Public Input No. 114-NFPA 70B-2023 [Global Input]

Statement of Problem and Substantiation for Public Input

In the equipment maintenance chapters, we are referring to "electrical tests" differently in the tables. For example, in Chapter 11, the electrical test table title is "Transformer Electrical Tests". In Chapter 13, the electrical test table is titled "Panelboard and Switchboard Electrical Testing". The title of the tables should be consistent concerning the reference to the electrical tests. The recommendation is to standardize on a table title (either "Electrical Testing" or "Electrical Tests") and check the tables in the document to determine which table titles do not match the standardized name and then update the non-standardized titles with the standardized name. The test description in Table 9.2.2 should be reviewed and updated to use the standardized language.

Submitter Information Verification

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Submittal Date: Wed Dec 20 14:50:45 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-156-NFPA 70B-2024
Statement: This revision aligns the table and chapter section titles for consistency.

Public Input No. 124-NFPA 70B-2023 [Global Input]

Type your content here ...

Statement of Problem and Substantiation for Public Input

Throughout the document, there are references to "electrical equipment" and "electrical maintenance". The scope of NFPA 70B includes "electrical, electronic, and communications systems and equipment". In locations where we are referring only to "electrical", we are leaving out the "electronic" and "communications" systems and equipment. For example, the scope of Chapter 11 states "This chapter identified electrical maintenance requirements for power and distribution transformers". The term "electrical" seems to be limiting in areas like the equipment chapter scopes since we are performing maintenance on electrical equipment but it is not only "electrical maintenance"; it's maintenance on "electrical equipment". It is recommended the term "electrical" be removed from the equipment equipment chapter scopes to more clearly indicate to the reader that the chapter is about maintenance on the identified equipment and not just "electrical" maintenance.

Submitter Information Verification

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Submittal Date: Thu Dec 21 07:31:43 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-157-NFPA 70B-2024
Statement: The word "electrical" was deleted because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1.

Public Input No. 139-NFPA 70B-2023 [Global Input]

Type your content here ...

Statement of Problem and Substantiation for Public Input

In the equipment chapters, a lot of test types are listed as 1 (online standard test). In some locations we list a test type as "1 or 2" with 2 being an offline standard test. For most test, a test type listed as "1" could also be a "2", such as checking anchoring. Therefore the "1" test type could be changed to "1 or 2" in most locations. The recommendation is to review all of the equipment chapters to identify where a "1" test type could be change to a "1 or 2" test type and make those changes.

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Submittal Date: Thu Dec 21 09:08:39 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The Public Input does not comply with 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards because the specific revisions were not provided.

Public Input No. 232-NFPA 70B-2024 [Global Input]

Type your content here ...

Statement of Problem and Substantiation for Public Input

Some chapters (such as 30, 32, 33, 36) have a Documentation section. In order to keep the order of the chapters the same, it is recommended that any documentation sections in the equipment chapters be moved to after the XX.3.6 Special section in each chapter.

Submitter Information Verification

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Submittal Date: Mon Jan 01 20:29:42 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: The NFPA publishing system automatically adjusts section numbers for the addition or deletion of sections created by a first revision. A separate revision is renumbering sections of the equipment chapters.

Public Input No. 238-NFPA 70B-2024 [Global Input]

Type your content here ...

Statement of Problem and Substantiation for Public Input

Recommend to delete Annex F - NEMA Configurations. These configurations are not referenced in other chapters of NFPA 70B. The NEMA configurations information is leftover information for when NFPA 70B was a guideline. There is no specific need to include them in the current version of NFPA 70B. The remaining Annexes would need to be renumbers and other sections that reference the Annexes (like the Contents) will need to be updated.

Submitter Information Verification

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Submittal Date: Mon Jan 01 20:47:51 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Annex F provides information that is useful to the user.

Public Input No. 244-NFPA 70B-2024 [Global Input]

Type your content here ...

Statement of Problem and Substantiation for Public Input

Recommend to delete Annex J - Power Quality. Power quality is not referenced in other chapters of NFPA 70B. The power quality information is leftover information for when NFPA 70B was a guideline. There is no specific need to include the information in the current version of NFPA 70B. The remaining Annexes would need to be renumbers and other sections that reference the Annexes (like the Contents) will need to be updated. Definitions for terms only used in this annex (like "sag") should be identified and deleted. References should be checked and any related to power quality could be removed.

Submitter Information Verification

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Submittal Date: Mon Jan 01 21:04:03 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Information on power quality is retained in the annex to provide guidance in supporting trouble shooting concerns found during maintenance activities. There are multiple power quality items found within the body of the document that this can provide the user further guidance.

Public Input No. 253-NFPA 70B-2024 [Global Input]

Type your content here ...

Statement of Problem and Substantiation for Public Input

Annex M contains a significant number of informational references, many of which have little connection to the content of NFPA 70B. Review each of the references to determine if the reference should remain in NFPA 70B and, for those that remain, determine if they are in the right section of Annex M.

Submitter Information Verification

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Submittal Date: Mon Jan 01 21:59:56 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-140-NFPA 70B-2024
Statement: This first revision updates the revision dates of the referenced ASTM standards.

Public Input No. 30-NFPA 70B-2023 [Global Input]

Type your content here ...

Transfer Switch Equipment

39.1 Scope.

39.1.1

This chapter identifies electrical maintenance requirements for the following:

(1) Enclosed automatic transfer switches, bypass-isolation switches, and other transfer switch equipment rated 1000 volts or less

(2) Enclosed automatic transfer switches, bypass-isolation switches, and other transfer switch equipment rated over 1000 volts

39.2 Frequency of Maintenance.

The periodic maintenance procedures specified in Section 39.3 shall be performed in accordance with the frequencies specified in Chapter 9, unless otherwise specified in this chapter.

39.3 Periodic Maintenance Procedures.

39.3.1 Operational Status Inspection

The operational status of transfer switch equipment shall be inspected in accordance with Table 39.3.1.

Table 39.3.1 Transfer Switch Equipment Operational Status Inspection

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Note
1	Inspect alarms and indicating lights, and/or control device display panel information.	1	1	
2	Review control device factory and user settings, automatic transfer mode, timings and delays, features, communications, engine-start setting, passwords, access history,	1	1	Note a variance manufac recomme defau

	cybersecurity settings.			
3	Review event logs and/or download event logs from the control device [1]	1 or 1A	1 or 1A	
4	Review status and warnings from continuous monitoring and predictive maintenance systems [2]	1	1	Note a variance manufact specifica
5	Review data and/or download data logs from continuous monitoring and predictive maintenance systems.	1 or 1A	1 or 1A	

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Downloading data may require a specialized process and equipment. Authorized and trained personnel may perform this task locally or remotely. Due to cybersecurity concerns, this task shall be considered enhanced maintenance.

[2] To reduce the chance of equipment degradation and failure, qualified service personnel shall review continuous monitoring and predictive maintenance system data against the instructions from the transfer switch equipment manufacturer. If recommended by the manufacturer, service and maintenance shall be performed.

39.3.2 Visual Inspection.

Transfer switch equipment shall be visually inspected in accordance with Table 39.3.2.

Table 39.3.2 Transfer Switch Equipment Visual Inspections

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	
1	Inspect doors and latches for fit, dents, corrosion, and missing hardware.	1 or 2	1 or 2	
2	Inspect exposed insulating	1 or 2	2	Some equi

	materials for evidence of physical damage, cracks from stresses of operation, or contamination 1			
3	Inspect exposed wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition, including corrosion.	1 or 2	2	Some equi
4	Check that exposed switch contacts, moving and stationary main and arcing, are free from environmental contamination.	1 or 2	NA	This ta emergen
5	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration.	1 or 2	2	Some equi
6	Check that fuses are secured	1 or 2	2	
7	Examine all exposed parts for any evidence of a	1 or 2	NA	This ta emergen

	short-circuit event. [2]			
8	Inspect exposed arc chutes for damage or excessive erosion.	1 or 2	2	Some equi
9	Perform infrared thermography or review data from continuous thermal monitoring system. [3]	1A	1A	

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Environmental contamination of insulation may lead to over-surface arc tracking and phase-to-phase or phase-to-ground shorts.

[2] Short circuits are not limited to the main and arcing contacts. Depending on the short-circuit current level, the evidence of a short circuit may be anywhere in the equipment, for example, between cable lugs, between switching poles and the metal housing parts, between controller circuitry and the enclosure, and between exposed cable strands and the enclosure.

[3] Infrared thermography of enclosed components, such as power contacts, may only be possible with some equipment disassembly; therefore, it shall be performed during electrical testing. Instead, during visual inspection, infrared measurements shall focus on measuring exposed live parts such as field wiring terminals. The equipment manufacturer shall review thermography measurements and data from continuous thermal monitoring systems deemed out of specification as they may indirectly indicate problems in other hidden components.

39.3.3 Cleaning.

Transfer switch equipment shall be cleaned in accordance with Table 39.3.3.

Table 39.3.3 Transfer Switch Equipment Cleaning

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Vacuum clean the switch, covers, barriers, and enclosure.	2	2	
2	Wipe contact	2	NA	Do not use any cleaning

	surfaces with an abrasive pad and a lint-free cleaning cloth, vacuum remaining debris. [1]			agents unless specified by the manufacturer.
3	Vacuum or wipe surfaces of bus insulators and bus supports with a cleaning cloth.	2A	2	Do not use any cleaning agents unless specified by the manufacturer.
4	Vacuum arc chutes and contact covers.	2	NA	This task may require removal of covers and arc chutes.
5	Remove any access lubricants with a cleaning cloth. [2]	2	2	Do not use any cleaning agents unless specified by the manufacturer.
6	Remove and dry any moisture buildup on inside and outside walls of enclosure.	1 or 2	1 or 2	

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Unless permitted by the equipment manufacturer, cleaning contacts with detergents and solvents is prohibited. The extreme heat from the arcing current breaks down the cleaning products into byproducts that contaminate contacts, arc chutes, and surrounding insulation, leading to longer arc interruption times, accelerated contact deterioration, increased contact resistance, increased heat rise, and reduced dielectric strength of the insulation.

[2] Access lubricants shall be removed. Elevated temperature inside the equipment may reduce the viscosity and cause lubricants to flow away from the intended locations, causing surface contaminations of conducting and insulating parts that may lead to dielectric breakdowns.

39.3.4 Lubrication.

Transfer switch equipment shall be lubricated in accordance with Table 39.3.4.

Table 39.3.4 Transfer Switch Equipment Lubrication

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Apply recommended lubricant as needed to mechanism parts as specified by the manufacturer.	2	NA	If possible manually operate transfer switch and check for unusual resistance binding.
2	Only if required by the manufacturer, apply recommended lubricant to pivot points, moving, and sliding surfaces of contacts. [1]	2	2	Bypass-Isolation switches are typically provided with overlapping sliding contacts lubricated with conductive non-conductive grease.
3	Remove any excess lubricants with a cleaning cloth. [2]	2	2	Do not use any cleaning agents unless specified by the manufacturer

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Unless required by the equipment manufacturer, lubrication of contacts is prohibited. The extreme heat from the arcing current breaks down the lubrication into byproducts that contaminate contacts, arc chutes, and surrounding insulation, leading to longer arc interruption times, accelerated contact deterioration, increased contact resistance, increased heat rise, and reduced dielectric strength of the insulation.

[2] Access lubricants shall be removed. Elevated temperature inside the equipment may reduce the viscosity and cause lubricants to flow away from the intended locations, causing surface contaminations of conducting and insulating parts that may lead to dielectric breakdowns.

39.3.5 Mechanical Servicing

Transfer switch equipment shall be mechanically serviced in accordance with Table 39.3.5.

Table 39.3.5 Switch Mechanical Servicing

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	
1	Verify operation and alignment of main and arcing contacts. [1]	2A	2A	
2	Check all accessible electrical hardware connections. [2]	2	2	WARNING:
3	Verify operation of electro-mechanical, and mechanical interlocks.	2A	2A	External
4	Verify the contact deflection and/or pressure is within manufacturer's specification using a recommended gage. [3]	2A	2A	Perform
5	Manually operate transfer switch and check for unusual resistance or binding.	2	2	

6	Perform functional tests of rack-out mechanisms of removable equipment. [4]	2A	2A	External
7	Check enclosure door for missing fasteners, gaskets, and check operation of door latches.	2	2	Enclos

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Due to the power contacts' extreme criticality, operation and alignment verification shall only be performed by qualified personnel according to the equipment manufacturer's instructions. In the rare case that adjustment is necessary, it can only be achieved by authorized and qualified personnel.

[2] Torque verifications shall be limited to field-made connections. Factory-made connections, such as internal bolted bus connections and internal wire terminations, do not require torque verification. If infrared thermography or thermal monitoring systems indicate a problem, factory-made connections shall be serviced by qualified personnel according to the equipment manufacturer's instructions. If the manufacturer's instructions are not available, particular care shall be exercised to identify the correct hardware size, SAE grade, Metric class, and the materials in contact. It is also essential to correctly identify electrical connections from mechanical connections of live parts supports. Such parts may require torque values based on the strength of the materials instead of hardware grades or classes.

[3] While the loss of contact deflection or pressure is a crucial indicator of contact wear and should be periodically verified, due to the criticality of the measurement, this task shall be only performed by qualified personnel according strictly to the manufacturer's instructions using specified tools and gages.

[4] This task is applicable to transfer switch equipment employing draw-out breakers or draw-out molded case switches and automatic bypass-isolation transfer switches with removable primary and/or secondary bypass switches.

39.3.6 Electrical Testing

Transfer switch equipment shall be electrically tested in accordance with Table 39.3.6.

Table 39.3.6 Transfer Switch Equipment Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography or review data from continuous	1A	1A	

	thermal monitoring system.			
2	Measure contact resistance of each switching pole.	2	2A	
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with switch closed and across each open pole.	2A	2A	
4	Functional tests only for switches with motor operators: Verify control power for close and trip functions Verify the electrical operation of switch Perform trip and close tests Verify operation of the switch from local switches or terminal blocks	2	2	Also appli if equipped an integ overcurr protecti device
5	Functional tests only for switches with shunt trip capabilities.	2	2	
6	Verify operation of space heaters, if equipped.	1 or 2	1 or 2	
7	Perform overpotential	2A	2A	WARNING not perfor

	test on control wiring.			test on wi connecte solid-sta compone
8	Test arc reduction technology in accordance with the manufacturer's instructions.	2	2	
9	Perform functional transfer tests for automatic transfer switches, bypass switches, and other transfer switch equipment, in accordance with the manufacturer's instructions. [1]	1	1	Transfer te shall b perform immedia after maintena procedure ensure t integrity o emerger power sys These tests include tra on loss power in transitic closed transitior delaye transitic
10	Perform functional tests of bypassing and isolating of the main transfer switch. [2]	1	1	Applicabl bypass/iso switches redunda transfe equipme

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Qualified personnel shall perform functional transfer tests of the transfer switch equipment with permission, according to the facility maintenance procedures, and following the manufacturer's operating instructions. The transfer switch operating mechanism and automatic control system shall be tested by simulating a normal source failure, return of normal source, loss of emergency source, return of emergency source, and single-phase conditions. Additionally, all essential functions and settings shall be tested; for example, transfer and re-transfer time delays, engine start, frequency sensing, voltage sensing, phase angle sensing, engine cool down and shutdown, open and delayed-transition interlocks, closed-transition interlocks, and any other devices within the transfer switch equipment as required by the devices' manufacturer.

[2] Qualified personnel shall perform functional tests of bypassing and isolating the primary transfer switch with permission, according to the facility maintenance procedures, and following the manufacturer's operating instructions. The test procedure shall include testing functionality of the draw-out mechanism, primary main power isolation contacts, secondary control isolation contacts, bypass operating mechanism, and bypass control system of the bypass/isolation transfer switch to verify the transfer switch is completely isolated from the power system without interrupting the power to the load.

39.3.7 Testing Under Load

Transfer switch equipment shall be tested under load in accordance with Table 39.3.7 or the manufacturer's published instructions.

Table 39.3.6 Transfer Switch Equipment Test Under Load

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Test under load. [1]	1A	1A	This testing is typically performed during EPSS full load testing Typically includes testing loss of power by opening utility breaker, testing generator engine start circuit, automatic transferring between Normal and Emergency sources, running equipment under load, and engine shutdown. This testing shall be performed immediately after maintenance procedures to ensure the integrity of

				the emergency power system.

NA: Not applicable.

*** Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.**

[1] Where required, qualified personnel shall exercise an Emergency Power Supply System (EPSS) under load with permission according to the facility maintenance procedures and follow the automatic transfer switch equipment manufacturer's operating instructions. The test shall include testing under load all components of the EPSS ranging from generators to the operation of the automatic transfer switches, including the engine start functions of the transfer switch and the ability to transfer the load from one source to another automatically.

END

Additional Proposed Changes

File Name	Description	Approved
Chapter_39_Transfer_Switch_Equipment_WALTER_DOLINSKI_-_NFPA_copy.docx		

Statement of Problem and Substantiation for Public Input

The ability to reliably transfer loads between two power sources without disrupting power is critical in many applications, including healthcare, data centers, oil and gas and others. Proper maintenance of the equipment that accomplishes this transfer is important.

Although transfer switches were addressed in previous editions of NFPA 70B it appears that their content was inadvertently reduced in the 2023 edition. References to transfer switches existed in the 2019 edition of NFPA 70B in multiple locations including but not limited to 6.3.4, 9.7.2, 11.26, 12.2.1.1, 12.2.5.1, Chapter 28, Figures H.23 and H.49 and other locations.

The 2023 edition included Transfer Switches in Chapter 17; however, Transfer switches are a separate offering with unique requirements and should be addressed by a dedicated chapter.

There are a total of three related public inputs being submitted: One to remove transfer switches from Chapter 17, One to create a new Chapter 39 dedicated to Transfer Switch Equipment, and one to address maintenance intervals for Transfer Switch Equipment in Table 9.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 28-NFPA 70B-2023 [Chapter 17]	

Submitter Information Verification

Submitter Full Name: Walter Dolinski
Organization: ASCO Power Technologies
Street Address:
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Submittal Date: Mon Dec 11 13:21:30 EST 2023

Committee: EEM-AAA

Committee Statement

Resolution: FR-155-NFPA 70B-2024

Statement: A new equipment chapter, dedicated to transfer switches, has been added to distinguish them from other switches. Transfer switches serve specific purpose, are designed to different standards, and necessitate a different level and scope of maintenance than switches.

Substantiation

The ability to reliably transfer loads between two power sources without disrupting power is critical in many applications, including healthcare, data centers, oil and gas and others. Proper maintenance of the equipment that accomplishes this transfer is important.

Although transfer switches were addressed in previous editions of NFPA 70B it appears that their content was inadvertently reduced in the 2023 edition. References to transfer switches existed in the 2019 edition of NFPA 70B in multiple locations including but not limited to 6.3.4, 9.7.2, 11.26, 12.2.1.1, 12.2.5.1, Chapter 28, Figures H.23 and H.49 and other locations.

The 2023 edition included Transfer Switches in Chapter 17; however, Transfer switches are a separate offering with unique requirements and should be addressed by a dedicated chapter.

There are a total of three related public inputs being submitted: One to remove transfer switches from Chapter 17, One to create a new Chapter 39 dedicated to Transfer Switch Equipment, and one to address maintenance intervals for Transfer Switch Equipment in Table 9.2.2.

>>> Add this TSE information into **Table 9.2.2 Maintenance Intervals**

Table 9.2.2 Maintenance Intervals

		Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3
Transfer Switch Equipment [1]	Operational status inspection [2]	1 week	1 week	1 week
	Visual inspection	12 months	6 months	3 months
	Cleaning	36 months	24 months	12 months
	Lubrication	36 months	24 months	12 months
	Mechanical servicing	36 months	24 months	12 months
	Electrical testing	36 months	24 months	12 months
	Testing under load [3]	1 month	1 month	1 month

[1] Service intervals for transfer switch equipment intended for use in emergency systems are under Condition 3 and reflect the requirements in NFPA 110. These intervals are shorter than those for switches in Chapter 17 to ensure that the transfer equipment is uniquely maintained to supply emergency power within 10 seconds of loss of normal power.

[2] For regulated facilities such as hospitals, Section 8.4.1 of NFPA 110 requires a weekly operational status inspection typically covering alarms, indicating lights, control device display, control device factory settings, user settings, status of the automatic transfer mode, delays, communications, engine-start setting, cybersecurity settings, etc.

