB	Circuit Breaker
CI	Circuit Interrupter
CNC	Computerized Numerical Controller
CON	Contactor
COs	Cable-Operated (Emergency) Switch
CPU	Central Processing Unit
CR	Control Relay
CRA	Control Relay, Automatic
CRH	Control Relay, Manual
CRL	Control Relay, Latch
CRM	Control Relay, Master <u>Main</u>
CRT	Cathode Ray Tube, Monitor or Video Display Unit
CRU	Control Relay, Unlatch
CS	Cam Switch
CT	Current Transformer
CTR	Counter
D	Diode
DISC	<u>Disconnecting Means</u>
DISP	Display
DR	Drive
EMO	Emergency (Machine) Off Device
END	Encoder
ESTOP	Emergency Stop
FLD	Field
FLS	Flow Switch
FS	Float Switch

<u>Designation</u>	<u>Device</u>
FTS	Foot Switch
FU	Fuse
GEN	Generator
GRD, GND	Ground
GUI	Graphical User Interface
HM	Hour Meter
HTR	Heating Element
IC	Integrated Circuit
INST	Instrument
IOL	Instantaneous Overload
I/O	Input/Output Device
L	Inductor
LED	Light Emitting Diode
LS	Limit Switch
LT	Pilot Light
LVDT	Linear Variable Differential Transformer
M	Motor Starter
MD	Motion Detector
MF	Motor Starter – Forward
MG	Motor – Generator
MR	Motor Starter – Reverse
MTR	Motor
OIT	Operator Interface Terminal
OL	Overload Relay
PB	Pushbutton
PBL	Pushbutton, Illuminated
PC	Personal Computer
PCB	Printed Circuit Board
PEC	Photoelectric Device
PL	Plug
PLC	Programmable Logic Controller
POT	Potentiometer
PRS	Proximity Switch
PS	Pressure Switch
PWS	Power Supply
Q	Transistor
QTM	Thermistor
REC	Rectifier
RECP	Receptacle
RES	Resistor
RH	Rheostat
S	Switch
SCR	Silicon Controlled Rectifier

<u>Designation</u>	<u>Device</u>
SOL	Solenoid
SNSR	Sensor
SS	Selector Switch
SSL	Selector Switch, Illuminated
SSR	Solid State Relay
ST	Saturable Transformer
SUP	Suppressor
SYN	Synchro or Resolver
T	Transformer
TACH	Tachometer Generator
TAS	Temperature-Actuated Switch
TB	Terminal Block
T/C	Thermocouple
TR	Timer Relay
TSDR	Transducer
TWS	Thumbwheel Switch
V	Electronic Tube
VAR	Varistor
VM	Voltmeter
VR	Voltage Regulator
VS	Vacuum Switch
WLT	Worklight
WM	Wattmeter
X	Reactor
ZSS	Zero Speed Switch

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Mon Feb 28 16:39:44 EST 2022

Committee Statement

Committee Statement: The term "disconnect switch" was changed to "disconnecting means" for consistency and to use the term defined in NFPA 70 and NFPA 79.

The term "Master" was changed to "Main" to include inclusive language per the NIST guide.

Response Message: FR-41-NFPA 79-2022

[Public Input No. 105-NFPA 79-2022 \[Section No. E.1\]](#)



First Revision No. 13-NFPA 79-2022 [Section No. J.2]

J.2 *NFPA 70* Terms.

Bonded (Bonding). Connected to establish electrical continuity and conductivity. [70: 400 70, 2023]

Discussion. Bonding is accomplished if items are connected together regardless of whether or not there is a connection to ground (earth).

Bonding Conductor ~~or~~ (Bonding Jumper) . A ~~reliable~~ conductor to ~~ensure~~ that ensures the required electrical conductivity between metal parts that are required to be electrically connected. [70: 400 70, 2023]

Discussion. Bonding conductor sizes are provided in the specific requirements related to what the bonding is intended to accomplish such as being suitable for fault current or minimizing voltage differences.

Bonding Jumper, Equipment. (Equipment Bonding Jumper) . The connection between two or more portions of the equipment grounding conductor. [70: 400 70, 2023]

Discussion. Equipment bonding jumpers are typically short in length and used to ensure a reliable connection such as between an enclosure and its hinged door.