[3] For regulated facilities such as hospitals, Section 8.4.1 of NFPA 110 requires a monthly EPS exercise under load to test the performance of the generator adequately, the engine start functions of the transfer switch, and the ability to transfer the load from one source to the other source. Additionally, The Joint Commission standard EC.02.05.07 EP7 requires the monthly generator load test to include a complete simulated cold start and automatic and manual transfer of all essential electrical system loads. The weekly inspection of the emergency power supply system (EPSS) as per EC.02.05.07 EP 4 requires inspection of all associated components and batteries, which include all automatic transfer switches, battery chargers, radiators, fuel pumps, etc.

For reference, the following table summarizes the frequency of maintenance in NFPA standards.

frequency	weekly	monthly	quarterly	semiannual	annual	3 years
NFPA 99 – 2021 Health Care Facilities Code		6.7.4.1.1.3 Maintenance shall be performed (monthly) per Chapter 8 of NFPA 110.				Table 6.9.4.1 Transfer equipment testing periods are every 3 years.
		6.7.4.1.1.5 (A) Generators shall be tasted 12 times per year.				
		Table 6.9.4.1 Transfer equipment inspection period is monthly.				
NPFA 110 - 2022 Standard for Emergency and Standby		8.4.6.1 Transfer switches shall be operated Monthly.			A.8.3.1 Transfer switch main contacts visual inspection and cleaning	

Power Systems					frequency is annual	
	8.4.1 EPS components shall be inspected weekly.	8.4.1 EPSS components shall be exercised under load at least monthly.	A.8.3.4 Transfer switches shall be subjected to quarterly inspections		A.8.3.4 Transfer switches shall be subjected to an annual maintenance	
NFPA 111-2022 Standard on Stored Electrical Energy Emergency and Standby Power Systems		8.4.1 Level 1 equipment shall be inspected and tested monthly		A.8.3.2 Transfer switch test	A.8.3.2 Transfer switch contacts visual inspection	
					8.4.4 The SEPSS shall be tested annually at 100/60 percent of its rated load	

>>> Remove transfer switch equipment from the charging text of Switch Chapter 17 and Table 17.3.5

Switches

17.1 Scope.

17.1.1

This chapter identifies electrical maintenance requirements for the following:

(1) Enclosed and dead-front (safety) switches, bolted-pressure switches (BPS), high-pressure contact switches (HPC~~), automatic transfer switches, bypass-isolation switches, and other transfer switch equipment~~ rated 1000 volts or less

(2) Switches used in metal-enclosed load interrupter switchgear ~~and automatic transfer switches, bypass-isolation switches, and other transfer switch equipment~~ rated over 1000 volts.

Table 17.3.5 Switch Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography	1A	1	
2	Measure contact resistance of each switching pole	2A	2	
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with switch closed and across each open pole	2A	2	
4	Functional tests only for switches with motor operators: Verify control power for close and trip functions Verify the electrical operation of switch Perform trip and close tests Verify operation of the switch from local switches or terminal blocks	2	2	
5	Functional tests only for switches with shunt trip capabilities	2	2	
6	Measure the resistance between the line and load terminal pads on each phase	NA	2	
7	Verify operation of space heaters, if equipped	NA	2	

8	Perform overpotential test one pole at a time with the other poles and structure grounded	NA	2A	
9	Perform overpotential test on control wiring	NA	2A	WARNING: Do not perform this test on wiring connected to solid-state components.
10	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	
~~11~~	~~Perform functional tests for automatic transfer switches, bypass switches, and other transfer switch equipment~~	~~1A or 2A~~	~~1A or 2A~~	

>>> Place transfer switches in a new Chapter 39

Transfer Switch Equipment

39.1 Scope.

39.1.1

This chapter identifies electrical maintenance requirements for the following:

(1) Enclosed automatic transfer switches, bypass-isolation switches, and other transfer switch equipment rated 1000 volts or less

(2) Enclosed automatic transfer switches, bypass-isolation switches, and other transfer switch equipment rated over 1000 volts

39.2 Frequency of Maintenance.

The periodic maintenance procedures specified in **Section 39.3** shall be performed in accordance with the frequencies specified in **Chapter 9**, unless otherwise specified in this chapter.

39.3 Periodic Maintenance Procedures.

39.3.1 Operational Status Inspection

The operational status of transfer switch equipment shall be inspected in accordance with **Table 39.3.1.**

Table 39.3.1 Transfer Switch Equipment Operational Status Inspection

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Inspect alarms and indicating lights, and/or control device display panel information.	1	1	
2	Review control device factory and user settings, automatic transfer mode, timings and delays, features, communications, engine-start setting, passwords, access history, cybersecurity settings.	1	1	Note any variance from manufacturer recommended defaults.
3	Review event logs and/or download event logs from the control device [1]	1 or 1A	1 or 1A	
4	Review status and warnings from continuous monitoring and predictive maintenance systems [2]	1	1	Note any variance from manufacturer's specifications.
5	Review data and/or download data logs from continuous monitoring and predictive maintenance systems.	1 or 1A	1 or 1A	

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Downloading data may require a specialized process and equipment. Authorized and trained personnel may perform this task locally or remotely. Due to cybersecurity concerns, this task shall be considered enhanced maintenance.

[2] To reduce the chance of equipment degradation and failure, qualified service personnel shall review continuous monitoring and predictive maintenance system data against the instructions from the transfer switch equipment manufacturer. If recommended by the manufacturer, service and maintenance shall be performed.

39.3.2 Visual Inspection.

Transfer switch equipment shall be visually inspected in accordance with **Table 39.3.2.**

Table 39.3.2 Transfer Switch Equipment Visual Inspections

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Inspect doors and latches for fit, dents, corrosion, and missing hardware.	1 or 2	1 or 2	
2	Inspect exposed insulating materials for evidence of physical damage, cracks from stresses of operation, or contamination [1]	1 or 2	2	Some equipment may be provided with viewing windows for inspection while energized.
3	Inspect exposed wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition, including corrosion.	1 or 2	2	Some equipment may be provided with viewing windows for inspection while energized.

4	Check that exposed switch contacts, moving and stationary main and arcing, are free from environmental contamination.	1 or 2	NA	This task may require removal of covers and arc chutes. Inspection of normal and emergency source contacts will require operating the switch electrically or manually.
5	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration.	1 or 2	2	Some equipment may be provided with viewing windows for inspection while energized.
6	Check that fuses are secured	1 or 2	2	
7	Examine all exposed parts for any evidence of a short-circuit event. [2]	1 or 2	NA	This task may require removal of covers and arc chutes. Inspection of normal and emergency source contacts will require operating the switch electrically or manually.
8	Inspect exposed arc chutes for damage or excessive erosion.	1 or 2	2	Some equipment may be provided with viewing windows for inspection while energized.
9	Perform infrared thermography or review data from continuous thermal monitoring system. [3]	1A	1A	

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Environmental contamination of insulation may lead to over-surface arc tracking and phase-to-phase or phase-to-ground shorts.

[2] Short circuits are not limited to the main and arcing contacts. Depending on the short-circuit current level, the evidence of a short circuit may be anywhere in the equipment, for example, between cable lugs, between switching poles and the metal housing parts, between controller circuitry and the enclosure, and between exposed cable strands and the enclosure.

[3] Infrared thermography of enclosed components, such as power contacts, may only be possible with some equipment disassembly; therefore, it shall be performed during electrical testing. Instead, during visual inspection, infrared measurements shall focus on measuring exposed live parts such as field wiring terminals. The equipment manufacturer shall review thermography measurements and data from continuous thermal monitoring systems deemed out of specification as they may indirectly indicate problems in other hidden components.

39.3.3 Cleaning.

Transfer switch equipment shall be cleaned in accordance with **Table 39.3.3.**

Table 39.3.3 Transfer Switch Equipment Cleaning

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Vacuum clean the switch, covers, barriers, and enclosure.	2	2	
2	Wipe contact surfaces with an abrasive pad and a lint-free cleaning cloth, vacuum remaining debris. [1]	2	NA	Do not use any cleaning agents unless specified by the manufacturer.
3	Vacuum or wipe surfaces of bus insulators and bus supports with a cleaning cloth.	2A	2	Do not use any cleaning agents unless specified by the manufacturer.
4	Vacuum arc chutes and contact covers.	2	NA	This task may require removal of covers and arc chutes.
5	Remove any access lubricants with a cleaning cloth. [2]	2	2	Do not use any cleaning agents unless specified by the manufacturer.

6	Remove and dry any moisture buildup on inside and outside walls of enclosure.	1 or 2	1 or 2	

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Unless permitted by the equipment manufacturer, cleaning contacts with detergents and solvents is prohibited. The extreme heat from the arcing current breaks down the cleaning products into byproducts that contaminate contacts, arc chutes, and surrounding insulation, leading to longer arc interruption times, accelerated contact deterioration, increased contact resistance, increased heat rise, and reduced dielectric strength of the insulation.

[2] Access lubricants shall be removed. Elevated temperature inside the equipment may reduce the viscosity and cause lubricants to flow away from the intended locations, causing surface contaminations of conducting and insulating parts that may lead to dielectric breakdowns.

39.3.4 Lubrication.

Transfer switch equipment shall be lubricated in accordance with **Table 39.3.4.**

Table 39.3.4 Transfer Switch Equipment Lubrication

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Apply recommended lubricant as needed to mechanism parts as specified by the manufacturer.	2	NA	If possible, manually operate transfer switch and check for unusual resistance or binding.
2	Only if required by the manufacturer, apply recommended lubricant to pivot points, moving, and sliding surfaces of contacts. [1]	2	2	Bypass-Isolation switches are typically provided with overlapping sliding contacts lubricated with conductive or non-conductive grease.
3	Remove any excess lubricants with a cleaning cloth. [2]	2	2	Do not use any cleaning agents

				unless specified by the manufacturer.

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Unless required by the equipment manufacturer, lubrication of contacts is prohibited. The extreme heat from the arcing current breaks down the lubrication into byproducts that contaminate contacts, arc chutes, and surrounding insulation, leading to longer arc interruption times, accelerated contact deterioration, increased contact resistance, increased heat rise, and reduced dielectric strength of the insulation.

[2] Access lubricants shall be removed. Elevated temperature inside the equipment may reduce the viscosity and cause lubricants to flow away from the intended locations, causing surface contaminations of conducting and insulating parts that may lead to dielectric breakdowns.

39.3.5 Mechanical Servicing

Transfer switch equipment shall be mechanically serviced in accordance with **Table 39.3.5.**

Table 39.3.5 Switch Mechanical Servicing

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Verify operation and alignment of main and arcing contacts. [1]	2A	2A	
2	Check all accessible electrical hardware connections. [2]	2	2	See Chapter 7. WARNING: Do not retorque factory installed hardware.
3	Verify operation of electro-mechanical, and mechanical interlocks.	2A	2A	External power source may be required for testing electro-mechanical interlocks.
4	Verify the contact deflection and/or pressure is within manufacturer's specification using	2A	2A	Perform this task per manufacturer's instructions.

	a recommended gage. [3]			
5	Manually operate transfer switch and check for unusual resistance or binding.	2	2	
6	Perform functional tests of rack-out mechanisms of removable equipment. [4]	2A	2A	External power source may be required for electro-mechanical interlocks.
7	Check enclosure door for missing fasteners, gaskets, and check operation of door latches.	2	2	Enclosure shall be secured as intended by the manufacturer.

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Due to the power contacts' extreme criticality, operation and alignment verification shall only be performed by qualified personnel according to the equipment manufacturer's instructions. In the rare case that adjustment is necessary, it can only be achieved by authorized and qualified personnel.

[2] Torque verifications shall be limited to field-made connections. Factory-made connections, such as internal bolted bus connections and internal wire terminations, do not require torque verification. If infrared thermography or thermal monitoring systems indicate a problem, factory-made connections shall be serviced by qualified personnel according to the equipment manufacturer's instructions. If the manufacturer's instructions are not available, particular care shall be exercised to identify the correct hardware size, SAE grade, Metric class, and the materials in contact. It is also essential to correctly identify electrical connections from mechanical connections of live parts supports. Such parts may require torque values based on the strength of the materials instead of hardware grades or classes.

[3] While the loss of contact deflection or pressure is a crucial indicator of contact wear and should be periodically verified, due to the criticality of the measurement, this task shall be only performed by qualified personnel according strictly to the manufacturer's instructions using specified tools and gages.

[4] This task is applicable to transfer switch equipment employing draw-out breakers or draw-out molded case switches and automatic bypass-isolation transfer switches with removable primary and/or secondary bypass switches.

39.3.6 Electrical Testing

Transfer switch equipment shall be electrically tested in accordance with **Table 39.3.6.**

Table 39.3.6 Transfer Switch Equipment Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography or review data from continuous thermal monitoring system.	1A	1A	
2	Measure contact resistance of each switching pole.	2	2A	
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with switch closed and across each open pole.	2A	2A	
4	Functional tests only for switches with motor operators: Verify control power for close and trip functions Verify the electrical operation of switch Perform trip and close tests Verify operation of the switch from local switches or terminal blocks	2	2	Also applicable if equipped with an integral overcurrent protection device
5	Functional tests only for switches with shunt trip capabilities.	2	2	
6	Verify operation of space heaters, if equipped.	1 or 2	1 or 2	
7	Perform overpotential test on control wiring.	2A	2A	WARNING: Do not perform this test on wiring connected to solid-state components.

8	Test arc reduction technology in accordance with the manufacturer's instructions.	2	2	
9	Perform functional transfer tests for automatic transfer switches, bypass switches, and other transfer switch equipment, in accordance with the manufacturer's instructions. [1]	1	1	Transfer testing shall be performed immediately after maintenance procedures to ensure the integrity of the emergency power system. These tests may include transfer on loss of power in open transition, closed transition, or delayed transition.
10	Perform functional tests of bypassing and isolating of the main transfer switch. [2]	1	1	Applicable to bypass/isolation switches and redundant transfer equipment.

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Qualified personnel shall perform functional transfer tests of the transfer switch equipment with permission, according to the facility maintenance procedures, and following the manufacturer's operating instructions. The transfer switch operating mechanism and automatic control system shall be tested by simulating a normal source failure, return of normal source, loss of emergency source, return of emergency source, and single-phase conditions. Additionally, all essential functions and settings shall be tested; for example, transfer and re-transfer time delays, engine start, frequency sensing, voltage sensing, phase angle sensing, engine cool down and shutdown, open and delayed-transition interlocks, closed-transition interlocks, and any other devices within the transfer switch equipment as required by the devices' manufacturer.

[2] Qualified personnel shall perform functional tests of bypassing and isolating the primary transfer switch with permission, according to the facility maintenance procedures, and following the manufacturer's operating instructions. The test procedure shall include testing functionality of the draw-out mechanism, primary main power isolation contacts, secondary control isolation contacts, bypass operating mechanism, and bypass control system of the bypass/isolation transfer switch to verify the

transfer switch is completely isolated from the power system without interrupting the power to the load.

39.3.7 Testing Under Load

Transfer switch equipment shall be tested under load in accordance with Table 39.3.7 or the manufacturer's published instructions.

Table 39.3.6 Transfer Switch Equipment Test Under Load

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Test under load. [1]	1A	1A	This testing is typically performed during EPSS full load testing Typically includes testing loss of power by opening utility breaker, testing generator engine start circuit, automatic transferring between Normal and Emergency sources, running equipment under load, and engine shutdown. This testing shall be performed immediately after maintenance procedures to ensure the integrity of the emergency power system.

NA: Not applicable.

* Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

[1] Where required, qualified personnel shall exercise an Emergency Power Supply System (EPSS) under load with permission according to the facility maintenance procedures and follow the automatic transfer switch equipment manufacturer's operating instructions. The test shall include testing under load all

components of the EPSS ranging from generators to the operation of the automatic transfer switches, including the engine start functions of the transfer switch and the ability to transfer the load from one source to another automatically.

END

Public Input No. 197-NFPA 70B-2023 [Section No. 1.1]

1.1 Scope.

This standard covers the preventive maintenance of electrical ~~, electronic, and communications~~ systems and equipment.

Statement of Problem and Substantiation for Public Input

The document does not contain any information for maintenance on "electronic systems" (Chapter 26 is for Electronic Systems and is currently "Reserved".) The document does not contain any information for maintenance on "communication systems" except where there is communication with equipment such as protection relays. There is no specific information about communication equipment such as Ethernet systems, phone systems, and emergency alarm systems. The scope is modified with this PI to change the scope to match the content of the document.

Submitter Information Verification

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Submittal Date: Fri Dec 22 14:57:47 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Retaining “electronic and communications” clarifies the scope.

Public Input No. 42-NFPA 70B-2023 [Section No. 1.1]

1.1 Scope.

This standard covers the preventive and predictive maintenance of electrical, electronic, and communications systems and equipment.

Statement of Problem and Substantiation for Public Input

Many of the tasks included in NFPA 70B are tests that are used to determine the health of equipment. Those tests are "predictive" tests as they help predict the life expectancy of the equipment. The current scope statement refers only to "preventive" maintenance which would include activities like cleaning and greasing equipment. The standards covers much more than the preventive maintenance. Adding "predictive" maintenance more adequately covers the content of the document.

Submitter Information Verification

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Submittal Date: Wed Dec 20 09:14:47 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-20-NFPA 70B-2024
Statement: The addition of “predictive” and “corrective” are added to provide clarity that all types of maintenance are included in the scope of the standard.

Public Input No. 169-NFPA 70B-2023 [New Section after 1.2]

A1.2

Electrical maintenance is the one of best ways to ensure continued reliable service from electrical, electronic, and communication systems and equipment. No amount of maintenance can correct improper equipment application or physical damage done during installation.

Statement of Problem and Substantiation for Public Input

This proposed new annex material is based on similar material that is currently part of annex material for Chapter 18. The information in the annex material for Chapter 18 seemed to be broadly applicable to all equipment covered in NFPA 70B. Therefore this PI is created to add that material. A separate, unlinked, PI has been created to remove the similar content in the annex material for Chapter 18 to remove what would be redundant text if this PI is accepted. The two PIs are not linked as one does not have to be done in order for the other one to be done and accepting just one does not create a problem if the other one remains.

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Submittal Date: Fri Dec 22 12:38:30 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: This recommended annex information is unnecessary to provide insight into the purpose of NFPA 70B which is addressed in Section 1.2.

Public Input No. 144-NFPA 70B-2023 [Section No. 1.3.1]

1.3.1

This standard applies to maintenance for electrical, electronic, and communications systems and equipment and is not intended to duplicate or supersede instructions provided by manufacturers. ~~Systems~~ Most systems and equipment covered ~~are~~ outside of Chapter 36A are typical of those installed for industrial plants, institutional and commercial buildings, and large multifamily residential complexes.

Additional Proposed Changes

File Name	Description	Approved
70B_Public_Comment_No_4.pdf	70B_PC4	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 4 of the (F2022) Second Draft Report for NFPA and per the Regs. at 4.4.8.3.1 and needs to be reconsidered by the TC for the next edition of the document.

A sizable minority of the systems included in this proposed standard are associated with individual residences as well. While there are special issues associated with prescribing maintenance at dwellings, there certainly are maintenance requirements, including but--importantly--not limited to those associated with manufacturers' instructions.
I will propose, in separate comments, adjustments to the possible ways described in PI 37 to include individual dwellings in this standard. When discussing them, I refer to Chapter 36A to avoid confusion, as the original PI talks of Chapter 36, but that number is used for a different purpose in the First Draft.
1) Why include individual dwellings in 70B?
Amount of harm reduction
According the NFPA’s 2019 report on home electrical fires,
https://www.nfpa.org/-/media/Files/Newsand-Research/Fire-statistics-and-reports/US-Fire-Problem/Fire-causes/osHomeElectricalFires.pdf ,
electrical failures or malfunctions were the second most common cause of home fires. Number Two. That count doesn’t include
all home fires involving what’s normally thought of as electrical equipment (aside from compactors, which were explicitly excluded). The Number One cause of home fires was unattended equipment–which could have been the NFIRS code chosen by fire departments to report some additional electrical equipment that overheated at EOL or in locked-rotor condition.
In addition to these, some home fire damage and deaths involving electrical equipment that would not be categorized as due to electrical failures or malfunctions still could have been prevented by periodically inspecting electrical equipment. An example is lint fires in dryer vents.
In short, while I am convinced that our best data show that electrical failures are AT LEAST the Number 2 cause of home electrical fires, I also am reasonably convinced that this is an underestimate of how many home electrical fires could potentially be prevented by maintenance inspections. I am also convinced that such inspections are more likely to occur if we include a framework for them in 70B.
Limiting the numbers to electrical failures or malfunctions, the same report shows that roughly 40% of these did not involve arcing, so even perfectly functioning AFCIs would not eliminate them. Those silent monitors won’t take the place of inspection.
The report also says that electrical fires were the worst type for property damage or civilian death. Even this death rate can be considered an undercount of the deaths that could be prevented by including individual dwellings in this standard: with inspection and maintenance, some of the fire and asphyxiation deaths would have been prevented by restoration of functioning smoke and CO alarms. It

is a well-established fact that some fire deaths occur in homes that had formerly functioning alarms. Replacing them with updated units that are less likely to nuisance-alarm does not guarantee that they all will be kept functional, but certainly some will. This was part of the rationale behind changes in the UL standards.

The substantiation is not limited to avoiding fires. The NFPA's 2017 report on non-fire electrical incidents asserts that 1-2 family dwellings were the sites of most of these non-fire visits by Fire Departments that didn't take place on a road or in a parking area. Specifically, when we eliminate downed power lines anywhere, the majority of the remaining electrical incidents took place at 1-2 family residences.

Finally, without active maintenance, electrical fire deaths in dwellings could well increase over the coming decade or two because of changes in our population and occupancy. Quoting from the Executive Summary of NFPA's report, 2021 Fire Safety in the
United States since 1980 THROUGH THE LENS OF THE NFPA FIRE & LIFE SAFETY ECOSYSTEM by Marty Ahrens & Birgitte Messerschmidt

"We have been successful in dramatically reducing the number of fire deaths of children under five, but there has been little change in the death toll of older adults. Several factors contribute to older adult fire death toll, including the increasing age of the population overall, older adults increasingly living alone, the increase in disabilities with age, and the tendency for older adults to live in older homes."

I know of no reason to think this tendency with respect to occupancy will change, except very gradually.

Worker protection

Suppose we were concerned about electrical maintenance for the sole, exclusive reason that maintaining workplace electrical systems is essential to complying with NFPA 70E, and with the OSH Act. Even on this basis, while maintaining residential electrical systems is not the key it also cannot be not excluded. Dwellings, even one- and two-family dwellings, even condo units, sometimes are employee workplaces. Staff may even sleep in the dwelling, at least intermittently.

Even the title of the proposed standard does not suggest a workplace-only scope.

Enforceability

There's no point in adopting a code, or publishing a model code, if it can't be enforced. Can it? The idea of requiring maintenance inspection is not new. Rather, it is more than a century old; and it has been enforced. In 1914–1914!–the Chicago Bureau of Electrical Inspection had seven inspectors devoted to reinspection. One concern reported at the time was "unauthorized alterations frequently made by inexperienced electricians . . .". Dwellings certainly were not and are not exempt from this hazard, or from the need for competent maintenance to prevent some of the harm this can cause.

The UK's "Regs," British Standard 7671, like our NEC, is adopted in a number of places around the world. It too recommends reinspection of dwellings; an Electrical Installation Condition Report, which can take half a day, according to one convenience-sampled source (https://www.milesmantayelectrical.com/testing) . For rentals, it does a lot more than recommend this; fairly recent legislation, The Electrical Safety Standards in the Private Rented Sector (England) Regulations 2020, requires inspection every five years–or sooner, if issues of concern are documented that don't demand immediate remediation.

Now the UK allows extension or even addition of circuits in most places without permits or inspection; this may justify more frequent inspection than is needed over here. However, realistically, much work in the U.S. skirts these requirements as well.

https://www.gov.uk/government/publications/electrical-safety-standards-in-the-private-rented-sectorguidance-
for-landlords-tenants-and-local-authorities/guide-for-landlords-electrical-safety-standards-inthe-private-rented-sector

https://www.legislation.gov.uk/uksi/2020/312/contents/made

This said, the Introduction to NFPA 73 mentions research suggesting that only 5% of fires take place in homes less than 10 years old. While our concerns extend beyond fires alone, this datum does suggest that a combination of three elements may make it much less necessary to reinspect homes that were quite that recently built. These are the lack of aging-related deterioration in newer homes; initial inspection prior to granting a Certificate of Occupancy; plus a lower level of illegal alterations than in homes that have had longer to deteriorate or invite upgrading for other reasons.

If we are concerned about the ability of inspection departments to handle the volume of work dwelling maintenance reinspection could add, there are ways to address enforcement other than adding to the workload of jurisdictional inspectors. In similar situations, duties have been offloaded onto Third Party Inspectors. In others, licensed contractors have been authorized to certify under bond that inspection/maintenance activities have been performed successfully.

Submitter Information Verification

Submitter Full Name: Tc On Eew-Aaa
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Submittal Date: Thu Dec 21 14:43:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The proposed change should be submitted to NFPA 73 which covers maintenance in dwellings. The Committee scope of EFM-AAA (NFPA 73) is: This Committee shall have primary responsibility for documents on the maintenance of electrical systems in existing one-family, two-family, and multifamily dwellings.

Public Comment No. 4-NFPA 70B-2021 [Section No. 1.3.1]

1.3.1

This standard applies to maintenance for electrical, electronic, and communications systems and equipment and is not intended to duplicate or supersede instructions that manufacturers normally provide. ~~Systems~~ Most systems and equipment covered outside of Chapter 36A are typical of those installed in industrial plants, institutional and commercial buildings, and large multifamily residential complexes.

Statement of Problem and Substantiation for Public Comment

A sizable minority of the systems included in this proposed standard are associated with individual residences as well. While there are special issues associated with prescribing maintenance at dwellings, there certainly are maintenance requirements, including but--importantly--not limited to those associated with manufacturers' instructions.

I will propose, in separate comments, adjustments to the possible ways described in PI 37 to include individual dwellings in this standard. When discussing them, I refer to Chapter 36A to avoid confusion, as the original PI talks of Chapter 36, but that number is used for a different purpose in the First Draft.

1) Why include individual dwellings in 70B?

Amount of harm reduction

According the NFPA's 2019 report on home electrical fires, https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/Fire-causes/osHomeElectricalFires.pdf , electrical failures or malfunctions were the second most common cause of home fires. Number Two. That count doesn't include
all home fires involving what's normally thought of as electrical equipment (aside from compactors, which were explicitly excluded). The Number One cause of home fires was unattended equipment– which could have been the NFIRS code chosen by fire departments to report some additional electrical equipment that overheated at EOL or in locked-rotor condition.

In addition to these, some home fire damage and deaths involving electrical equipment that would not be categorized as due to electrical failures or malfunctions still could have been prevented by periodically inspecting electrical equipment. An example is lint fires in dryer vents.

In short, while I am convinced that our best data show that electrical failures are AT LEAST the Number 2 cause of home electrical fires, I also am reasonably convinced that this is an underestimate of how many home electrical fires could potentially be prevented by maintenance inspections. I am also convinced that such inspections are more likely to occur if we include a framework for them in 70B.

Limiting the numbers to electrical failures or malfunctions, the same report shows that roughly 40% of these did not involve arcing, so even perfectly functioning AFCIs would not eliminate them. Those silent monitors won't take the place of inspection.

The report also says that electrical fires were the worst type for property damage or civilian death. Even this death rate can be considered an undercount of the deaths that could be prevented by including individual dwellings in this standard: with inspection and maintenance, some of the fire and asphyxiation deaths would have been prevented by restoration of functioning smoke and CO alarms. It is a well-established fact that some fire deaths occur in homes that had formerly functioning alarms. Replacing them with updated units that are less likely to nuisance-alarm does not guarantee that they all will be kept functional, but certainly some will. This was part of the rationale behind changes in the

UL standards.

The substantiation is not limited to avoiding fires. The NFPA's 2017 report on non-fire electrical incidents asserts that 1-2 family dwellings were the sites of most of these non-fire visits by Fire Departments that didn't take place on a road or in a parking area. Specifically, when we eliminate downed power lines anywhere, the majority of the remaining electrical incidents took place at 1-2 family residences.

Finally, without active maintenance, electrical fire deaths in dwellings could well increase over the coming decade or two because of changes in our population and occupancy. Quoting from the Executive Summary of NFPA's report, 2021 Fire Safety in the
United States since 1980 THROUGH THE LENS OF THE NFPA FIRE & LIFE SAFETY ECOSYSTEM by Marty Ahrens & Birgitte Messerschmidt

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Suppose we were concerned about electrical maintenance for the sole, exclusive reason that maintaining workplace electrical systems is essential to complying with NFPA 70E, and with the OSH Act. Even on this basis, while maintaining residential electrical systems is not the key it also cannot be not excluded. Dwellings, even one- and two-family dwellings, even condo units, sometimes are employee workplaces. Staff may even sleep in the dwelling, at least intermittently.

Even the title of the proposed standard does not suggest a workplace-only scope.

Enforceability

There's no point in adopting a code, or publishing a model code, if it can't be enforced. Can it? The idea of requiring maintenance inspection is not new. Rather, it is more than a century old; and it has been enforced. In 1914–1914!–the Chicago Bureau of Electrical Inspection had seven inspectors devoted to reinspection. One concern reported at the time was "unauthorized alterations frequently made by inexperienced electricians . . .". Dwellings certainly were not and are not exempt from this hazard, or from the need for competent maintenance to prevent some of the harm this can cause.

The UK's "Regs," British Standard 7671, like our NEC, is adopted in a number of places around the world. It too recommends reinspection of dwellings; an Electrical Installation Condition Report, which can take half a day, according to one convenience-sampled source (https://www.milesmantayelectrical.com/testing) . For rentals, it does a lot more than recommend this; fairly recent legislation, The Electrical Safety Standards in the Private Rented Sector (England) Regulations 2020, requires inspection every five years–or sooner, if issues of concern are documented that don't demand immediate remediation.

Now the UK allows extension or even addition of circuits in most places without permits or inspection; this may justify more frequent inspection than is needed over here. However, realistically, much work in the U.S. skirts these requirements as well.

https://www.gov.uk/government/publications/electrical-safety-standards-in-the-private-rented-sector-guidance-for-landlords-tenants-and-local-authorities/guide-for-landlords-electrical-safety-standards-in-the-private-rented-sector
https://www.legislation.gov.uk/uksi/2020/312/contents/made

This said, the Introduction to NFPA 73 mentions research suggesting that only 5% of fires take place in homes less than 10 years old. While our concerns extend beyond fires alone, this datum does suggest

that a combination of three elements may make it much less necessary to reinspect homes that were quite that recently built. These are the lack of aging-related deterioration in newer homes; initial inspection prior to granting a Certificate of Occupancy; plus a lower level of illegal alterations than in homes that have had longer to deteriorate or invite upgrading for other reasons.

If we are concerned about the ability of inspection departments to handle the volume of work dwelling maintenance reinspection could add, there are ways to address enforcement other than adding to the workload of jurisdictional inspectors. In similar situations, duties have been offloaded onto Third Party Inspectors. In others, licensed contractors have been authorized to certify under bond that inspection/maintenance activities have been performed successfully.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 5-NFPA 70B-2021 [Section No. 1.3.2]	
Public Comment No. 18-NFPA 70B-2022 [New Section after 36.5]	

Related Item

• FR1 • PI37

Submitter Information Verification

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Submittal Date: Tue Oct 19 12:47:13 EDT 2021
Committee: EEM-AAA

Committee Statement

Committee Action: Rejected but held

Resolution: Insufficient time to process this. Reject the public comment but hold it for processing as a Public Input for the next revision cycle in accordance with Section 4.4.8.3.

Public Input No. 16-NFPA 70B-2023 [Section No. 1.3.1]

1.3.1

This standard applies to maintenance for electrical, electronic, and communications systems and equipment and is not intended to duplicate or supersede instructions provided by manufacturers. Systems and equipment covered are typical of those installed for industrial plants, institutional and commercial buildings, solar photovoltaic systems, battery energy storage systems, and large multifamily residential complexes.

Statement of Problem and Substantiation for Public Input

With the expansion of the chapters and maintenance requirements for solar PV and BESS, it should be made more clear that 70B does provide maintenance requirements applicable to a wide range of solar PV systems and BESS topologies, including ground-mounted and remote systems. It is not currently clear that PV systems or BESS which are not attached to an industrial facility or commercial building can be considered part of the application of this standard. This would be a helpful clarification for the solar and storage industries.

Submitter Information Verification

Submitter Full Name: Rebekah Hren
Organization: IPPNC LLC
Street Address:
City:
State:
Zip:

Submittal Date: Mon Dec 04 12:52:55 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Systems are already covered by the existing “application” in Section 1.3 and other chapters of the standard.

Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]

2.4 References for Extracts in Mandatory Sections.

NFPA 70®, National Electrical Code®, 2023 edition.

NFPA *70E®, Standard for Electrical Safety in the Workplace®,*~~2021~~ 2024 edition.

Statement of Problem and Substantiation for Public Input

The edition date for NFPA 70E is updated to be the most current edition of the document.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 44-NFPA 70B-2023 [Section No. 3.3.3]	
Public Input No. 45-NFPA 70B-2023 [Section No. 3.3.11]	
Public Input No. 47-NFPA 70B-2023 [Section No. 3.3.17]	
Public Input No. 49-NFPA 70B-2023 [Section No. 3.3.49]	
Public Input No. 50-NFPA 70B-2023 [Section No. 3.3.47]	
Public Input No. 51-NFPA 70B-2023 [Section No. 3.3.53]	
Public Input No. 44-NFPA 70B-2023 [Section No. 3.3.3]	
Public Input No. 45-NFPA 70B-2023 [Section No. 3.3.11]	
Public Input No. 47-NFPA 70B-2023 [Section No. 3.3.17]	
Public Input No. 49-NFPA 70B-2023 [Section No. 3.3.49]	
Public Input No. 50-NFPA 70B-2023 [Section No. 3.3.47]	
Public Input No. 51-NFPA 70B-2023 [Section No. 3.3.53]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
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Submittal Date: Wed Dec 20 09:19:34 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 44-NFPA 70B-2023 [Section No. 3.3.3]

3.3.3 Arc Flash Hazard.

A source of possible injury or damage to health associated with the release of energy caused by an electric arc. [***70E,*** ~~2021~~ 2024]

Statement of Problem and Substantiation for Public Input

The reference to NFPA 70E is updated to the most recent version of the standard. The definition did not change in the most recent edition of NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 09:23:27 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 45-NFPA 70B-2023 [Section No. 3.3.11]

3.3.11 Condition of Maintenance.

The state of the electrical equipment considering the manufacturers' instructions, manufacturers' recommendations, and applicable industry codes, standards, and recommended practices. [***70E***, ~~2021~~ 2024]

Statement of Problem and Substantiation for Public Input

The reference to NFPA 70E is updated to the most recent version of the standard. The definition did not change in the most recent edition of NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 09:26:31 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 47-NFPA 70B-2023 [Section No. 3.3.17]

3.3.17 Electrically Safe Work Condition.

A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to verify the absence of voltage, and, if necessary, temporarily grounded for personnel protection. [***70E,*** ~~2021~~ 2024]

Statement of Problem and Substantiation for Public Input

The reference to NFPA 70E is updated to the most recent version of the standard. The definition did not change in the most recent edition of NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 09:34:12 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 48-NFPA 70B-2023 [Section No. 3.3.18]

3.3.18 EMP Coordinator.

The individual responsible for ~~coordinating~~ the implementation and operation of the EMP.

Statement of Problem and Substantiation for Public Input

The word "coordinator" is removed as it is not necessary and we should avoid using part of the term to define the term.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 09:36:12 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-58-NFPA 70B-2024
Statement: The word "coordinating" was deleted to avoid using a word that is similar to the defined term.

Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]

TITLE OF NEW CONTENT

3.3.22 Functional Failure.

The point in time in which degradation of the equipment leads to a failure for it to perform it's necessary function.

Statement of Problem and Substantiation for Public Input

The definition is necessary to establish the maximum intervals for maintenance.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]	Uses definition.
Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]	Sister definitiion
Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]	Sister
Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]	
Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]	
Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]	

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:

Submittal Date: Sat Dec 23 05:14:25 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-23-NFPA 70B-2024

Statement: The first revision adds the use of P-F curve as a method to assist with maintenance strategies in reducing unplanned equipment outages. First revision adds explanatory content for functional failure, P-F interval and potential failure to the new appendix for P-F curves and their application.

Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]

TITLE OF NEW CONTENT

3.3.42 P-F Interval.

The time from Potential Failure point to Functional Failure point.

Statement of Problem and Substantiation for Public Input

Definition is necessary to establish maxium intervals for maintenance.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]	Uses definition
Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]	Sister
Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]	Sister
Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]	
Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]	
Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]	

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:

Submittal Date: Sat Dec 23 05:18:24 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-23-NFPA 70B-2024

Statement: The first revision adds the use of P-F curve as a method to assist with maintenance strategies in reducing unplanned equipment outages. First revision adds explanatory content for functional failure, P-F interval and potential failure to the new appendix for P-F curves and their application.

Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]

TITLE OF NEW CONTENT

3.3.45 Potential Failure.

The point in time at which degradation of the equipment can be detected although still fully functional.

Statement of Problem and Substantiation for Public Input

It is necessary to understand Potential Failure point as part of establishing maximum maintenance intervals.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]	Use of the definition
Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]	sister
Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]	sister
Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]	
Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]	
Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]	

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:

Submittal Date: Sat Dec 23 05:09:02 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-23-NFPA 70B-2024

Statement: The first revision adds the use of P-F curve as a method to assist with maintenance strategies in reducing unplanned equipment outages. First revision adds explanatory content for functional failure, P-F interval and potential failure to the new appendix for P-F curves and their application.

Public Input No. 50-NFPA 70B-2023 [Section No. 3.3.47]

3.3.47 Qualified Person.

One who has demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk. [***70E,*** ~~2021~~ 2024]

Statement of Problem and Substantiation for Public Input

The reference to NFPA 70E is updated to the most recent version of the standard. The definition did not change in the most recent edition of NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 09:39:05 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 49-NFPA 70B-2023 [Section No. 3.3.49]

3.3.49 Risk Assessment.

An overall process that identifies hazards, estimates the likelihood of occurrence of injury or damage to health, estimates the potential severity of injury or damage to health, and determines if protective measures are required. [***70E,*** ~~2021~~ 2024]

Statement of Problem and Substantiation for Public Input

The reference to NFPA 70E is updated to the most recent version of the standard. The definition did not change in the most recent edition of NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 09:37:23 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 51-NFPA 70B-2023 [Section No. 3.3.53]

3.3.53 Single-Line Diagram.

A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or system. [***70E***, ~~2021~~ 2024]

Statement of Problem and Substantiation for Public Input

The reference to NFPA 70E is updated to the most recent version of the standard. The definition did not change in the most recent edition of NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	
Public Input No. 43-NFPA 70B-2023 [Section No. 2.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 09:42:22 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-11-NFPA 70B-2024
Statement: This updates extracts to the current edition of NFPA 70E.

Public Input No. 53-NFPA 70B-2023 [Section No. 3.3.64]

3.3.64 Unbalanced Voltages.

Unequal voltage values on 3-phase circuits ~~that can exist anywhere on the power distribution system~~ .

Statement of Problem and Substantiation for Public Input

The deleted text is not needed as there is no restriction where the voltage balance may occur. The existing location of the proposed text is also problematic as it seems to be referring to the location of the "3-phase circuits" and not the location of the "unequal voltage values". Deleting the text does not hurt the definition and it removes the ambiguity of the location of the current language.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:04:23 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-59-NFPA 70B-2024
Statement: The phrase "that can exist anywhere on the power distribution system" was deleted because it is unnecessary and could be confusing.

Public Input No. 54-NFPA 70B-2023 [Section No. 4.1.2]

~~4.1.2~~ –

~~This standard is not intended to duplicate or supersede manufacturer's instructions.~~

Statement of Problem and Substantiation for Public Input

The requirement in this line is already addressed in section 1.3.1. The requirement does not need to be duplicated here.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:08:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-60-NFPA 70B-2024
Statement: This requirement is already in 1.3.1 therefore does not need to be duplicated here.

Public Input No. 55-NFPA 70B-2023 [Section No. 4.1.3]

4.1.3

In the absence of manufacturer's instructions, equipment shall be maintained in accordance with this standard and applicable industry consensus standards.

Statement of Problem and Substantiation for Public Input

The existing language directs the reader to applicable industry standards but does not specifically point to NFPA 70B as one of those standards. The proposed language makes it clear that NFPA 70B is one of those standards.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:10:36 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-61-NFPA 70B-2024
Statement: Adding the words " this standard and applicable" makes it clear that NFPA 70B is one of the industry consensus standards.

Public Input No. 33-NFPA 70B-2023 [Section No. 4.2.1]

4.2.1 General.

The equipment owner and those performing maintenance shall implement and document an overall EMP that directs activity appropriate to the safety and operational risks.

Statement of Problem and Substantiation for Public Input

While I agree that the owner of the equipment must meet these EMP requirements, so to must those performing maintenance.