Bonding Jumper, Supply-Side (Supply-Side Bonding Jumper) . A conductor installed on the supply side of a service or within a service equipment enclosure(s), or for a separately derived system, that ensures the required electrical conductivity between metal parts required to be electrically connected. [70:250-2 2023]

Discussion. Conductors that are intended to carry fault current for ungrounded conductors that do not have overcurrent protection at their supply point are considered supply-side bonding jumpers. Examples are those for tap conductors and transformer secondary conductors. Conductor sizing is based on a percentage of the ungrounded conductors.

Bonding Jumper, System. (System Bonding Jumper) The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system. [70: 400 70, 2023]

Discussion. System bonding jumpers provide a fault current path for grounded systems. They can be conductors, busbars, or other suitable means.

Discussion. Equipment made of conductive materials that contains electrical conductors is commonly considered to be "likely to become energized" because an insulation failure can occur and energize the equipment. This type of equipment is generally required to be provided with an effective ground-fault current path. An equipment grounding conductor or bonding jumper is commonly used to provide an effective ground-fault current path. The earth is not permitted as the only path for this fault current.

Ground. The earth. [70: 400 70, 2023]

Discussion. Systems or equipment are either connected to the earth or are considered ungrounded systems.

Ground Fault. An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, ~~metallic metal~~ enclosures, ~~metallic metal~~ raceways, ~~metallic metal~~ equipment, or earth. [70: 400 70, 2023]

Discussion. An insulation failure is a common example of a condition that results in a ground fault.

Grounded (Grounding). Connected (connecting) to ground or to a conductive body that extends the ground connection. [70: 400 70, 2023]

Discussion. Equipment that is connected to an equipment grounding conductor can be considered grounded, as the equipment grounding conductor extends the ground connection.

Grounded, Solidly. (Solidly Grounded) Connected to ground without inserting any resistor or impedance device. [70: 400 70, 2023]

Discussion. Solidly grounded is a ~~method type~~ of system grounding. Using resistors or reactors are other options for grounding some types of systems.

Grounded Conductor. A system or circuit conductor that is intentionally grounded.

[70: 400 70, 2023]

Discussion. The grounded conductor is commonly grounded by a grounding electrode conductor. Depending on the type of electrical system, this can be a neutral conductor, phase conductor, or line conductor. Insulated grounded conductors are generally required to be identified with white or gray coloring.

Ground-Fault Current Path. An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, grounded conductors, equipment, or the earth to the electrical supply source. [70: 400 70, 2023]

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; grounded conductors; and the earth itself. [70: 400 70, 2023]

Discussion. Current will take all the paths that exist when a voltage difference exists. Some of these paths can be effective ground-fault current paths and others, such as the earth, are not.

Effective Ground-Fault Current Path, Effective .(Effective Ground-Fault Current Path)

An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under during ground-fault conditions events from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors. [70: 400 70, 2023]

Grounding Conductor, Equipment .(Equipment Grounding Conductor) (EGC). The A conductive path(s) that provides a is part of an effective ground-fault current path and connects normally non-current non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. [70: 400 70, 2023]

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding. [70: 400 70, 2023]

Informational Note No. 2: See 250.118 [of NFPA 70] for a list of acceptable equipment grounding conductors. [70: 400 70, 2023]

Discussion. Equipment grounding conductors are commonly used to provide an effective ground-fault current path paths . Insulated equipment grounding conductors are generally required to be identified with a green coloring.

Grounding Electrode. A conducting object through which a direct connection to earth is established. [70: 400 70, 2023]

Discussion. Underground metal water pipes, concrete encased steel reinforcing rods, and ground rods are typical grounding electrodes.

Grounding Electrode Conductor (GEC) . A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system. [70: 400 70, 2023]

Discussion. Grounding electrode conductors are what actually accomplish the grounding of equipment or systems.

Metal Wireways, Metal .(Metal Wireways) Sheet metal troughs with hinged or removable covers for housing and protecting electrical wires and cable and in which conductors are laid in place after the raceway has been installed as a complete system. [70: 376-2 2023]

Discussion. Wireways are a type of raceway used to contain electrical conductors and are commonly available in square cross sections.