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
Zip:

Submittal Date: Fri Dec 15 17:22:50 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Adding the proposed text is not appropriate because the requirement is on the equipment owner, not on those performing maintenance.

Public Input No. 56-NFPA 70B-2023 [Section No. 4.2.1]

4.2.1 General.

The equipment owner shall implement and document an ~~overall~~ EMP that directs activity ~~appropriate to the safety and operational risks~~ concerning the maintenance of equipment included in the EMP .

Statement of Problem and Substantiation for Public Input

The word "overall" is deleted as it is not needed. Referring to the EMP is adequate. The last portion of the sentence is changed to remove the ambiguous reference to "appropriate to the safety and operational risks". There was not reference to what safety and operational risks were to be addressed. The revised text makes it clear what is to be addressed.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
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Submittal Date: Wed Dec 20 10:14:01 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-62-NFPA 70B-2024

Statement: The word "overall" was deleted because it is unnecessary. The phrase "appropriate to the safety and operational risks" was replaced with "for the maintenance of equipment included in the EMP because safety and operational risks related to this requirement are not described elsewhere.

Public Input No. 57-NFPA 70B-2023 [Section No. 4.2.4.2]

4.2.4.2*

The EMP shall include the following elements:

(1) ~~An electrical safety program that addresses the condition of maintenance~~

(2) Identification of personnel responsible for implementing each element of the program

(3) Survey and analysis of electrical equipment and systems to determine maintenance requirements and priorities

(4) Developed and documented maintenance procedures for equipment

(5) A plan of inspections, servicing, and suitable tests

(6) A maintenance, equipment, and personnel documentation and records-retention policy

(7) A process to prescribe, implement, and document corrective measures based on collected data

(8) A process for incorporating design for maintainability in electrical installations

(9) A program review and revision process that considers failures and findings for continuous improvement

Statement of Problem and Substantiation for Public Input

The electrical safety program is outside the scope of NFPA 70B. NFPA 70B concerns the maintenance of equipment. Electrical safety management requirements are provided in NFPA 70E. NFPA 70E already requires the electrical safety program to consider the impact of the condition of the equipment as it related to electrical safety. Since the electrical safety program is outside the scope of NFPA 70B and is already addressed very adequately in NFPA 70E, the requirement should removed from NFPA 70B.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
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Submittal Date: Wed Dec 20 10:19:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-63-NFPA 70B-2024

Statement: The requirement has been clarified to not require the electrical safety program as part of the EMP but for the electrical safety program to address the condition of maintenance and its impact on electrical safety.

The word "electrical" was deleted in list items 3 and 8 because NFPA 70B applies to

electrical, electronic and communication systems and equipment as indicated in Section 1.1. The words " included in the EMP" were added in those two list items to include those types of systems and equipment.

Public Input No. 58-NFPA 70B-2023 [Section No. 4.2.4.2]

4.2.4.2*

The EMP shall include the following elements:

(1) An electrical safety program that addresses the condition of maintenance

(2) Identification of personnel responsible for implementing each element of the program

(3) Survey and analysis of ~~electrical~~ equipment and systems included in the EMP to determine maintenance requirements and priorities

(4) Developed and documented maintenance procedures for equipment

(5) A plan of inspections, servicing, and suitable tests

(6) A maintenance, equipment, and personnel documentation and records-retention policy

(7) A process to prescribe, implement, and document corrective measures based on collected data

(8) A process for incorporating design for maintainability in ~~electrical~~ installations included in the EMP

(9) A program review and revision process that considers failures and findings for continuous improvement

Statement of Problem and Substantiation for Public Input

Per the scope of NFPA 70B, the document covers "electrical, electronic, and communication systems and equipment." In two places in this section, a reference to "electrical" is made. That reference excludes the electronic and communication systems and equipment listed in the NFPA 70B scope. The proposed changes make the requirement more general to cover any equipment or systems included in the EMP.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:22:36 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-63-NFPA 70B-2024

Statement: The requirement has been clarified to not require the electrical safety program as part of the EMP but for the electrical safety program to address the condition of maintenance and its impact on electrical safety.

The word "electrical" was deleted in list items 3 and 8 because NFPA 70B applies to

electrical, electronic and communication systems and equipment as indicated in Section 1.1. The words " included in the EMP" were added in those two list items to include those types of systems and equipment.

Public Input No. 59-NFPA 70B-2023 [Section No. 4.3.1]

4.3.1 EMP Coordinator.

The ~~EMP~~ equipment owner shall identify an EMP coordinator.

Statement of Problem and Substantiation for Public Input

The equipment owner is the entity that needs to identify the EMP coordinator. The current language states the EMP is the entity to identify the coordinator.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:29:09 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-64-NFPA 70B-2024
Statement: The equipment owner is responsible for identifying the EMP coordinator which is consistent with 4.2.1.

Public Input No. 60-NFPA 70B-2023 [Section No. 4.3.2]

~~**4.3.2** – Maintenance Personnel.~~

~~Personnel assigned to EMP duties shall be qualified for the assigned tasks.~~

Statement of Problem and Substantiation for Public Input

Section 5 is the Personnel Safety section in NFPA 70B. Section 5.1.1 requires that electrical maintenance shall be performed by qualified persons. Therefore the requirement in 4.3.2 is redundant and is not necessary.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:30:58 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The essential duties of maintenance personnel involved in the execution of the EMP are specific tasks related to the EMP and requires certain necessary qualifications. The requirement is for qualification for maintenance tasks not personnel safety.

Public Input No. 62-NFPA 70B-2023 [Section No. 4.3.3]

4.3.3 ~~Electrical~~ Maintenance Training.

A qualified person responsible for conducting ~~electrical~~ maintenance shall be trained in the specific maintenance tasks, test methods, test equipment, PPE usage (as applicable), and hazards associated with the ~~electrical~~ equipment or system being serviced.

4.3.3.1

A person who is undergoing on-the-job training for the purpose of obtaining the skills and knowledge necessary to be considered a qualified person, and who in the course of such training demonstrates an ability to perform specific duties safely at his or her level of training, and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those specific duties.

4.3.3.2

The employer shall determine through regular supervision or through inspections conducted on at least an annual basis that each employee is complying with the electrical maintenance procedures and testing required by this standard.

4.3.3.3

A person responsible for conducting ~~electrical~~ maintenance shall be provided additional training (or retraining) if any of the following conditions exists:

(1) The supervision or annual inspections indicate the person is not complying with the maintenance procedures and testing requirements.

(2) New technology, new types of equipment, or changes in procedures necessitate the use of maintenance procedures and testing requirements different from those that the person would normally use.

(3) The person needs to review tasks that are performed less often than once per year.

(4) The person needs to review maintenance procedures and testing requirements that they do not normally use during regular job duties.

(5) The person's job duties change.

(6) A new edition of this standard is adopted that includes changes applicable to the person's job duties.

4.3.3.4

Training shall be documented in accordance with the following:

(1) Documentation shall be issued when the person demonstrates proficiency in the ~~electrical~~ maintenance procedures and testing requirements.

(2) Documentation shall be retained for the duration of the person's employment.

(3) Documentation shall specify the content of the training, the person's name, and the dates of training.

Statement of Problem and Substantiation for Public Input

The existing language refers to "electrical" in several locations. That reference leaves out "electronic and communication" systems and equipment that are included in the NFPA 70B scope. The section is modified to remove the word "electrical" in several places to let the requirement apply more broadly to cover all the equipment in the NFPA 70B scope.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 10:37:34 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-65-NFPA 70B-2024

Statement: The word "electrical: was deleted four times in 4.3.3, once in 4.3.3.3, once in 4.3.3.2, and once in 4.3.3.4 because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1. The word "system" was changed to "systems" in 4.3.3 to be grammatically correct.

A comma was editorially added to 4.3.3.1 to be grammatically correct.

The phrase " as appropriate for that employee's work tasks" was added to 4.3.3.2 to make it clear that employee compliance needs only to be determined based on tasks that employee does.

The word "additional" was deleted from the opening paragraph of 4.3.3.3 because it does not add anything. List items 3 and 4 were combined because they are similar in concept and to remove the vague wording "do not normally use".

The phrase " to include work not currently being performed by that person' was added to list item 5 because training is only needed if the person will be doing additional types of work.

The phrase " or the EMP" was added list item 6 because training is necessary if changes occur in the EMP that are applicable to the persons job duties.

Public Input No. 63-NFPA 70B-2023 [Section No. 4.3.3.1]

4.3.3.1

A person who is undergoing on-the-job training for the purpose of obtaining the skills and knowledge necessary to be considered a qualified person, and who in the course of such training demonstrates an ability to perform specific duties safely at his or her level of training, and who is under the direct supervision of a qualified person, shall be considered to be a qualified person for the performance of those specific duties.

Statement of Problem and Substantiation for Public Input

Adding a comma to improved readability.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:39:49 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-65-NFPA 70B-2024

Statement: The word "electrical: was deleted four times in 4.3.3, once in 4.3.3.3, once in 4.3.3.2, and once in 4.3.3.4 because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1. The word "system" was changed to "systems" in 4.3.3 to be grammatically correct.

A comma was editorially added to 4.3.3.1 to be grammatically correct.

The phrase " as appropriate for that employee's work tasks" was added to 4.3.3.2 to make it clear that employee compliance needs only to be determined based on tasks that employee does.

The word "additional" was deleted from the opening paragraph of 4.3.3.3 because it does not add anything. List items 3 and 4 were combined because they are similar in concept and to remove the vague wording "do not normally use".

The phrase " to include work not currently being performed by that person' was added to list item 5 because training is only needed if the person will be doing additional types of work.

The phrase " or the EMP" was added list item 6 because training is necessary if changes occur in the EMP that are applicable to the persons job duties.

Public Input No. 64-NFPA 70B-2023 [Section No. 4.3.3.2]

4.3.3.2

The employer shall determine through regular supervision or through inspections conducted on at least an annual basis that each employee is complying with the electrical maintenance procedures and testing required by this standard as appropriate for that employee's work tasks .

Statement of Problem and Substantiation for Public Input

The current language could be interpreted to mean that each employee must be able to do all work covered in NFPA 70B and that the employer must verify that employees capabilities on all of those tasks at least annually. Often employees may specialize in a specific task, such as protection relay testing, and not be required to perform other tasks, such as maintaining a cable tray system. Some employees may not perform any maintenance work (e.g., they might be an office assistant.) The proposed language makes it clear the review of the employee needs to be performed the work tasks performed by that employee and not all tasks listed in NFPA 70B.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:40:56 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-65-NFPA 70B-2024

Statement: The word "electrical: was deleted four times in 4.3.3, once in 4.3.3.3, once in 4.3.3.2, and once in 4.3.3.4 because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1. The word "system" was changed to "systems" in 4.3.3 to be grammatically correct.

A comma was editorially added to 4.3.3.1 to be grammatically correct.

The phrase " as appropriate for that employee's work tasks" was added to 4.3.3.2 to make it clear that employee compliance needs only to be determined based on tasks that employee does.

The word "additional" was deleted from the opening paragraph of 4.3.3.3 because it does not add anything. List items 3 and 4 were combined because they are similar in concept and to remove the vague wording "do not normally use".

The phrase " to include work not currently being performed by that person' was added to list item 5 because training is only needed if the person will be doing additional types of work.

The phrase " or the EMP" was added list item 6 because training is necessary if changes occur in the EMP that are applicable to the persons job duties.

Public Input No. 65-NFPA 70B-2023 [Section No. 4.3.3.3]

4.3.3.3

A person responsible for conducting electrical maintenance shall be provided ~~additional~~ training ~~(or retraining)~~ if any of the following conditions exists:

(1) The supervision or annual inspections indicate the person is not complying with the maintenance procedures and testing requirements.

(2) New technology, new types of equipment, or changes in procedures necessitate the use of maintenance procedures and testing requirements different from those that the person would normally use.

(3) The person needs to review ~~tasks~~ maintenance procedures and testing requirements that are performed less often than once per year.

(4) The ~~person needs to review maintenance procedures and testing requirements that they do not normally use during regular job duties.~~

(5) ~~The~~ person's job duties change.

(6) A new edition of this standard is adopted that includes changes applicable to the person's job duties.

Statement of Problem and Substantiation for Public Input

Items 3 and 4 both have to do with tasks/procedures/tests that are not performed "often". These two items can be combined to simplify the requirements and remove the ambiguous "do not normally use" phrase. That term "do not normally use" could mean very different things to different people.

Submitter Information Verification

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Submittal Date: Wed Dec 20 11:16:07 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-65-NFPA 70B-2024

Statement: The word "electrical: was deleted four times in 4.3.3, once in 4.3.3.3, once in 4.3.3.2, and once in 4.3.3.4 because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1. The word "system" was changed to "systems" in 4.3.3 to be grammatically correct.

A comma was editorially added to 4.3.3.1 to be grammatically correct.

The phrase " as appropriate for that employee's work tasks" was added to 4.3.3.2 to make it clear that employee compliance needs only to be determined based on tasks that employee does.

The word "additional" was deleted from the opening paragraph of 4.3.3.3 because it does not add anything. List items 3 and 4 were combined because they are similar in concept and to remove the vague wording "do not normally use".

The phrase " to include work not currently being performed by that person' was added to list item 5 because training is only needed if the person will be doing additional types of work.

The phrase " or the EMP" was added list item 6 because training is necessary if changes occur in the EMP that are applicable to the persons job duties.

Public Input No. 66-NFPA 70B-2023 [Section No. 4.3.3.3]

4.3.3.3

A person responsible for conducting electrical maintenance shall be provided additional training (or retraining) if any of the following conditions exists:

(1) The supervision or annual inspections indicate the person is not complying with the maintenance procedures and testing requirements.

(2) New technology, new types of equipment, or changes in procedures necessitate the use of maintenance procedures and testing requirements different from those that the person would normally use.

(3) The person needs to review tasks that are performed less often than once per year.

(4) The person needs to review maintenance procedures and testing requirements that they do not normally use during regular job duties.

(5) The person's job duties change to include work not currently being performed by that person .

(6) A new edition of this standard is adopted that includes changes applicable to the person's job duties.

Statement of Problem and Substantiation for Public Input

The current language makes training required for any job change. The need for training should be for when the change adds work to the person that the person does not already do. I should not have to do training if I remove a work task from a person. For example, I may have a person that is currently doing circuit breaker maintenance and protective relay testing. If that person's job changes and will now only include protective relay testing, training should not be required as that person also had the training for that work task.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
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Submittal Date: Wed Dec 20 11:27:38 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-65-NFPA 70B-2024

Statement: The word "electrical: was deleted four times in 4.3.3, once in 4.3.3.3, once in 4.3.3.2, and once in 4.3.3.4 because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1. The word "system" was changed to "systems" in 4.3.3 to be grammatically correct.

A comma was editorially added to 4.3.3.1 to be grammatically correct.

The phrase " as appropriate for that employee's work tasks" was added to 4.3.3.2 to make it clear that employee compliance needs only to be determined based on tasks that employee does.

The word "additional" was deleted from the opening paragraph of 4.3.3.3 because it does not add anything. List items 3 and 4 were combined because they are similar in concept and to remove the vague wording "do not normally use".

The phrase " to include work not currently being performed by that person' was added to list item 5 because training is only needed if the person will be doing additional types of work.

The phrase " or the EMP" was added list item 6 because training is necessary if changes occur in the EMP that are applicable to the persons job duties.

Public Input No. 67-NFPA 70B-2023 [Section No. 4.3.3.3]

4.3.3.3

A person responsible for conducting electrical maintenance shall be provided additional training (or retraining) if any of the following conditions exists:

(1) The supervision or annual inspections indicate the person is not complying with the maintenance procedures and testing requirements.

(2) New technology, new types of equipment, or changes in procedures necessitate the use of maintenance procedures and testing requirements different from those that the person would normally use.

(3) The person needs to review tasks that are performed less often than once per year.

(4) The person needs to review maintenance procedures and testing requirements that they do not normally use during regular job duties.

(5) The person's job duties change.

(6) A new edition of this standard or the EMP is adopted that includes changes applicable to the person's job duties.

Statement of Problem and Substantiation for Public Input

There is not currently a requirement to provide training if the EMP changes and the changes in the EMP affects a person's job. It is important for a person to know if the EMP changes and had modified requirements that affect a person's work. Requiring training based on the change in the EMP is added with this proposed change.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
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Submittal Date: Wed Dec 20 11:33:53 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-65-NFPA 70B-2024

Statement: The word "electrical: was deleted four times in 4.3.3, once in 4.3.3.3, once in 4.3.3.2, and once in 4.3.3.4 because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1. The word "system" was changed to "systems" in 4.3.3 to be grammatically correct.

A comma was editorially added to 4.3.3.1 to be grammatically correct.

The phrase " as appropriate for that employee's work tasks" was added to 4.3.3.2 to

make it clear that employee compliance needs only to be determined based on tasks that employee does.

The word "additional" was deleted from the opening paragraph of 4.3.3.3 because it does not add anything. List items 3 and 4 were combined because they are similar in concept and to remove the vague wording "do not normally use".

The phrase " to include work not currently being performed by that person' was added to list item 5 because training is only needed if the person will be doing additional types of work.

The phrase " or the EMP" was added list item 6 because training is necessary if changes occur in the EMP that are applicable to the persons job duties.

Public Input No. 23-NFPA 70B-2023 [New Section after 4.4]

TITLE OF NEW CONTENT

Type your content here ..

4.4 Required Documentation

4.4.1 For equipment and systems that a failure could create a safety or environmental hazard the manufacturer's documentation shall be available to personnel performing maintenance and shalll include the following:

(1) Illustrations that show the location of controls

(2) Explanation of the function of each control (functional control description)

(3) Illustrations of proper interconnections to other equipment

(4) Step-by-step procedures for testing and proper use of the equipment

(5) Safety considerations in use and servicing of the equipment

(6) Schematics

(7) Wiring diagrams

(8) Mechanical layouts

(9) Parts lists

(10) All pertinent data for the equipment

(11) Instructions for cleaning

(12) Utility supply requirements (electrical, gas, ventilation, heating, cooling, and so forth)

(13) Explanation of figures, symbols, and abbreviations on the equipment

(14) Technical performance specifications

(15) Instructions for unpacking, inspection, installation, adjustment, and alignment

(16) Preventive and corrective maintenance, inspection, and repair procedures and intervals

(17) Troubleshooting flow charts or procedures

4.4.2 Where existing equipment does not have complete manufacturers documentation, owner shall employ best efforts to obtain them.

4.4.3 Where the manufacturers documentation cannot be obtained, owner shall create the necessary documentation to support the required preventive maintenance.

Statement of Problem and Substantiation for Public Input

Documentation requirements were included in only a few of the equipment specific chapters but needs to be considered for all equipment and systems. The entries are similar to those of other chapters and NFPA 99 for electrical equipment and systems in healthcare facilities. The same safety principles apply in 70B.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:

Submittal Date: Sun Dec 10 10:44:15 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The proposed list of documentation is too extensive for a general requirement applicable to all equipment.

Public Input No. 68-NFPA 70B-2023 [Section No. 4.4.1]

4.4.1

The EMP coordinator shall determine the scope of the work to be performed and develop a prioritized plan for the ~~electrical~~ maintenance of the ~~electrical~~ equipment or system.

Statement of Problem and Substantiation for Public Input

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 11:38:45 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-54-NFPA 70B-2024
Statement: The word "electrical" was deleted in two places because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1.

Public Input No. 69-NFPA 70B-2023 [Section No. 4.4.2]

4.4.2

~~Electrical equipment~~ Equipment and systems shall be evaluated to determine the appropriate scope and frequency of maintenance.

Statement of Problem and Substantiation for Public Input

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
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Submittal Date: Wed Dec 20 11:40:28 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-55-NFPA 70B-2024
Statement: The word "electrical" was deleted because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1.

Public Input No. 70-NFPA 70B-2023 [Section No. 4.4.3]

4.4.3

Environmental, physical, ~~or operating~~ and operating conditions of a specific installation shall be considered in determining the frequency of ~~electrical~~ equipment and systems maintenance.

Statement of Problem and Substantiation for Public Input

The "or" or changed to an "and" as all three items listed should be considered when determining maintenance needs. The current language would allow one, two, or all three items to be considered but not require all of them to be considered.

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 11:41:08 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-56-NFPA 70B-2024
Statement: The word "or" was changed to "and" because all three conditions need to be considered. The word "electrical" was deleted and replaced with "equipment and systems" because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1.