Neutral Conductor. The conductor connected to the neutral point of a system that is intended to carry current under normal conditions. [70: 400 70, 2023]

Discussion. Neutral conductors only exist if the system has a neutral point and are generally also grounded conductors.

Neutral Point. The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-current system. [70: 400 70, 2023]

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential. [70: 400 70, 2023]

Discussion. A neutral point only exists on systems that have multiple "connection points" with a connection point in the middle.

Separately Derived System. An electrical source power supply output , other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections. [70: 400 70, 2023]

Discussion. Transformers, generators, and batteries that are not directly connected to other sources are examples of separately derived systems. System bonding jumpers, equipment grounding conductors, and grounding electrode conductors are not considered direct connections.

Service. The conductors and equipment for delivering electric energy from connecting the serving utility to the wiring system of the premises served. [70: 400 70, 2023]

Discussion. Services only exist if a utility is supplying the electricity.

Ungrounded. Not connected to ground or to a conductive body that extends the ground connection. [70: 400 70 , 2023]

Discussion. Systems that have no direct connection to ground (earth) are considered ungrounded, such as vehicle-supplied battery systems and transformer or generator systems that are not connected to ground. A slang term commonly used for these types of systems is "floating."

Submitter Information Verification

Committee: EEI-AAA

Submittal Date: Thu Feb 10 08:33:03 EST 2022

Committee Statement

Committee Statement: The terms have been revised to correlate with NFPA 70.

Response Message: FR-13-NFPA 79-2022



First Revision No. 51-NFPA 79-2022 [Section No. K.1.1]

K.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 70[®], National Electrical Code[®], 2020 2023 edition.

NFPA 70E[®], Standard for Electrical Safety in the Workplace[®], 2021 edition.

NFPA 70E[®], Standard for Electrical Safety in the Workplace[®], 2024 edition.

NFPA 77, Recommended Practice on Static Electricity, 2019 2024 edition.

Submitter Information Verification

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Committee Statement

Committee Statement: The date of publication has been updated to reflect the most recent edition of each standard

Response Message: FR-51-NFPA 79-2022

Public Input No. 44-NFPA 79-2021 [Section No. K.1.1]



First Revision No. 52-NFPA 79-2022 [Section No. K.1.2.1]

K.1.2.1 ANSI Publications.

American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI B11.0, *Safety of Machinery*, 2015 2020 .

ANSI B11-TR4, *Selection of Programmable Electronic Systems (PES/PLC) for Machine Tools*, 2004, reaffirmed 2015.

ANSI B11-TR6, *Safety Control Systems for Machine Tools*, 2010.

ANSI Z535.4, *Product Safety Signs and Labels*, 2011, reaffirmed 2017.

Submitter Information Verification

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Committee Statement

Committee Statement: The date of publication has been updated to reflect the most recent edition of each standard

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[Public Input No. 45-NFPA 79-2021 \[Section No. K.1.2.1\]](#)



First Revision No. 53-NFPA 79-2022 [Section No. K.1.2.4]

K.1.2.4 IEC Publications.

International Electrotechnical Commission, 3, rue de Varembé, P.O. Box 131, CH-1211 Geneva 20, Switzerland.

IEC 60034-1 Ed. 13.0, *Rotating electrical machines — Part 1: Rating and performance*, 2017.

IEC 60072-1 Ed. 6.0, *Dimensions and output series for rotating electrical machines — Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080*, 1991.

IEC 60204-1 Ed. 6.0 1 , *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*, 2016, amendment 1, 2021 .

IEC 60332-1-1 Ed. 1.1, *Tests on electric and optical fibre cables under fire conditions — Part 1-1: Test for vertical flame propagation for a single insulated wire or cable — Apparatus*, 2004, amendment 1, 2015.

IEC 60364-4-41 Ed. 5.1, *Low voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*, 2005, corrigendum amendment 1, 2017.

IEC 60364-5-53 Ed. 3.2 4.1 , *Electrical Installations of buildings — Part 5-53: Selection and erection of electrical equipment — Isolation, switching and control Low-voltage electrical installations — Part 5-53: Selection and erection of electrical equipment — Devices for safety, isolation, switching, control and monitoring* , 2019, amendment 1, 2015 2020 .

IEC 60417-1 DB [Database] , *Graphical symbols for use on equipment — Part 1: Overview and application*, 2002.

IEC 60050-195-1-10, *International electrotechnical vocabulary (IEV) — Part 195: Earthing and protection against electric shock* .

IEC 60050-195-2-06, *International electrotechnical vocabulary (IEV) — Part 195: Neutral conductor* .

IEC 60050-195-06-02, *International electrotechnical vocabulary (IEV) — Part 195: Fault protection* .

IEC 60050-826-12-10, *International electrotechnical vocabulary (IEV) — Part 826: Exposed conductive part* .

IEC 60050-826-12-11, *International electrotechnical vocabulary (IEV) — Part 826: Extraneous conductive part* .

IEC 60050-826-13-22, *International electrotechnical vocabulary (IEV) — Part 826: Protective conductor* .

IEC 60309-1, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes — Part 1: General requirements* , 2021.

IEC 60529 Ed. 2.2, *Degrees of protection provided by enclosures (IP Code)*, 2013, corrigendum 2, 2015.

IEC 60617, *Graphical symbols for diagrams* , 2012.

IEC 60621-3 Ed. 1.0, *Electrical installations for outdoor sites under heavy conditions (including open-cast mines and quarries) — Part 3: General requirements for equipment and ancillaries*, 1979 (withdrawn).

IEC 60742 Ed. 1.0, *Isolating transformers and safety isolating transformers*, 1983 (superseded by IEC 61558-1).

IEC 60870-5-1 Ed. 1.0, *Telecontrol equipment and systems — Part 5: Transmission protocols — Section One: Transmission frame formats*, 1990.

IEC 60884-1, *Plugs and socket-outlets for household and similar purposes — Part 1: General requirements* , 2014.

IEC 60832-1, *Live working — Insulating sticks and attachable devices — Part 1: Insulating sticks* , 2010.

IEC 60947-4-1 Ed. 3.1 4.0 , *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters*, 2012 2018 , corrigendum 2, 2021 .

IEC 60947-5-1 Ed. 4.0, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*, 2016, corrigendum 4 ~~2~~, 2016 2020.

IEC 60947-7-1 Ed. 3.0, *Low-voltage switchgear and controlgear — Part 7-1: Ancillary equipment — Terminal blocks for copper conductors*, 2009.

IEC 61010-1 Ed. 3.1, *Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements*, 2016.

IEC 61310-1 Ed. 2.0, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals*, 2007.

IEC 61310-3 Ed. 2.0, *Safety of machinery — Indication, marking and actuation — Part 3: Requirements for the location and operation of actuators*, 2007.

IEC 61508 Ed. 2.0, *[Series] Functional safety of electrical/electronic/programmable electronic safety-related systems*, 2010.

IEC 61558-1 Ed. 3.0, *Safety of transformers, reactors, power supply units and combinations thereof — Part 1: General requirements and tests*, 2017.

IEC 61800-5-2 Ed. 2.0, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional*, 2016.

IEC 61984, *Connectors — Safety requirements and tests*, 2011.

IEC 62061 Ed. 1.2, *Safety of machinery — Functional safety of safety-related ~~electrical, electronic and programmable electronic~~ control systems*, 2005, corrigendum 1, 2015 2021.

IEC 81346-2, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 2: Classification of objects and codes for classes*, 2019.

NOTE: The IEC publishes consolidated editions of its publications with all the amendments and corrigenda included with the base document. For example:

Edition 1.0 is a base document without any amendments.

Edition 1.1 is the base 1.0 edition consolidated with one amendment.

Edition 1.2 is the base 1.0 edition consolidated with two amendments.

Edition 2.0 is the second edition of a base document. This may include new information combined as well as amendments from edition 1.x.

Edition 2.1 is the second edition of a document consolidated with amendment 1 to that edition.

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First Revision No. 54-NFPA 79-2022 [Section No. K.1.2.5]

K.1.2.5 IEEE Publications.

IEEE, 3 Park Avenue, 17th Floor, New York, NY 10016-5997.

IEEE 100-GD , *Standards Dictionary: Glossary of Terms and Definitions*, 2013.

ANSI Y32.2/IEEE 315, *IEEE Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Letters)*, 1993.