Public Input No. 22-NFPA 70B-2023 [Section No. 4.6]

4.6 Acceptance ~~Test Report.~~ ~~**Tests**~~

4.6.1 Acceptance testing shall be performed prior to energizing electrical equipment and systems for which a wiring error, insulation failure or other failure could present a hazard upon energization after initial installation and after performing other than visual maintenance.

4.6.2 A copy of the acceptance test reports ~~, if available,~~ shall be included with the maintenance records.

Statement of Problem and Substantiation for Public Input

Acceptance testing had a more significant inclusion in the 2019 version and is an ANSI standard on its own accord via NETA ATS. Many manufacturers specify acceptance testing prior to energizing their equipment. This is particularly important as it relates to electrical hazards since a wiring error or insulation failure could lead to a serious arc flash event upon energizing. It is also consistent with NFPA 70E 110.3(B) Inspection. The electrical safety program shall include elements to verify that newly installed or modified electrical equipment or systems have been inspected to comply with applicable installation codes and standards prior to being placed into service. And NEC 110.3 and 110.7.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
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Zip:

Submittal Date: Sun Dec 10 10:17:05 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-4-NFPA 70B-2024
Statement: If an acceptance test report is not available, it cannot be included in the maintenance record.

Public Input No. 71-NFPA 70B-2023 [Section No. 4.7.1]

~~4.7.1~~ ~~*~~ –

~~Safety certifications shall be maintained for repaired or rebuilt equipment.~~

Statement of Problem and Substantiation for Public Input

The term "safety certifications" is an undefined and ambiguous term. Therefore the requirement should be removed. Other information in this section properly address the concerns that are the topic of this section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 72-NFPA 70B-2023 [Sections A.4.7.1, A.4.7.2]	
Public Input No. 72-NFPA 70B-2023 [Sections A.4.7.1, A.4.7.2]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 11:50:51 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-66-NFPA 70B-2024

Statement: This subsection has been deleted because it is already covered by 4.7.2. The annex material in A.4.7.1 has been retained and combined with A.4.7.2.

Public Input No. 73-NFPA 70B-2023 [Section No. 4.8 [Excluding any Sub-Sections]]

~~Electrical equipment cleaning shall be a part of the~~ The EMP shall define the cleaning requirements for the equipment covered by the EMP.

Statement of Problem and Substantiation for Public Input

The requirement is reworded for better readability.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 11:55:24 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-67-NFPA 70B-2024
Statement: The requirement was reworded to be clear that cleaning information for the equipment in the EMP needs to be included.

Public Input No. 74-NFPA 70B-2023 [Section No. 4.8.1]

4.8.1 Cleaning Personnel.

4.8.1.1

~~Electrical equipment~~ Equipment cleaning shall be performed by personnel who are familiar with the cleaning materials required and methodologies necessary for effective removal of contaminants, debris, and other foreign materials that compromise ~~electrical~~ equipment performance.

4.8.1.2

The persons assigned to the task of ~~electrical~~ equipment cleaning shall be trained in the following:

(1) Potential damage to the equipment from cleaning procedures

(2) Potential personal injury

(3) Specific cleaning procedures

(4) Equipment not to be cleaned

Statement of Problem and Substantiation for Public Input

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 11:57:37 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-57-NFPA 70B-2024
Statement: The word "electrical" was deleted in three places because NFPA 70B applies to electrical, electronic and communication systems and equipment as indicated in Section 1.1.

Public Input No. 31-NFPA 70B-2023 [New Section after 4.8.1.2]

4.9 Cybersecurity, Operational Technology (OT)

Cybersecurity requirements provided for equipment and systems shall be maintained. The following items shall be completed.

- Maintain a current asset inventory of OT devices including current version.
- Install any Software/Firmware Patch updates monthly or during the next scheduled outage or maintenance window.
- Conduct a risk analysis of security notifications and mitigation recommendations.
- Continuous monitoring and analysis of system cybersecurity events such as intrusion detection, logged security events, and other events.
- Determine and implement improvement actions from the monitoring and analysis.
- An audit on the preceding items shall be conducted annually.

  If continuous monitoring is not being utilized, then an OT system cybersecurity risk assessment shall be conducted every two years.

Note- See NIST SP 800-82r3 for guidance in establishing secure operational technology (OT) performance, reliability, and safety requirements. See Section 3.3.6 for additional guidance on OT cybersecurity risk assessments.

Note – See ANSI/ISA/IEC 62443-3-2 may be used as a guide for the cybersecurity initial and detailed risk assessments.

Note- See NEMA CY 7001-2023 for guidance on meeting 2023 NEC cybersecurity requirements.

Statement of Problem and Substantiation for Public Input

The continued cyber attacks on connected operational technology (OT) systems provide a need to make sure these systems have cybersecurity protection and this protection is maintained. A look through any search engine and you will find attacks on different areas of the electrical infrastructure, automation/controls, and HVAC. The addition of maintenance requirements for your initial cybersecurity protections will prevent the loss of protection over time. This is a major concern after starting an installation with the correct protection then losing it over time by not maintaining it. Several examples of how cybersecurity threats are seen within buildings, electrical control systems and infrastructure can be seen as follows:

https://www.industrialdefender.com/blog/florida-water-treatment-plant-cyber-attack
https://www.facilitiesnet.com/security/article/The-Facility-Managers-Role-in-Cybersecurity--20054
https://www.databreaches.net/exclusive-attack-on-hvac-vendor-gave-threat-actor-access-to-boston-childrens-hospital/
https://www.reliaquest.com/blog/cyber-threats-to-manufacturing-industry-1h-2023/

Further examples and reports can be found easily and the need to better secure our electrical infrastructure is essential for personal safety and protection of property. The average cost of single cyber attack is $2.8M as found by a Trend Micro's "State of Industrial Cybersecurity" published in 2022. As we see initial Cybersecurity requirements within the NEC, NFPA 72, and NFPA 79 the need to keep these systems up to date and secure is important. I ask the committee to recognize the importance of this topic and add the necessary requirements to NFPA 70B.

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 13 09:56:33 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The proposed requirements are overly broad, and some are more appropriate for installation requirements. Not all equipment needs to consider cybersecurity.

Public Input No. 32-NFPA 70B-2023 [Chapter 5]

~~Chapter 5~~ –

4.9 _ Personnel Safety

~~5~~

4 .

~~1– Introduction.~~ ~~5.1.1~~

~~9.1~~ –

~~Electrical maintenance shall be performed only by qualified persons.~~

~~5~~

~~4 .~~

~~1~~

~~9 .2 *~~ –

~~Electrical safety-related work practices shall be instituted and followed, in accordance with applicable state, federal, or local codes and standards, to identify the hazards and reduce the associated risks.~~

Statement of Problem and Substantiation for Public Input

It seems like a chapter dedicated to two sections is not ideal. This recommendation relocates these two sections from Chapter 5 to the general requirements in Chapter 4.

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
Zip:

Submittal Date: Fri Dec 15 17:05:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Personnel safety requirements are best kept in a separate chapter to be easily located.

Public Input No. 97-NFPA 70B-2023 [Chapter 5]

Chapter 5 Personnel Safety and Qualifications

5.1 Introduction.

5.1.1

Electrical maintenance shall be performed only by qualified persons.

5.1.2*

Electrical safety-related work practices shall be instituted and followed, in accordance with applicable state, federal, or local codes and standards, to identify the hazards and reduce the associated risks.

5.1.3

Testing personnel shall be qualified to operate the test equipment used in the type of test to be performed.

5.1.4

Testing personnel shall be qualified to perform the test procedure on the specific equipment to be tested.

Statement of Problem and Substantiation for Public Input

This PI proposed to move testing personnel qualification requirements content from 8.4 to this chapter and rename this chapter to include qualifications. A linked PI deletes the material from 8.4. This proposal helps the reader find the personnel safety and qualification requirements in one location in the document.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 96-NFPA 70B-2023 [Section No. 8.4]	
Public Input No. 96-NFPA 70B-2023 [Section No. 8.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 13:29:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The proposed requirements are covered in 4.3.3.

Public Input No. 2-NFPA 70B-2023 [Section No. 5.1.1]

5.1.1

Electrical maintenance shall be performed only by qualified persons. Such qualified persons shall, at a minimum, be trained to meet the qualified person training requirements in 110.4(A)(1) in NFPA 70E, Standard for Electrical Safety in the Workplace.

Statement of Problem and Substantiation for Public Input

The qualified person training requirements of NFPA 70E need to be added as the minimum level of training requirements for a qualified person to be a qualified person to meet this NFPA 70B requirement in 5.1.

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
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Submittal Date: Thu Mar 02 14:19:51 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The reference to NFPA 70E is not included within NFPA 70B because it can be used in other countries or jurisdictions which may have their own electrical safety requirements.

Public Input No. 61-NFPA 70B-2023 [Section No. 5.1.1]

5.1.1

~~Electrical maintenance~~ Maintenance performed on electrical, electronic, and communication systems and equipment shall be performed ~~only~~ by qualified persons.

Statement of Problem and Substantiation for Public Input

The current language stating "electrical" maintenance shall be performed by qualified personnel does not address maintenance on electronics and communication systems. The wording is revised to clearly state the requirement applies to all these systems. An unnecessary "only" is removed for better readability.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 10:33:30 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-28-NFPA 70B-2024
Statement: Section 1.1 identifies that the scope of this document covers the preventive maintenance of electrical, electronic, and communications systems.

Public Input No. 1-NFPA 70B-2023 [Section No. 5.1.2]

5.1.2*

Electrical safety-related work practices shall be instituted and followed, in accordance with NFPA 70E, Standard for Electrical Safety in the Workplace, and applicable state, federal, or local codes and standards, to identify the hazards and reduce the associated risks.

Statement of Problem and Substantiation for Public Input

NFPA 70E is a logical standard that needs to become a mandatory way to comply with this 70B requirement. Mandatory references to standards, including NFPA 70E, are permitted per the Manual of Style for NFPA Technical Committee Documents. Accordingly, NFPA 70E needs to be referenced here. Also note that 70B A.5.1.2 indicates that NFPA 70E is among the references that should be utilized for the development of programs and procedures associated with electrical maintenance activities and are necessary to be used in conjunction with this document. NFPA 70E is a standard and needs to be a requirement in 70B rather than mentioned as "should be used" in a 70B annex.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3-NFPA 70B-2023 [Sections A.5.1.2, A.6.1.1]	Related concept.
Public Input No. 3-NFPA 70B-2023 [Sections A.5.1.2, A.6.1.1]	

Submitter Information Verification

Submitter Full Name: Palmer Hickman
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State:
Zip:

Submittal Date: Thu Mar 02 13:57:42 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The reference to NFPA 70E is not included within NFPA 70B because it can be used in other countries or jurisdictions which may have their own electrical safety requirements.

Public Input No. 75-NFPA 70B-2023 [Section No. 5.1.2]

5.1.2*

~~Electrical safety~~ Safety -related work practices shall be instituted and followed, in accordance with applicable state, federal, or local codes and standards, to identify the hazards and reduce the associated risks.

Statement of Problem and Substantiation for Public Input

Not all work practices are "electrical". For example, equipment cleaning could expose a person to electrical hazards but there are other hazards such as fall from heights, noise, and cleaning fluids that need to be addressed. Removing the word "electrical" allows this requirement to apply to all hazards associated with electrical equipment maintenance, not just the electrical hazards.

Submitter Information Verification

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Submittal Date: Wed Dec 20 11:59:18 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-68-NFPA 70B-2024
Statement: There can be hazards that might need to be addressed by employers that are beyond electrical.

Public Input No. 76-NFPA 70B-2023 [Section No. 6.2.4]

6.2.4

When single-line diagrams are not available, the facility or equipment owner shall be responsible for providing an ~~equally~~ effective means of obtaining the necessary information for system studies .

Statement of Problem and Substantiation for Public Input

The term "equally" is ambiguous and hard to define. A person could easily argue that although a field survey to get equipment data can provide the necessary information for a system study, that the field survey method is not "equally" as effective as a single-line diagram since it talks a lot more time to get the data. The term "equally" is removed due to its ambiguity. Language is added to the end of the sentence to make it clear what the purpose is for the data. The current language does not provide that information.

Submitter Information Verification

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Submittal Date: Wed Dec 20 12:02:59 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-5-NFPA 70B-2024 The proposed addition of “for system studies” is not necessary since this is the topic of the article.

Statement: First revision content is to remove ‘equally’ as ambiguous. “Equally effective” is redundant to “effective”.

Public Input No. 39-NFPA 70B-2023 [Section No. 6.3]

6.3* Short-Circuit Current Studies.

6.3.1

Where a short-circuit current study does not exist, one shall be created, as necessary to support the arc-flash risk assessment and equipment evaluations.

6.3.2

The short-circuit current study shall be updated when changes occur in the electrical distribution system that could affect the results of the study.

6.3.3

The short-circuit current study shall be reviewed for accuracy at intervals not to exceed 5 years.

6.3.4

The most recent study shall be made available to the EMP coordinator.

6.3.5

When the short-circuit current study is updated, an electrical equipment rating evaluation shall be completed for the equipment within the scope of the study.

Statement of Problem and Substantiation for Public Input

The existing language refers to "short-circuit" study, but a more appropriate term is "short-circuit current" study. The language is revised to add "current". This PI is associated with another PI to change the language in Annex section 6 to make a similar change in the name of the study.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 38-NFPA 70B-2023 [Section No. A.6.1.1]	
Public Input No. 38-NFPA 70B-2023 [Section No. A.6.1.1]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
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State:
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Submittal Date: Wed Dec 20 08:00:10 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The phrase “short-circuit study” is used in IEEE 3002.3-2018. Therefore, it is appropriate here.

Public Input No. 77-NFPA 70B-2023 [Section No. 6.3.1]

6.3.1

Where a short-circuit study does not exist, one shall be created, as necessary, to support the arc-flash risk assessment and equipment evaluations.

Statement of Problem and Substantiation for Public Input

Adding a comma to provide for better readability.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
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Submittal Date: Wed Dec 20 12:07:55 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-69-NFPA 70B-2024
Statement: A comma was editorially added after "necessary" in 6.3.1 to be grammatically correct.

Public Input No. 78-NFPA 70B-2023 [Section No. 6.3.3]

~~6.3.3~~ –

~~The short-circuit study shall be reviewed for accuracy at intervals not to exceed 5 years.~~

Statement of Problem and Substantiation for Public Input

Section 6.3.2 requires the study to be updated when changes occur in the system that might affect the results of the study. Therefore, requiring the review of the study every five years is not required. The requirement to review the study at least every five years could be burdensome for many facilities covered by this standard, such as commercial facilities and large residential complexes. Many organizations would have to contact this work as they don't have in-house personnel to perform the work. That work and expense would be unnecessary if the system has not changed. If the system changes, a qualified company should be doing the work and would be required to make changes to the study.

Submitter Information Verification

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Street Address:
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Submittal Date: Wed Dec 20 12:12:05 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Utilities can make changes in their distribution system which can affect the short-circuit study without the owner being aware a change was made. This is a review of the study not a complete study. This requirement is similar to and consistent with NFPA 70E, Section 130.5(G).

Public Input No. 79-NFPA 70B-2023 [Section No. 6.4.3]

~~6.4.3~~ –

~~The coordination study shall be reviewed for accuracy at intervals not to exceed 5 years.~~

Statement of Problem and Substantiation for Public Input

Section 6.4.2 requires the study to be updated when changes occur in the system that might affect the results of the study. Therefore, requiring the review of the study every five years is not required. The requirement to review the study at least every five years could be burdensome for many facilities covered by this standard, such as commercial facilities and large residential complexes. Many organizations would have to contact this work as they don't have in-house personnel to perform the work. That work and expense would be unnecessary if the system has not changed. If the system changes, a qualified company should be doing the work and would be required to make changes to the study. The coordination of protection devices is something that is likely not to change for the majority of the facilities covered by NFPA 70B (such as commercial facilities like a Walmart.) There is no reason to update a coordination study every five years if there are no changes.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Street Address:
City:
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Submittal Date: Wed Dec 20 12:17:51 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The current language addresses changes that could occur in the electrical system. The committee affirms that the existing language supports the review and audit of the study at an interval not to exceed 5 years.

Public Input No. 80-NFPA 70B-2023 [Section No. 6.5.2]

~~6.5.2~~ –

~~The load-flow study shall be reviewed for accuracy at intervals not to exceed 5 years.~~

Statement of Problem and Substantiation for Public Input

Section 6.5.1 requires the study to be updated when changes occur in the system that might affect the results of the study. Therefore, requiring the review of the study every five years is not required.

Submitter Information Verification

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Street Address:
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Submittal Date: Wed Dec 20 12:20:09 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-6-NFPA 70B-2024
Statement: First revision removes 6.5.2 as 6.5.1 requires update of the load-flow study whenever changes occur.

Public Input No. 81-NFPA 70B-2023 [Section No. 6.6.3]

~~6.6.3~~ –

~~The reliability study shall be reviewed for accuracy at intervals not to exceed 5 years.~~

Statement of Problem and Substantiation for Public Input

Section 6.6.4 requires the study to be updated when changes occur in the system. Therefore, requiring the review of the study every five years is not required.

Submitter Information Verification

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Submittal Date: Wed Dec 20 12:21:22 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-7-NFPA 70B-2024
Statement: Section 6.6.4 requires the study to be updated when changes occur in the system. Therefore, requiring the review of the study every five years is not required.

Public Input No. 40-NFPA 70B-2023 [Section No. 6.7]

~~**6.7** * – Incident Energy Analysis (Arc-Flash Study).~~

~~**6.7.1** –~~

~~The incident energy analysis shall be updated when changes occur in the electrical distribution system that could affect the results of the analysis.~~

~~**6.7.2** –~~

~~The analysis shall be reviewed for accuracy at intervals not to exceed 5 years.~~

~~**6.7.3** –~~

~~The most recent study shall be made available to the EMP coordinator.~~

Statement of Problem and Substantiation for Public Input

The current requirement to perform an incident energy analysis is outside the scope of NFPA 70B since, per the scope, the document covers "the preventive maintenance of electrical, electronic, and communication systems and equipment." An incident energy analysis is not "preventive maintenance". The current requirement is in direct conflict with NFPA 70E. NFPA 70E allows for two methods to determine arc-flash PPE - incident energy analysis OR arc-flash PPE category method. The requirement in NFPA 70B allows for only the incident energy analysis method and does not allow the arc-flash PPE category method in NFPA 70E. Therefore the two standards have a direct conflict. Management of hazards related to arc-flash energy is within the scope of NFPA 70E and is covered thoroughly in NFPA 70E. The requirement to perform an incident energy analysis (arc-flash study) should be removed from NFPA 70B since it is out of scope for 70B and the NFPA 70B language is in conflict with NFPA 70E.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 41-NFPA 70B-2023 [Section No. A.6.7]	
Public Input No. 41-NFPA 70B-2023 [Section No. A.6.7]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
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Submittal Date: Wed Dec 20 09:03:14 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: An arc-flash study is integral to the maintenance of electrical equipment and interacting with said equipment is directly related to the review of data obtained in the incident

energy analysis.

Public Input No. 174-NFPA 70B-2023 [Section No. 6.8]

6.8* Electrical Maintenance-Related Design.

~~Where a recognized hazard presents an increased risk during maintenance, a study shall be conducted to develop design options that could be implemented to reduce risk.~~

A study shall be conducted to design options to eliminate hazards or reduce risk.during maintenance-related activities.

6.8.1 The study shall, at minimum, consider the following elements:

6.8.1.2 Redundant power sources for critical systems.

6.8.1.3 Permanently installed condition monitoring devices to eliminate exposure to shock and arc flash hazards.

6.8.1.4 Methods of electrical disconnecting to de-energize components and full barriers to isolate components or compartments from nearby energized exposed conducitve parts for repair or replacement.

Statement of Problem and Substantiation for Public Input

New wording of the main statement makes it clear and concise as to the necessity of maintenance-related design and it's intended goal. The added requirements for consideration are well accepted electrical "safety-by-design" professionals but are completely ignored by entities that design for lowest total installed cost and, thus, a root cause to many electrical maintenance related incidents.

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Submittal Date: Fri Dec 22 13:26:41 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-8-NFPA 70B-2024
Statement: The requirement is clarified to state that eliminating exposures is an option to reducing risk. The annex revision expands design element options to be considered in a study to reduce hazards.

Public Input No. 82-NFPA 70B-2023 [Section No. 7.2.1.1]

7.2.1.1 Infrared Thermographic Inspection~~- of Electrical Connections~~ .

Infrared thermographic inspection of electrical connections, terminations, and ~~terminations~~ connectors shall be performed in accordance with Section 7.4.

Statement of Problem and Substantiation for Public Input

The title of this section is simplified. The simplification also address not including "terminations" and "connectors" in the existing title. The word "connectors" is added to the requirement and the sentence structure modified as infrared inspection can be used on these connectors.

Submitter Information Verification

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Submittal Date: Wed Dec 20 12:25:02 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-83-NFPA 70B-2024
Statement: The title has been updated to remove “of electrical connections” since terminations are not electrical connections but are included in the text below as part of the inspection.

Public Input No. 84-NFPA 70B-2023 [New Section after 7.2.1.4.1]

7.2.1.4.1

A calibrated torque wrench shall be used to obtain torque values.

Statement of Problem and Substantiation for Public Input

There is no requirement for a person to use a calibrated torque wrench for determining torque on a fastener. The proposal is to insert a new 7.2.1.4.1 to first state a calibrated tool is required, as what is done in 7.2.1.3.1. Then renumber the section accordingly after the insertion of this new requirement.

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Submittal Date: Wed Dec 20 12:30:01 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Chapter 8.5 test equipment and tools under 8.5.3 states “test equipment that provides measurements shall be calibrated.” Making this proposed change is a redundant requirement.

Public Input No. 85-NFPA 70B-2023 [Section No. 7.2.1.4.1]

7.2.1.4.1

When ~~using a calibrated torque wrench to confirm~~ confirming the torque of previously installed threaded hardware, the retightening value shall not exceed 90 percent of the manufacturer's specified initial torque value.

Statement of Problem and Substantiation for Public Input

The text concerning the use of the calibrated torque wrench is not needed for this requirement. The requirement is only about the allowed torque values. The unnecessary text is remove. Note - A separate PI, not linked to this one, proposes adding a requirement to use a calibrated torque wrench for this work.

Submitter Information Verification

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City:
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Submittal Date: Wed Dec 20 12:33:08 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-84-NFPA 70B-2024
Statement: The text concerning the use of the calibrated torque wrench is not needed for this requirement. The requirement is only about the allowed torque values. Calibration of tools is covered in Section 8.5.

Public Input No. 86-NFPA 70B-2023 [Section No. 7.2.1.4.2]

7.2.1.4.2

Where initial threaded hardware torque value data is not available, torque values shall be in accordance with Table 7.2.1.4.2(a), Table 7.2.1.4.2(b), or Table 7.2.1.4.2(c).

Table 7.2.1.4.2(a) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Cadmium or Zinc Plated

Bolt Diameter (in.)	Torque (Pound-Feet)
¼	6
5⁄16	11
⅜	20
7⁄16	32
½	48
9⁄16	70
⅝	96
¾	160
⅞	240
1.0	370

Notes:

(1) Consult the manufacturer for equipment supplied with metric fasteners.

(2) The table is based on national coarse thread pitch.

(3) The bolt grade is SAE 5.

(4) The minimum tensile (strength) is 105,000 lbf/in.^{2}.

Table 7.2.1.4.2(b) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Silicon Bronze

	-	Torque (Pound-Feet)
Bolt Diameter (in.)	Nonlubricated	Lubricated
5⁄16	15	10
⅜	20	15
½	40	25
⅝	55	40
¾	70	60

Notes:

(1) Consult the manufacturer for equipment supplied with metric fasteners.

(2) This table is based on national coarse thread pitch.

(3) This table is based on bronze alloy bolts having a minimum 70,000 lb/in.^{2} tensile strength.

Table 7.2.1.4.2(c) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Aluminum

Bolt Diameter (in.)	Torque (Pound-Feet), Lubricated
5⁄16	10
⅜	14
½	25
⅝	40
¾	60

Notes:

(1) Consult the manufacturer for equipment supplied with metric fasteners.

(2) This table is based on national coarse thread pitch.

(3) This table is based on aluminum alloy bolts having a minimum 55,000 lb/in.^{2} tensile strength.

Statement of Problem and Substantiation for Public Input

Adding the word "bolt" to ensure readers understand what the "grade" is applied to.

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Submittal Date: Wed Dec 20 12:37:16 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-85-NFPA 70B-2024

Statement: Tables Note 1: Each of the tables includes a statement about consulting the manufacturer for metric fastener torque requirements but is better clarified in the main paragraph of the section. This change allows the reader to quickly find the requirement for metric fasteners instead of having the find the requirement as a note to the table for US Standard fasteners.

Table 7.2.1.4.2(a) Note 3: Adding the word “fastener” clarifies to readers what the “grade” is applied to.

Table 7.2.1.4.2(a) Note 4: The parenthesis around “strength” is not needed and the unit of measure for tensile strength is corrected to be lb/in2.

Public Input No. 87-NFPA 70B-2023 [Section No. 7.2.1.4.2]

7.2.1.4.2

Where initial threaded hardware torque value data is not available, torque values shall be in accordance with Table 7.2.1.4.2(a), Table 7.2.1.4.2(b), or Table 7.2.1.4.2(c).

Table 7.2.1.4.2(a) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Cadmium or Zinc Plated

Bolt Diameter (in.)	Torque (Pound-Feet)
¼	6
5⁄16	11
⅜	20
7⁄16	32
½	48
9⁄16	70
⅝	96
¾	160
⅞	240
1.0	370

Notes:

(1) Consult the manufacturer for equipment supplied with metric fasteners.

(2) The table is based on national coarse thread pitch.

(3) The grade is SAE 5.

(4) The minimum tensile ~~(strength) is~~ strength is 105,~~000 lbf~~ 000 lb /in.^{2}.

Table 7.2.1.4.2(b) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Silicon Bronze

Bolt Diameter (in.)	-	Torque (Pound-Feet)
	Nonlubricated	Lubricated
5⁄16	15	10
⅜	20	15
½	40	25
⅝	55	40
¾	70	60

Notes:

(1) Consult the manufacturer for equipment supplied with metric fasteners.

(2) This table is based on national coarse thread pitch.

(3) This table is based on bronze alloy bolts having a minimum 70,000 lb/in.^{2} tensile strength.

Table 7.2.1.4.2(c) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Aluminum

Bolt Diameter (in.)	Torque (Pound-Feet), Lubricated
5⁄16	10
⅜	14
½	25
⅝	40
¾	60

Notes:

(1) Consult the manufacturer for equipment supplied with metric fasteners.

(2) This table is based on national coarse thread pitch.

(3) This table is based on aluminum alloy bolts having a minimum 55,000 lb/in.^{2} tensile strength.

Statement of Problem and Substantiation for Public Input

The parenthesis around "strength" in note 4 is not needed and is removed. The unit for tensile strength in note 4 should not include "f" so that is removed.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Wed Dec 20 12:40:46 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-85-NFPA 70B-2024

Statement: Tables Note 1: Each of the tables includes a statement about consulting the manufacturer for metric fastener torque requirements but is better clarified in the main paragraph of the section. This change allows the reader to quickly find the requirement for metric fasteners instead of having the find the requirement as a note to the table for US Standard fasteners.

Table 7.2.1.4.2(a) Note 3: Adding the word “fastener” clarifies to readers what the “grade” is applied to.

Table 7.2.1.4.2(a) Note 4: The parenthesis around “strength” is not needed and the unit of measure for tensile strength is corrected to be lb/in2.

Public Input No. 88-NFPA 70B-2023 [Section No. 7.2.1.4.2]

7.2.1.4.2

Where initial threaded hardware torque value data is not available, torque values shall be in accordance with Table 7.2.1.4.2(a), Table 7.2.1.4.2(b), or Table 7.2.1.4.2(c) for US Standard fasteners and, for equipment supplied with metric fasteners, the manufacturer shall be consulted for metric hardware torque requirements .

Table 7.2.1.4.2(a) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Cadmium or Zinc Plated

Bolt Diameter (in.)	Torque (Pound-Feet)
¼	6
5⁄16	11
⅜	20
7⁄16	32
½	48
9⁄16	70
⅝	96
¾	160
⅞	240
1.0	370

Notes:

(1) ~~Consult the manufacturer for equipment supplied with metric fasteners.(2)~~ The table is based on national coarse thread pitch.

(~~3~~ 2) The grade is SAE 5.

(~~4~~ 3) The minimum tensile (strength) is 105,000 lbf/in.^{2}.

Table 7.2.1.4.2(b) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Silicon Bronze

Bolt Diameter (in.)	- Nonlubricated	Torque (Pound-Feet) Lubricated
5⁄16	15	10
⅜	20	15
½	40	25
⅝	55	40
¾	70	60

Notes:

(1) ~~Consult the manufacturer for equipment supplied with metric fasteners.(2)~~ This table is based on national coarse thread pitch.

(~~3~~ 2) This table is based on bronze alloy bolts having a minimum 70,000 lb/in.^{2} tensile strength.

Table 7.2.1.4.2(c) Bolt-Torque Values for Electrical Connections, US Standard Fasteners — Aluminum

Bolt Diameter (in.)	Torque (Pound-Feet), Lubricated
5⁄16	10
⅜	14
½	25
⅝	40
¾	60

Notes:

(1) ~~Consult the manufacturer for equipment supplied with metric fasteners.(2)~~ This table is based on national coarse thread pitch.

(~~3~~ 2) This table is based on aluminum alloy bolts having a minimum 55,000 lb/in.^{2} tensile strength.

Statement of Problem and Substantiation for Public Input

Each of the tables includes a statement about consulting the manufacturer for metric fastener torque requirements. Those individual notes can be deleted and the issue addressed in the main paragraph of the section. This allows the reader to more quickly find the requirement for metric fasteners instead of having the find the requirement as a note to the table for US Standard fasteners.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Street Address:
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Submittal Date: Wed Dec 20 12:43:21 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-85-NFPA 70B-2024

Statement: Tables Note 1: Each of the tables includes a statement about consulting the manufacturer for metric fastener torque requirements but is better clarified in the main paragraph of the section. This change allows the reader to quickly find the requirement for metric fasteners instead of having the find the requirement as a note to the table for US Standard fasteners.

Table 7.2.1.4.2(a) Note 3: Adding the word “fastener” clarifies to readers what the “grade” is applied to.

Table 7.2.1.4.2(a) Note 4: The parenthesis around “strength” is not needed and the unit of measure for tensile strength is corrected to be lb/in2.

Public Input No. 89-NFPA 70B-2023 [Section No. 7.2.2]

7.2.2 ~~Newly Installed Threaded~~ New Threaded Hardware Torque Values.

7.2.2.1

~~Newly installed threaded~~ New threaded hardware connections shall be torqued to the manufacturer's published data.

7.2.2.2

Where the manufacturer's data is not available, torque values shall be in accordance with Table 7.2.1.4.2(a), Table 7.2.1.4.2(b), or Table 7.2.1.4.2(c) based on the hardware used.

Statement of Problem and Substantiation for Public Input

The existing language is a bit awkward to read. The text is simplified to refer to "new threaded" hardware. A separate section addresses hardware that had already been installed and would no longer be considered new.

Submitter Information Verification

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Organization: DuPont
Street Address:
City:
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Zip:

Submittal Date: Wed Dec 20 12:48:30 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The proposed language does not clarify the requirement.

Public Input No. 90-NFPA 70B-2023 [Section No. 7.3]

7.3 Insulation Resistance Quality.

7.3.1

For equipment rated up to 1000 volts ac or 1500 volts dc , the quality of electrical insulation (insulation resistance) shall be verified using a dc insulation resistance test set.

7.3.1.1 Insulation Resistance Testing.

The applied test voltage shall not exceed the value specified by the manufacturer.

7.3.1.1.1

Where manufacturer's value is not available, test voltage shall be in accordance with appropriate industry standard.

7.3.1.1.2

The test instrument used to perform an insulation-resistance test shall be calibrated.

7.3.2

For equipment rated in excess of 1000 volts ac or 1500 volts dc , the electrical insulation quality test method shall be determined by the EMP.

7.3.2.1

The test method shall be one or more of the following:

(1) dc insulation resistance

(2) ac or dc dielectric withstand testing

(3) dc overpotential (hipot) testing

(4) ac insulation power factor/dissipation factor testing

(5) Very low frequency (VLF) testing

(6) Damped alternating current (DAC) voltage test

(7) Acoustical ultrasonic testing

(8) Partial discharge (PD) testing

Statement of Problem and Substantiation for Public Input

NFPA 70 is changing the voltage demarcations from just "1000 volts" to "1000 volts ac and 1500 volts dc" in recognition that the class of equipment is the same for products that fall in these voltage classes. This proposed change is to align NFPA 70B with the changes occurring in NFPA 70.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 12:50:45 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The voltage range given in the standard is for tests done on electrical equipment rated 1000V and less for 7.3.1. For rotating equipment there is a limitation in the testing standard to 1000V dc. There are different methods listed that are available that are more effective at determining insulation quality at voltages over 1000V regardless of if the equipment is AC or DC rated.

Public Input No. 14-NFPA 70B-2023 [New Section after 7.3.1.1.2]

TITLE OF NEW CONTENT

Type your content here ...7.3.1.1.3 Where insulation resistance test is one part of a multiple step maintenance procedure including cleaning the test shall be performed "as-found" and "as-left".

Statement of Problem and Substantiation for Public Input

"As-found" and "as-left" testing were part of the 70B recommended practice and NETA MTS. They are important for evaluating the sufficiency of the interval and impact of contamination and other maintenance.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
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City:
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Zip:

Submittal Date: Fri Dec 01 12:48:37 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: As a standard, NFPA 70B represents the minimum maintenance required. Requiring an “as found” condition assessment, while might be useful for trending and evaluation, can extend outages and is not representative of the “minimum” maintenance required.

Public Input No. 19-NFPA 70B-2023 [Section No. 7.4]

7.4 ~~Infrared Thermography.~~ Temperature Measurement

7.4.1

~~Infrared thermography~~ Temperature measurements shall be ~~used~~ taken when required to verify temperature differences (ΔT) of the following:

(1) Similar electrical components under similar loading

(2) Comparison between electrical components and ambient air temperatures

7.4.2~~–~~

~~All accessible and necessary covers shall be removed prior to infrared thermography inspection to provide a clear line of sight to the equipment being scanned.~~

Continuously monitoring permanently installed temperature measurement devices shall be permitted to satisfy the requirements of 7.4.

7.4.3

Temperature differences between the area of concern and the reference area shall be documented.

7.4.4

~~Infrared thermography inspections shall be performed at normal circuit loading~~

Where the temperature measurement technique applied is a single point of time measure, the circuit loading shall be a minimum of 40% of nominal circuit loading and after sufficient operating duration to have reached a steady-state temperature .

7.4.5

~~Where normal~~

The circuit loading

~~is not feasible, circuit loading of not less than 40 percent of nominal circuit loading shall be permitted.~~

shall be documented with the temperature measurements.

7.4.6

~~Circuit loading characteristics shall be documented and retained for future reference.~~

Statement of Problem and Substantiation for Public Input

The requirement to utilize infrared thermography is unnecessarily restrictive in eliminating the many other available technologies to serve the same function. Standard is re-written to reflect the necessary functionality and performance without restricting the technology applied to achieve the results.

Submitter Information Verification

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Submittal Date: Thu Dec 07 12:41:19 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-86-NFPA 70B-2024

Statement: Language added to annex describing how Infrared windows can provide line of sight without requiring covers to be removed.

Gathering “load” information when performing an infrared scan is not the “minimum” required maintenance activity required for NFPA 70B and can be impractical and dangerous. Performing infrared thermography at operating load or at 40% is a recommended practice and has been moved to the annex.

Continuously monitoring permanently installed temperature measurement devices provide an alternative technology of producing the same results as an infrared thermography. Adding language to require the operating temperature to have reached a steady-state temperature is a valid technical condition when performing infrared thermography. Recording circuit loading characteristics of areas of concern clarifies the requirement.

Public Input No. 91-NFPA 70B-2023 [New Section after 7.4.2]

A7.4.2

Infrared windows (viewports) can provide line of sight from the infrared camera to the equipment being inspected without requiring the removal of covers or panels.

Statement of Problem and Substantiation for Public Input

The recommendation is to add Annex material for this requirement to let the reader know that infrared windows can be used to provide line-of-sight from an infrared camera to the item being inspected and eliminate the need to remove a cover or open a door.

Submitter Information Verification

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Submittal Date: Wed Dec 20 12:56:25 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-86-NFPA 70B-2024

Statement: Language added to annex describing how Infrared windows can provide line of sight without requiring covers to be removed.

Gathering “load” information when performing an infrared scan is not the “minimum” required maintenance activity required for NFPA 70B and can be impractical and dangerous. Performing infrared thermography at operating load or at 40% is a recommended practice and has been moved to the annex.

Continuously monitoring permanently installed temperature measurement devices provide an alternative technology of producing the same results as an infrared thermography. Adding language to require the operating temperature to have reached a steady-state temperature is a valid technical condition when performing infrared thermography. Recording circuit loading characteristics of areas of concern clarifies the requirement.

Public Input No. 92-NFPA 70B-2023 [Sections 7.4.4, 7.4.5, 7.4.6]

~~**Sections 7.4.4, 7.4.5, 7.4.6**~~

~~**7.4.4** –~~

~~Infrared thermography inspections shall be performed at normal circuit loading.~~

~~**7.4.5** –~~

~~Where normal circuit loading is not feasible, circuit loading of not less than 40 percent of nominal circuit loading shall be permitted.~~

~~**7.4.6** –~~

~~Circuit loading characteristics shall be documented and retained for future reference.~~

Statement of Problem and Substantiation for Public Input

It is not reasonable nor safe to gather loading for all circuits being inspected with infrared. Facilities may have thousands of pieces of equipment being inspected. In order to gather loading information for all circuits, clamp-on ammeters would need to be used to check the loading of the equipment at the time the infrared inspection is occurring. To determine if that loading was "normal circuit loading" the actual load measurement would have to be compared to some document that lists the "normal circuit loading". For some equipment, like adjustable speed drives, normal circuit loading may vary based on a product being manufactured at that time. Having to perform a clamp-on ammeter reading for every circuit every time an infrared inspection is done creates significant hazard to personnel as potentially thousands of readings would need to be taken for one infrared inspection cycle. The requirement to ensure the infrared inspection is done at "normal circuit loading" is not practical, causes safety concerns, and should be removed.

The 40 percent loading requirement is also not practical, causes safety concerns, and should be removed, just like the first requirement. As a practical example, I may have a 120 volt, 15 amp circuit that is loaded to 14 amps. So, per the existing requirement, my infrared inspection of that equipment would be valid down to 5.6 amps (40% of the 14 amps of normal load). For another 15 amp circuit, its normal load may be 8 amps so the infrared inspection of that circuit would be valid down to 3.2 amps. So now I have two different valid load levels (5.6 amps and 3.2 amps) for the same size circuits (15 amps.) That different for allowable low load limits make sense and causes confusion.

With the first two items removed, the last item is not needed and is removed.

There are cases where infrared inspections of electrical equipment is done at low circuit loading and the inspection provides meaningful results. For example, infrared inspections can be performed for an oil filled substation transformer. The transformer radiators can easily be checked for proper operation even when the transformer is very lightly loaded though the normal circuit load may be quite large. There is no reasonable way to make a valid low load threshold for when an infrared inspection for all types of equipment.

Some information about equipment loading could be added a a new Annex A7.4.1 and include information that a certain amount of load is needed to help ensure infrared inspections can help determine issues in the system.

Submitter Information Verification

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Submittal Date: Wed Dec 20 12:59:32 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-86-NFPA 70B-2024

Statement: Language added to annex describing how Infrared windows can provide line of sight without requiring covers to be removed.

Gathering “load” information when performing an infrared scan is not the “minimum” required maintenance activity required for NFPA 70B and can be impractical and dangerous. Performing infrared thermography at operating load or at 40% is a recommended practice and has been moved to the annex.

Continuously monitoring permanently installed temperature measurement devices provide an alternative technology of producing the same results as an infrared thermography. Adding language to require the operating temperature to have reached a steady-state temperature is a valid technical condition when performing infrared thermography. Recording circuit loading characteristics of areas of concern clarifies the requirement.

Public Input No. 93-NFPA 70B-2023 [Section No. 8.2]

8.2 Risk Assessment Special Considerations.

Where the following special considerations are present, a risk assessment shall be performed to identify hazards and determine if additional protective measures are required prior to beginning work:

(1) Electrical, as follows:

(a) X-ray

(b) Overpotential

(2) Mechanical, as follows:

(a) Stored energy

(b) Mass energy

(3) Chemical, as follows:

(a) SF_6 ~~gas~~ gas fault by-products

(b) Electrolytes

(4) Environmental, as follows:

(a) Asbestos

(b) SF_6 gas

(c) Insulating fluids, as follows:

i. PCBs

ii. Tetrachloroethylene

Statement of Problem and Substantiation for Public Input

Text revised to add a missing space.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Wed Dec 20 13:15:17 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-12-NFPA 70B-2024

Statement: The term SF6 was removed and replaced with insulating gas to be more general.