IEEE 841, *Petroleum and Chemical Industry — Premium-Efficiency, Severe-Duty, Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors Up to and Including 370 kW (500 hp) from 0.75 kW to 370 kW (1 hp to 500 hp)* , 2009 2021 .

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First Revision No. 55-NFPA 79-2022 [Section No. K.1.2.6]

K.1.2.6 ISO Publications.

International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO 5457, *Technical product documentation — Sizes and layout of drawing sheets*, 1999, amendment 1, 2010 .

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*, 2014 2019 .

ISO 7200, *Technical drawings — Title blocks product documentation — Data fields in title blocks and document headers*, 1984 2004 .

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*, 2010.

ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*, 2015.

ISO 13849-2, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*, 2012.

ISO 13850, *Safety of machinery — Emergency stop function — Principles for design*, 2015.

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First Revision No. 56-NFPA 79-2022 [Section No. K.1.2.7]

K.1.2.7 NEMA Publications.

National Electrical Manufacturers Association, 1300 North 17th Street, Suite 900, Arlington, VA 22209.

NEMA MG-4 MG 1 , *Motors and Generators*, 2014 2016 .

NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, 2014 2020 .

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**First Revision No. 57-NFPA 79-2022 [Section No. K.1.2.9]****K.1.2.9** UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 50, *Enclosures for Electrical Equipment, Non-Environmental Considerations*, 2015.

UL 62, *Flexible Cord and Cables*, 2018.

UL 248-14, *Low-Voltage Fuses — Part 14: Supplemental Fuses*, 2000, revised 2015 2020 .

UL 489, *Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures*, 2016, revised 2019 .

UL 498, *Attachment Plugs and Receptacles*, 2017, revised 2018 2021 .

UL 508, *Industrial Control Equipment*, 2018, revised 2021 .

UL 508A, *Industrial Control Panels*, 2018, revised 2021 .

UL 651, *Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings*, 2011, revised 2016 2020 .

UL 758, *Appliance Wiring Material*, 2014, revised 2017 2021 .

UL 1004-1, *Rotating Electrical Machines — General Requirements*, 2012, revised 2018 2020 .

UL 1077, *Supplementary Protectors for Use in Electrical Equipment*, 2015, revised 2016 2021 .

UL 1682, *Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type*, 2017.

UL 6420, Standard for Equipment Used for System Isolation and Rated as a Single Unit , 2012, revised 2018. .

UL 60950-1, *Information Technology Equipment — Safety — Part I: General Requirements*, 2007, revised 2014 2019 .

UL 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements , 2018.

UL 2237, *Outline of Investigation for Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery*, 2018 2019, revised 2021 .

UL 2238, *Cable Assemblies and Fittings for Industrial Control and Signal Distribution*, 2018, revised 2021 .

UL 60947-4-1, Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters , 2014, revised 2017.

UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements*, 2012, revised 2016 2019 .

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Added UL 60947-4-1 and UL 6420

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[Public Input No. 27-NFPA 79-2021 \[Section No. K.1.2.9\]](#)

[Public Input No. 29-NFPA 79-2021 \[Section No. K.1.2.9\]](#)

[Public Input No. 66-NFPA 79-2021 \[Section No. K.1.2.9\]](#)



First Revision No. 58-NFPA 79-2022 [Section No. K.2]

K.2 Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

DOE-HDBK-1003-96, *Guide to Good Practices for Training and Qualification of Maintenance Personnel*, 1996.

IEC 81346-2, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 2: Classification of objects and codes for classes*, 2009 (withdrawn) 2019.

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V — Part 2 combinations thereof — Part 2- 6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*, 2009 2021.

ISO 5457, *Technical product documentation — Sizes and layout of drawing sheets*, 1999, amendment 1, 2010.

ISO 7200, *Technical product documentation — Data fields in title blocks and document headers*, 2004.

~~UL 6420, *Equipment Used for System Isolation and Rated as a Single Unit*, 2012.~~

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UL 6420 was removed and put in Section K.1.2.9.

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[Public Input No. 30-NFPA 79-2021 \[Section No. K.2\]](#)



First Revision No. 85-NFPA 79-2022 [Section No. K.3]

K.3 References for Extracts in Informational Sections.

NFPA 70[®], National Electrical Code[®], 2020 2023 edition.

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Committee Statement: Updating revision year of NEC after receiving CW comments.

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