Public Input No. 95-NFPA 70B-2023 [Section No. 8.3]

8.3* Testing Category Types.

~~Electrical~~ Maintenance maintenance testing tasks shall be identified as one of the following category types:

(1) Category 1 — Online standard test

(2) Category 1A — Online enhanced test

(3) Category 2 — Offline standard test

(4) Category 2A — Offline enhanced test

WARNING: Testing of ~~electrical~~ equipment while it is connected to the source of supply introduces additional hazards to the worker. Workers should understand the hazards and risks of the test being performed.

8.3.1 Category 1 — Online Standard Test.

Online standard tests shall include testing procedures performed while the ~~electrical~~ equipment or device is connected to the source of supply.

8.3.2 Category 1A — Online Enhanced Test.

Online enhanced tests shall include certain testing procedures performed while the ~~electrical~~ equipment or device is connected to the source of supply and that are not typically performed in normal ~~electrical~~ maintenance activities and that provide additional diagnostic information. *(See A.8.3.)*

8.3.3 Category 2 — Offline Standard Test.

Offline standard tests shall include testing procedures performed while the ~~electrical~~ equipment or device is disconnected from the source of supply or is connected to an external test voltage source of supply.

8.3.4 Category 2A — Offline Enhanced Test.

Offline enhanced tests shall include certain testing procedures performed while the ~~electrical~~ equipment or device is disconnected from the source of supply or is connected to an external test voltage source of supply and that are not typically performed in normal ~~electrical~~ maintenance activities and that provide additional diagnostic information. *(See A.8.3.)*

Statement of Problem and Substantiation for Public Input

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

Submitter Information Verification

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Submittal Date: Wed Dec 20 13:19:20 EST 2023

Committee: EEM-AAA

Committee Statement

Resolution: FR-9-NFPA 70B-2024

Statement: Removing the word “electrical” aligns with the scope statement in Section 1.1. Normal was changed to standard to align with the term used in Categories 1 and 2.

Public Input No. 96-NFPA 70B-2023 [Section No. 8.4]

~~**8.4** – Qualifications of Testing Personnel.~~

~~**8.4.1** –~~

~~Testing personnel shall be qualified to operate the test equipment used in the type of test to be performed.~~

~~**8.4.2** –~~

~~Testing personnel shall be qualified to perform the test procedure on the specific equipment to be tested.~~

Statement of Problem and Substantiation for Public Input

Requirements for personnel qualifications (and safety) are better grouped into one section. This PI deletes the requirements in this section. A separate linked PI moves them into Chapter 5 - Personnel Safety and proposed a title change of that chapter to Personnel Safety and Qualifications.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 97-NFPA 70B-2023 [Chapter 5]	
Public Input No. 97-NFPA 70B-2023 [Chapter 5]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Wed Dec 20 13:24:23 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-29-NFPA 70B-2024
Statement: The requirements are covered in 4.3.3.

Public Input No. 94-NFPA 70B-2023 [Section No. 8.5.2]

8.5.2

The test equipment shall be applied in accordance with the manufacturer's ~~specifications~~ requirements .

Statement of Problem and Substantiation for Public Input

The term "specification" is changed to "requirements" as the updated word seems more appropriate as the equipment manufacturer likely has requirements concerning the use of the equipment. "Specifications" is more thought of as the specifications for the test equipment itself and not how it is used.

Submitter Information Verification

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Submittal Date: Wed Dec 20 13:17:28 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-13-NFPA 70B-2024
Statement: Adding the term "and tools" clarifies the items to be included in this section.

Public Input No. 20-NFPA 70B-2023 [Section No. 8.7.1]

~~**8.7.1** – Conditions of Maintenance.~~

~~**8.7.1.1** – Serviceable.~~

~~Equipment that passes all tests and is electrically and mechanically sound shall be designated as serviceable.~~

~~**8.7.1.2** * – Limited Service.~~

~~Equipment that has problems that are not detrimental to the protective operation or design characteristics of the equipment shall be designated as limited service.~~

~~**8.7.1.3** * – Nonserviceable.~~

~~Equipment that has a problem that is detrimental to the proper electrical or mechanical operation of the equipment shall be designated as nonserviceable.~~

Statement of Problem and Substantiation for Public Input

This section appears to be definitions, which if they were should be in chapter 3. However, only "nonserviceable" is used elsewhere and in that location is essentially defined again.

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Submittal Date: Thu Dec 07 15:08:53 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-21-NFPA 70B-2024
Statement: First revision relocates this content to Chapter 3 as definitions.

Public Input No. 98-NFPA 70B-2023 [Section No. 9.1 [Excluding any Sub-Sections]]

This chapter identifies the required frequency of maintenance for ~~electrical~~ equipment.

Statement of Problem and Substantiation for Public Input

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

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Submittal Date: Wed Dec 20 13:36:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-1-NFPA 70B-2024
Statement: The scope was simplified to address the variety of the content contained in Chapter 9.

Public Input No. 100-NFPA 70B-2023 [Section No. 9.1.2]

9.1.2 Maintenance Frequency Modifications.

9.1.2.1

Once the initial frequency for inspection and tests has been established based on the intervals listed in Table 9.2.2 and the equipment condition assessment, this frequency shall be adhered to for at least two maintenance cycles unless unexpected failures occur.

9.1.2.1.1

For equipment that has unexpected failures, the cause of the failure shall be used to determine if the maintenance interval for the equipment needs to be reduced.

9.1.2.1.2*

If more than two ~~inspections~~ maintenance cycles are completed without requiring additional service, the equipment owner shall be permitted to resume the original ~~inspection~~ maintenance interval period.

9.1.2.2

If more than two ~~inspections~~ maintenance cycles are completed without detecting equipment problems, the maintenance cycle shall be permitted to be extended to longer ~~intervals than listed in Table~~ maintenance intervals originally established for the equipment based on 9. ~~2~~ 1 .2 .1.

Statement of Problem and Substantiation for Public Input

The language in the requirements are updated to remove the reference to "inspection" and refer to "maintenance cycle" or "maintenance interval" as that wording is more consistent with the rest of the document. Plus, the maintenance cycle includes work other than inspections (such as electrical testing) so the word "inspection" is not all inclusive. The requirement in 9.1.2.2 is modified to refer to the initial maintenance intervals as determined in 9.1.2.1 as that requirement is based on the maintenance frequency table and modifications for the equipment condition assessment and other items, which is more than just meeting the requirements in the table.

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Submittal Date: Wed Dec 20 13:43:18 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-24-NFPA 70B-2024
Statement: First revision replaces “inspection” with “maintenance interval” to align with definitions.

Public Input No. 99-NFPA 70B-2023 [Section No. 9.1.2.1 [Excluding any Sub-Sections]]

Once the initial frequency for inspection and tests has been established based on the intervals listed in Table 9.2.2, modifications based on the the installed continuous monitoring and predictive techniques, and the equipment condition assessment, this frequency shall be adhered to for at least two maintenance cycles unless unexpected failures occur.

Statement of Problem and Substantiation for Public Input

There is not currently an allowance to take "credit" for the installed continuous monitoring or predictive techniques that are allowed per 9.1.1. The maintenance frequency should specifically allow for frequency adjustments based on those items.

Submitter Information Verification

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Submittal Date: Wed Dec 20 13:39:56 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Proposed content is redundant to 9.1.1.1

Public Input No. 102-NFPA 70B-2023 [Section No. 9.2]

9.~~2~~ 3 Frequency of Maintenance.

9.~~2~~ 3 .1*

The manufacturer’s recommendations shall be followed for each of the maintenance scopes specified in this standard for the required intervals.

9.~~2~~ 3 .2*

Where the manufacturer's recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.~~2~~ 3 .2, in accordance with the equipment condition assessment in Section 9.~~2~~ 3 , and as modified by the other parts of this chapter.

Table 9.~~2~~ 3 .2 Maintenance Intervals

		-	-	Equipment Condition Assessment		
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**		
All equipment	Infrared thermography	12 months	12 months	6 months		
Battery ESSs	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	- -
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Busways	Visual inspection	60 months	60 months	12 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Cable trays	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months		
	Mechanical inspection	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Electronic equipment	-	-			Reserved	-
Fuses	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical	60 months	36 months	12 months	

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		servicing			
	-	Electrical testing	60 months	36 months	12 months
GFCIs	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	-		Reserved
Grounding and bonding	Visual inspection	12 months	12 months	6 months	
	Cleaning	-		Reserved	-
	Lubrication	-		Reserved	-
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	36 months
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months	
	Corona detection	12 months	6 months	4 months	
	-	Maintenance and testing	60 months	36 months	12 months
Lighting	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Servicing	60 months	36 months	12 months
Lighting control systems	-	-			Reserved
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

9.~~2~~ 3 .2.1

The intervals in Table 9.~~2~~ 3 .2 shall only be required if referenced by a specific section in another chapter.

9.~~2~~ 3 .2.2

The maintenance interval for electrical equipment shall be permitted to be altered based on the potential risk to personnel or facility operations due to a failure of the equipment to operate as expected.

9.~~2~~ 3 .2.3

Any deviations from the maintenance intervals described in Table 9.~~2~~ 3 .2 to extend the maintenance interval and the justification for the deviation shall be documented in the EMP.

Statement of Problem and Substantiation for Public Input

The Equipment Condition is used in the maintenance interval table to help the reader determine the specified maintenance interval. The Equipment Condition information appears after the maintenance interval table, so the reader looks at a table with different intervals for different equipment conditions

that have not yet been defined. This PI is to move the Frequency of Maintenance section to after the Equipment Condition section. A separate linked PI renumbers the Equipment Condition section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 101-NFPA 70B-2023 [Section No. 9.3]	
Public Input No. 103-NFPA 70B-2023 [Sections A.9.2.1, A.9.2.2, A.9.3.2, A.9.3.2.1]	
Public Input No. 101-NFPA 70B-2023 [Section No. 9.3]	
Public Input No. 103-NFPA 70B-2023 [Sections A.9.2.1, A.9.2.2, A.9.3.2, A.9.3.2.1]	

Submitter Information Verification

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Committee: EEM-AAA

Committee Statement

Resolution: The NFPA publishing system automatically adjusts section numbers for the addition or deletion of sections created by a first revision.

Public Input No. 17-NFPA 70B-2023 [Section No. 9.2.2]

9.2.2*

Where the manufacturer's recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

-	-	Equipment Condition Assessment			
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months		6 months
Battery ESSs	Visual inspection	60 months	36 months		12 months
	Cleaning	60 months	36 months		12 months
	-	Lubrication	-	Reserved	- -
	Mechanical servicing	-	Reserved	-	
	-	Electrical testing	60 months	36 months	
Busways	Visual inspection	60 months	60 months		12 months
	-	Cleaning	60 months	36 months	
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months
	-	Electrical testing	60 months	36 months	
	-	Special	60 months	36 months	
Cable trays	Visual inspection	12 months	12 months		6 months
	-	Cleaning	60 months	36 months	
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months
	-	Electrical testing	60 months	36 months	
Electric vehicle power transfer systems	Visual inspection	60 months	36 months		12 months
	Mechanical inspection	60 months	36 months		12 months
	-	Electrical testing	60 months	36 months	
Electronic equipment	-	-	Reserved	-	
Fuses	Visual inspection	60 months	36 months		12 months
	Cleaning	60 months	36 months		12 months
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months

-	-	Equipment Condition Assessment				
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months		
GFCIs	Visual inspection	12 months	12 months			6 months
	-	Cleaning	60 months	36 months		
	Lubrication	60 months	36 months			12 months
	-	Mechanical servicing	-	Reserved	-	
Grounding and bonding	Visual inspection	12 months	12 months			6 months
	Cleaning	-	Reserved	-	-	
	Lubrication	-	Reserved	-		
	-	Mechanical servicing	-	Reserved	-	
	-	Electrical testing	60 months			36 months
High-voltage substation insulators	Visual inspection	12 months	12 months			6 months
	Corona detection	12 months	6 months			4 months
	-	Maintenance and testing	60 months	36 months		
Lighting	Visual inspection	60 months	36 months			12 months
	Cleaning	60 months	36 months			12 months
	-	Servicing	60 months	36 months		
Lighting control systems	-	-	Reserved	-		
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months			6 months
	Cleaning	60 months	36 months			12 months
	Lubrication	-	Reserved	-		
	Mechanical servicing	60 months	36 months			12 months
	-	Electrical testing	60 months	36 months		
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months			6 months
	Cleaning	60 months	36 months			12 months
	Lubrication	-	Reserved	-		
	Mechanical servicing	60 months	36 months			12 months
	-	Electrical testing	60 months	36 months		

-	-	~~Equipment Condition Assessment~~				
Product	**Scope of Work**	~~Condition 1~~	~~Condition 2~~	~~Condition 3~~		
Medium-voltage power circuit breakers	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	~~60 months~~	~~36 months~~			12 months
	Mechanical servicing	~~60 months~~	~~36 months~~			12 months
	-	Electrical testing	~~60 months~~	~~36 months~~		
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	~~60 months~~	~~36 months~~			12 months
	Mechanical servicing	~~60 months~~	~~36 months~~			12 months
	-	Electrical testing	~~60 months~~	~~36 months~~		
Motor control equipment	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	~~60 months~~	~~36 months~~			12 months
	Mechanical servicing	~~60 months~~	~~36 months~~			12 months
	-	Electrical testing	~~60 months~~	~~36 months~~		
Panelboards and switchboards	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	~~60 months~~	~~36 months~~			12 months
	Mechanical inspections	~~60 months~~	~~36 months~~			12 months
	-	Electrical testing	~~60 months~~	~~36 months~~		
Photovoltaic systems	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	-	~~Reserved~~	-	-	
	Lubrication	-	~~Reserved~~	-		
	-	Mechanical servicing	-	~~Reserved~~	-	
	-	Electrical testing	~~60 months~~	~~36 months~~		
Portable electrical tools and equipment	Visual inspection			Before each use	~~Before each use~~	~~Before eac use~~
	Cleaning			Before each use	~~Before each use~~	~~Before eac use~~
	Lubrication			In accordance with the	~~In accordance with the~~	~~In accorda with the~~

-	-	~~Equipment Condition Assessment~~				
Product	Scope of Work	~~Condition 1~~	~~Condition 2~~	~~Condition 3~~		
				manufacturer's instructions	~~manufacturer's instructions~~	~~manufactu instruction~~
	Mechanical servicing			In accordance with the manufacturer's instructions	~~In accordance with the manufacturer's instructions~~	~~In accorda with the manufactu instruction~~
	-	Electrical testing			3 months	~~3 months~~
Power and distribution transformers	Visual inspection	~~12 months~~	~~12 months~~			6 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	-	~~Reserved~~	-		
	-	Mechanical servicing	~~60 months~~	~~36 months~~		
	-	Electrical testing	~~60 months~~	~~36 months~~		
Power cables	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	-	Mechanical servicing	~~Reserved~~	~~Reserved~~	-	
	-	Electrical testing	~~60 months~~	~~36 months~~		
Power-factor correction capacitors	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	-	~~Reserved~~	-		
	-	Mechanical servicing	~~60 months~~	~~36 months~~		
	Electrical testing	~~60 months~~	~~36 months~~			12 months
	-	Special	-	~~Reserved~~	-	
Protective relays, electromechanical	Visual inspection	~~36 months~~	~~24 months~~			12 months
	Cleaning	~~36 months~~	~~24 months~~			12 months
	-	Lubrication	-	~~Reserved~~	-	
	-	Mechanical servicing	~~36 months~~	~~24 months~~		
	-	Electrical testing	~~36 months~~	~~24 months~~		
Protective relays, solid state and microprocessor	Visual inspection	~~60 months~~	~~36 months~~			12 months
	Cleaning	~~60 months~~	~~36 months~~			12 months
	Lubrication	-	~~Reserved~~	-		
	-	Mechanical servicing	~~60 months~~	~~36 months~~		

-	-	Equipment Condition Assessment			
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	
Public pools, fountains, and similar installations	-	-	Reserved	-	
Rotating equipment	Visual inspection	60 months	36 months		12 months
	Cleaning	60 months	36 months		12 months
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months
	-	Electrical testing	60 months	36 months	
Stationary standby batteries	Visual inspection	60 months	36 months		12 months
	Cleaning	60 months	36 months		12 months
	Mechanical servicing	-	Reserved	-	
	-	Electrical testing	60 months	36 months	
Substations	Visual inspection	12 months	12 months		6 months
	-	Cleaning	60 months	36 months	
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months
	-	Electrical testing	60 months	36 months	
	Special	60 months	36 months		12 months
	-	Mechanical checks	60 months	36 months	
Switches	Visual inspection	60 months	36 months		12 months
	Cleaning	60 months	36 months		12 months
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months
	-	Electrical testing	60 months	36 months	
Switchgear	Visual inspection	12 months	12 months		6 months
	-	Cleaning	60 months	36 months	
	Lubrication	60 months	36 months		12 months
	Mechanical servicing	60 months	36 months		12 months

-	-	Equipment Condition Assessment				
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months		
	-	Special	60 months	36 months		
Uninterruptible power supplies	Visual inspection	6 months	3 months			1 month
	Cleaning	12 months	6 months			3 months
	-	Lubrication	-	Reserved	-	
	-	Mechanical servicing	12 months	6 months		
	Electrical testing	12 months	6 months			3 months
	-	Special procedures			24 months	24 months
Wind power electric systems	Visual inspection	60 months	36 months			12 months
	Cleaning	60 months	36 months			12 months
	-	Lubrication	-	Reserved	-	
	-	Mechanical servicing	60 months	36 months		
	-	Electrical testing	60 months	36 months		
Wiring devices	Visual inspection	12 months	3 months			1 month
	-	Cleaning	60 months	36 months		
	Lubrication	-	Reserved	-		
	-	Mechanical servicing	60 months	36 months		
	Electrical testing	60 months	36 months			12 months

9.2.2.1

The intervals in Table 9.2.2 shall only be required if referenced by a specific section in another chapter.

9.2.2.2

The maintenance interval for electrical equipment shall be permitted to be altered based on the potential risk to personnel or facility operations due to a failure of the equipment to operate as expected.

9.2.2.3

Any deviations from the maintenance intervals described in Table 9.2.2 to extend the maintenance interval and the justification for the deviation shall be documented in the EMP.

Statement of Problem and Substantiation for Public Input

9.3.2.2 states "Criticality Condition 3 shall be assigned where the failure of the equipment or system will endanger personnel." Which is a repeat of a statement within 9.2.2 that directs persons to utilize the table. Thus, conditions 1 and 2 will never exist where the table is required. Those columns could be presented separately in the annex for recommended maintenance where safety is not a factor.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 18-NFPA 70B-2023 [Section No. 9.3]	
Public Input No. 18-NFPA 70B-2023 [Section No. 9.3]	

Submitter Information Verification

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Submittal Date: Thu Dec 07 12:26:28 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The content of Table 9.2.2 is retained. A conflict existed between current 9.2.2 and 9.3.2.2 forcing the application of Condition 3 column in all cases. A separate FR to 9.3.2.1 has corrected the conflict.

Public Input No. 29-NFPA 70B-2023 [Section No. 9.2.2]

9.2.2*

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved - -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved -
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		servicing			
	-	Electrical testing	60 months	36 months	12 months
GFCIs	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	-		Reserved
Grounding and bonding	Visual inspection	12 months	12 months	6 months	
	Cleaning	-		Reserved	-
	Lubrication	-		Reserved	-
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	36 months
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months	
	Corona detection	12 months	6 months	4 months	
	-	Maintenance and testing	60 months	36 months	12 months
Lighting	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Servicing	60 months	36 months	12 months
Lighting control systems	-	-			Reserved
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment				
		Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

		Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3
Transfer Switch Equipment [1]	Operational status inspection [2]	1 week	1 week	1 week
	Visual inspection	12 months	6 months	3 months
	Cleaning	36 months	24 months	12 months
	Lubrication	36 months	24 months	12 months
	Mechanical servicing	36 months	24 months	12 months
	Electrical testing	36 months	24 months	12 months
	Testing under load [3]	1 month	1 month	1 month

[1] Service intervals for transfer switch equipment intended for use in emergency systems are under Condition 3 and reflect the requirements in NFPA 110. These intervals are shorter than those for switches in Chapter 17 to ensure that the transfer equipment is uniquely maintained to supply emergency power within 10 seconds of loss of normal power.

[2] For regulated facilities such as hospitals, Section 8.4.1 of NFPA 110 requires a weekly operational status inspection typically covering alarms, indicating lights, control device display, control device factory settings, user settings, status of the automatic transfer mode, delays, communications, engine-start setting, cybersecurity settings, etc.

[3] For regulated facilities such as hospitals, Section 8.4.1 of NFPA 110 requires a monthly EPS exercise under load to test the performance of the generator adequately, the engine start functions of the transfer switch, and the ability to transfer the load from one source to the other source. Additionally, The Joint Commission standard EC.02.05.07 EP7 requires the monthly generator load test to include a complete simulated cold start and automatic and manual transfer of all essential electrical system loads. The weekly inspection of the emergency power supply system (EPSS) as per EC.02.05.07 EP 4 requires inspection of all associated components and batteries, which include all automatic transfer switches, battery chargers, radiators, fuel pumps, etc.

9.2.2.1

The intervals in Table 9.2.2 shall only be required if referenced by a specific section in another chapter.

9.2.2.2

The maintenance interval for electrical equipment shall be permitted to be altered based on the potential risk to personnel or facility operations due to a failure of the equipment to operate as expected.

9.2.2.3

Any deviations from the maintenance intervals described in Table 9.2.2 to extend the maintenance interval and the justification for the deviation shall be documented in the EMP.

Statement of Problem and Substantiation for Public Input

The ability to reliably transfer loads between two power sources without disrupting power is critical in many applications, including healthcare, data centers, oil and gas and others. Proper maintenance of

the equipment that accomplishes this transfer is important.

Although transfer switches were addressed in previous editions of NFPA 70B it appears that their content was inadvertently reduced in the 2023 edition. References to transfer switches existed in the 2019 edition of NFPA 70B in multiple locations including but not limited to 6.3.4, 9.7.2, 11.26, 12.2.1.1, 12.2.5.1, Chapter 28, Figures H.23 and H.49 and other locations.

The 2023 edition included Transfer Switches in Chapter 17; however, Transfer switches are a separate offering with unique requirements and should be addressed by a dedicated chapter.

There are a total of three related public inputs being submitted: One to remove transfer switches from Chapter 17, One to create a new Chapter 39 dedicated to Transfer Switch Equipment, and one to address maintenance intervals for Transfer Switch Equipment in Table 9.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 28-NFPA 70B-2023 [Chapter 17]	

Submitter Information Verification

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Submittal Date: Mon Dec 11 13:15:58 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-92-NFPA 70B-2024 The suggestion for an additional scope of work for “operational status inspection” was removed. The requirements for this scope is covered in the individual chapter.

Statement: Added maintenance intervals for the new chapter “transfer switch equipment”. Equipment maintenance intervals were adjusted to match requirements for similar equipment.

Public Input No. 111-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved - -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved -
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Condition 1	Condition 2	Condition 3	Equipment Condition Assessment	
	-	Electrical testing	60 months	36 months	12 months	
Public pools, fountains, and similar installations	-	-			Reserved	-
Rotating equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Stationary standby batteries	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Substations	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
-	~~Mechanical checks~~	~~60 months~~	~~36 months~~	~~12 months~~		
Switches	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Switchgear	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

There are no Mechanical Checks for Substations in Chapter 12. Therefore there is no need to have maintenance interval requirements.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 14:35:12 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Section 12.3.4 addresses mechanical servicing for substations and switchgear.

Public Input No. 112-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer's recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

				Equipment Condition Assessment	
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
GFCIs	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months

		-	-	Equipment Condition Assessment	
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	-		Reserved
Grounding and bonding	Visual inspection	12 months	12 months	6 months	
	Cleaning	-		Reserved	-
	Lubrication	-		Reserved	-
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	36 months
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months	
	Corona detection	12 months	6 months	4 months	
	-	Maintenance and testing	60 months	36 months	12 months
Lighting	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Servicing	60 months	36 months	12 months
Lighting control systems	-	-			Reserved
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment	
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
Motor control equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	Mechanical ~~inspections~~ servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Photovoltaic systems	Visual inspection	60 months	36 months	12 months	
	Cleaning	-		Reserved	-
	Lubrication	-		Reserved	-
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use	
	Cleaning	Before each use	Before each use	Before each use	
	Lubrication	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordanc with the manufacturer instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical	60 months	36 months	12 months

		-	-	Equipment Condition Assessment	
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
		testing			
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	-	-	Equipment Condition Assessment	
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month	
	Cleaning	12 months	6 months	3 months	
	-	Lubrication	-		Reserved
	-	Mechanical servicing	12 months	6 months	3 months
	-	Electrical testing	12 months	6 months	3 months
	-	Special procedures	24 months	24 months	24 months
Wind power electric systems	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Wiring devices	Visual inspection	12 months	3 months	1 month	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months

Statement of Problem and Substantiation for Public Input

The term "mechanical inspections" is changed to "mechanical servicing" to match the requirements for Panelboards and Switchboards in Chapter 13.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Wed Dec 20 14:38:19 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 113-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

		Equipment Condition Assessment			
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
-	~~Special~~	~~60 months~~	~~36 months~~	~~12 months~~	
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Condition 1	Condition 2	Condition 3	Equipment Condition Assessment	
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

There are no "special" requirements for Busway in Chapter 14. Therefore no inspection interval is needed for that item.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 14:41:19 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 115-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved - -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved -
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

		-	-	Equipment Condition Assessment	
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables and conductors	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

The entry for "power cables" is modified to include "and conductors" to match the title of Chapter 18. Conductors are not separately addressed in the table and therefore need to be included with cables.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 15:00:22 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 116-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
-	~~Lubrication~~	~~60 months~~	~~36 months~~	~~12 months~~	
-	~~Mechanical servicing~~	~~60 months~~	~~36 months~~	~~12 months~~	
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

There are no lubrication or mechanical servicing requirements in Chapter 19 for cable tray. Therefore those maintenance intervals are not required in the table.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 15:02:46 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 117-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

				Equipment Condition Assessment	
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	~~Lubrication~~		~~Reserved~~		
	~~Mechanical servicing~~		~~Reserved~~		
	Electrical testing	60 months	36 months	12 months	
Busways	Visual inspection	60 months	60 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	Mechanical servicing	60 months	36 months	12 months	
	Electrical testing	60 months	36 months	12 months	
	Special	60 months	36 months	12 months	
Cable trays	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	Mechanical servicing	60 months	36 months	12 months	
	Electrical testing	60 months	36 months	12 months	
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	Electrical testing	60 months	36 months	12 months	
~~Electronic equipment~~			~~Reserved~~		
Fuses	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	Condition 1	Condition 2	Equipment Condition Assessment	
				Condition 3	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
GFCIs	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
-	~~Mechanical servicing~~	-	~~Reserved~~	-	
Grounding and bonding	Visual inspection	12 months	12 months	6 months	
~~Cleaning~~	-	~~Reserved~~	-		
-	~~Lubrication~~	-	~~Reserved~~	-	
-	~~Mechanical servicing~~	-	~~Reserved~~	-	
	-	Electrical testing	60 months	36 months	36 months
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months	
	Corona detection	12 months	6 months	4 months	
	-	Maintenance and testing	60 months	36 months	12 months
Lighting	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Servicing	60 months	36 months	12 months
~~Lighting control systems~~	-	-	~~Reserved~~	-	
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	~~Lubrication~~	-	~~Reserved~~	-	
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	~~Lubrication~~	-	~~Reserved~~	-	
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months

		-		Equipment Condition Assessment	
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Motor control equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical inspections	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Photovoltaic systems	Visual inspection	60 months	36 months	12 months	
~~Cleaning~~	-	~~Reserved~~	-		
-	~~Lubrication~~	-	~~Reserved~~	-	
-	~~Mechanical servicing~~	-	~~Reserved~~	-	
	-	Electrical testing	60 months	36 months	12 months
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use	
	Cleaning	Before each use	Before each use	Before each use	
	Lubrication	In accordance with the	In accordance with the	In accordance with the	

		-	-	Equipment Condition Assessment	
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
~~Lubrication~~	-	~~Reserved~~	-		
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
-	~~Mechanical servicing~~	~~Reserved~~	~~Reserved~~	-	
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
~~Lubrication~~	-	~~Reserved~~	-		
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
-	~~Special~~	-	~~Reserved~~	-	
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
-	~~Lubrication~~	-	~~Reserved~~	-	
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
~~Lubrication~~	-	~~Reserved~~	-		
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
~~Public pools, fountains, and similar installations~~	-	-	~~Reserved~~	-	
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
~~Mechanical servicing~~	-	~~Reserved~~	-		
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment	
Product	Scope of Work	Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month	
	Cleaning	12 months	6 months	3 months	
-	~~Lubrication~~	-	~~Reserved~~	-	
	-	Mechanical servicing	12 months	6 months	3 months
	-	Electrical testing	12 months	6 months	3 months
	-	Special procedures	24 months	24 months	24 months
Wind power electric systems	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
-	~~Lubrication~~	-	~~Reserved~~	-	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Wiring devices	Visual inspection	12 months	3 months	1 month	
	-	Cleaning	60 months	36 months	12 months
-	~~Lubrication~~	-	~~Reserved~~	-	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months

Statement of Problem and Substantiation for Public Input

There is no reason to have a Reserved item listed in the table. The equipment chapter already indicates which items are reserved for future use. Therefore the Reserved rows in the table can be deleted. Note - There is not a Reserved line for all items in the chapters that are noted as Reserved. Therefore there is no consistency about what was/was not listed as a Reserved item in the table. The best way to clean up the table and make it more useable is to delete the Reserved rows in the table.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 15:05:36 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024
Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 118-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved - -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved -
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	Condition 1	Condition 2	Equipment Condition Assessment Condition 3	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
GFCIs	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
-	~~Lubrication~~	~~60 months~~	~~36 months~~	~~12 months~~	
	-	Mechanical servicing	-		Reserved -
Grounding and bonding	Visual inspection	12 months	12 months	6 months	
	Cleaning	-		Reserved	- -
	Lubrication	-		Reserved	- -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	36 months
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months	
	Corona detection	12 months	6 months	4 months	
	-	Maintenance and testing	60 months	36 months	12 months
Lighting	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Servicing	60 months	36 months	12 months
Lighting control systems	-	-			Reserved -
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

There is no lubrication requirement for GFCIs in Chapter 21. Therefore a maintenance interval is not required for lubrication for this equipment.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Wed Dec 20 15:10:49 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 120-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved - -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved -
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	60 months	36 months	12 months	
	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Motor control equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical inspections	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Photovoltaic systems	Visual inspection	60 months	36 months	12 months	
	Cleaning	-		Reserved	- -
	Lubrication	-		Reserved	- -
	Mechanical servicing	- 36 months	~~Reserved~~ 24 months	- 12 months	
	-	Electrical testing	60 months	36 months	12 months
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use	
	Cleaning	Before each use	Before each use	Before each use	
	Lubrication	In accordance with the	In accordance with the	In accordance with the	

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

Mechanical servicing is a requirement for PV systems per chapter 30. Therefore some frequency should provided. Possible frequencies are listed as a starting point to determine what frequencies to list.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 20 15:18:39 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 121-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved - -
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	Mechanical inspection	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months
Electronic equipment	-	-			Reserved -
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Condition 1	Condition 2	Condition 3	Equipment Condition Assessment
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month	
	Cleaning	12 months	6 months	3 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	12 months	6 months	3 months
	-	Electrical testing	12 months	6 months	3 months
	-	Special procedures	24 months	24 months	24 months
Wind power electric systems	Visual inspection	60 months	36 months	12 months	
	~~Cleaning~~	~~60 months~~	~~36 months~~	~~12 months~~	
-	~~Lubrication~~	-	~~Reserved~~	-	
-	~~Mechanical servicing~~	~~60 months~~	~~36 months~~	~~12 months~~	
	-	Electrical testing	60 months	36 months	12 months
Wiring devices	Visual inspection	12 months	3 months	1 month	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months

Statement of Problem and Substantiation for Public Input

There are no requirements in Chapter 31 for cleaning, lubricating, or mechanical servicing of wind power electric systems. Therefore we should not list frequencies for those tasks.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 07:22:21 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 122-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer's recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

		Equipment Condition Assessment			
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**	
All equipment	Infrared thermography	12 months	12 months	6 months	
Battery ESSs	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Lubrication	-		Reserved
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months	
	~~Mechanical inspection~~	~~60 months~~	~~36 months~~	~~12 months~~	
-	~~Electrical testing~~	~~60 months~~	~~36 months~~	~~12 months~~	
Electronic equipment	-	-			Reserved
Fuses	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months	

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		
	Lubrication	In accordance with the	In accordance with the	In accordance with the		

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
		manufacturer's instructions	manufacturer's instructions	manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3	
	-	Electrical testing	60 months	36 months	12 months
Public pools, fountains, and similar installations	-	-			Reserved -
Rotating equipment	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	-	Lubrication	60 months	36 months	12 months
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Stationary standby batteries	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Mechanical servicing	-		Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Substations	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	60 months	36 months	12 months
	-	Mechanical checks	60 months	36 months	12 months
Switches	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Switchgear	Visual inspection	12 months	12 months	6 months	
	-	Cleaning	60 months	36 months	12 months -
	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

There are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems. Therefore we should not include a frequency for those items.

Submitter Information Verification

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Submittal Date: Thu Dec 21 07:23:08 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-27-NFPA 70B-2024

Statement: First revision removes:

1) ‘reserved’ intervals to maintain consistency in the table.

2) ‘special’ since there are no special requirements for busway in Chapter 14.

3) ‘lubrication’ and ‘mechanical servicing’ since these are not required in Chapter 19 for cable trays.

4) “mechanical servicing and electrical testing requirements” since there are no mechanical servicing or electrical testing requirements in Chapter 33 for electric vehicle power systems.

5) the frequency of lubrication of GFCIs since there is no requirement to lubricate GFCIs.

6) cleaning, lubricating, or mechanical servicing of wind

power electric systems since there are no requirements in Chapter 31 for these procedures.

First revision replaces:

1) ‘reserved’ with intervals to align with requirements in Chapter 30 for photovoltaic systems.

2) “inspections” with “servicing” to match the requirements for panelboards and switchboards in Chapter 13.

3) Battery ESSs with Batteries for the interval to be applicable to batteries.

First revision incorporates ‘and conductors’ to align with the title of Chapter 18 for power cables and conductors.

Public Input No. 198-NFPA 70B-2023 [Section No. 9.2.2 [Excluding any Sub-Sections]]

Where the manufacturer’s recommendations are not provided or available and failure, breakdown, or malfunction of the equipment will present an unacceptable risk for personnel or the environment, equipment maintenance shall be performed at intervals not greater than half of the Performance Failure to Functional Failure (P-F) interval. Where manufacturer's recommendation is not provided and the P-F interval cannot be established, then equipment maintenance shall be performed at not greater than the intervals specified in Table 9.2.2, in accordance with the equipment condition assessment in Section 9.2, and as modified by the other parts of this chapter.

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3
All equipment	Infrared thermography	12 months	12 months	6 months
Battery ESSs	Visual inspection	60 months	36 months	12 months
	Cleaning	60 months	36 months	12 months
	Lubrication			Reserved
	Mechanical servicing		Reserved	
	Electrical testing	60 months	36 months	12 months
Busways	Visual inspection	60 months	60 months	12 months
	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months
	Mechanical servicing	60 months	36 months	12 months
	Electrical testing	60 months	36 months	12 months
	Special	60 months	36 months	12 months
Cable trays	Visual inspection	12 months	12 months	6 months
	Cleaning	60 months	36 months	12 months
	Lubrication	60 months	36 months	12 months
	Mechanical servicing	60 months	36 months	12 months
	Electrical testing	60 months	36 months	12 months
Electric vehicle power transfer systems	Visual inspection	60 months	36 months	12 months
	Mechanical inspection	60 months	36 months	12 months
	Electrical testing	60 months	36 months	12 months
Electronic equipment				Reserved
Fuses	Visual inspection	60 months	36 months	12 months
	Cleaning	60 months	36 months	12 months

Product	Scope of Work	Equipment Condition Assessment				
		Condition 1	Condition 2	Condition 3		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
GFCIs	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	-		Reserved	-
Grounding and bonding	Visual inspection	12 months	12 months	6 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	36 months	
High-voltage substation insulators	Visual inspection	12 months	12 months	6 months		
	Corona detection	12 months	6 months	4 months		
	-	Maintenance and testing	60 months	36 months	12 months	
Lighting	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	
	-	Servicing	60 months	36 months	12 months	
Lighting control systems	-	-			Reserved	-
Low-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage ground-fault protection systems	Visual inspection	12 months	12 months	6 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	-		Reserved	-	
	Mechanical servicing	60 months	36 months	12 months		

		-	-	Equipment Condition Assessment		
Product	Scope of Work	Condition 1	Condition 2	Condition 3		
	-	Electrical testing	60 months	36 months	12 months	
Medium-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Molded-case/insulated-case/low-voltage power circuit breakers	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Lubrication	60 months	36 months	12 months		
	Mechanical servicing	60 months	36 months	12 months		
	-	Electrical testing	60 months	36 months	12 months	
Motor control equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Panelboards and switchboards	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical inspections	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Photovoltaic systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	-		Reserved	-	-
	Lubrication	-		Reserved	-	-
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Portable electrical tools and equipment	Visual inspection	Before each use	Before each use	Before each use		
	Cleaning	Before each use	Before each use	Before each use		

		-	-	Equipment Condition Assessment	
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**	
	Lubrication	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	
	-	Mechanical servicing	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions	In accordance with the manufacturer's instructions
	-	Electrical testing	3 months	3 months	3 months
Power and distribution transformers	Visual inspection	12 months	12 months	6 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
Power cables	Visual inspection	60 months	36 months	12 months	
	-	Cleaning	60 months	36 months	12 months
	-	Mechanical servicing	Reserved	Reserved	-
	-	Electrical testing	60 months	36 months	12 months
Power-factor correction capacitors	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months
	-	Electrical testing	60 months	36 months	12 months
	-	Special	-		Reserved -
Protective relays, electromechanical	Visual inspection	36 months	24 months	12 months	
	Cleaning	36 months	24 months	12 months	
	-	Lubrication	-		Reserved -
	-	Mechanical servicing	36 months	24 months	12 months
	-	Electrical testing	36 months	24 months	12 months
Protective relays, solid state and microprocessor	Visual inspection	60 months	36 months	12 months	
	Cleaning	60 months	36 months	12 months	
	Lubrication	-		Reserved	-

Product	Scope of Work	Equipment Condition Assessment				
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Public pools, fountains, and similar installations	-	-			Reserved	-
Rotating equipment	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	60 months	36 months	12 months	
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Stationary standby batteries	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	Mechanical servicing	-		Reserved	-	
	-	Electrical testing	60 months	36 months	12 months	
Substations	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
	-	Mechanical checks	60 months	36 months	12 months	
Switches	Visual inspection	60 months	36 months	12 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Switchgear	Visual inspection	12 months	12 months	6 months		
	-	Cleaning	60 months	36 months	12 months	-
	Lubrication	60 months	36 months	12 months		

Product	Scope of Work	-	-	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3		
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
	-	Special	60 months	36 months	12 months	
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 month		
	Cleaning	12 months	6 months	3 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	12 months	6 months	3 months	
	-	Electrical testing	12 months	6 months	3 months	
	-	Special procedures	24 months	24 months	24 months	
Wind power electric systems	Visual inspection	60 months	36 months	12 months		
	Cleaning	60 months	36 months	12 months		
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	
Wiring devices	Visual inspection	12 months	3 months	1 month		
	-	Cleaning	60 months	36 months	12 months	
	-	Lubrication	-		Reserved	-
	-	Mechanical servicing	60 months	36 months	12 months	
	-	Electrical testing	60 months	36 months	12 months	

Statement of Problem and Substantiation for Public Input

P-F intervals are the accepted and proven scientific method to determine the required maintenance intervals required to detect and prevent functional failures. Intervals longer than half the P-F interval will reduce the effectiveness in preventing failures.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]	Needed definition
Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]	Needed definition
Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]	Needed definition
Public Input No. 199-NFPA 70B-2023 [New Section after 3.3.44]	
Public Input No. 200-NFPA 70B-2023 [New Section after 3.3.21]	

Public Input No. 201-NFPA 70B-2023 [New Section after 3.3.42]

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Committee: EEM-AAA

Committee Statement

Resolution: FR-152-NFPA 70B-2024
Statement: First revision clarifies predictive methods are acceptable for establishing intervals. Deleted content is redundant to Section 1.2.

Public Input No. 101-NFPA 70B-2023 [Section No. 9.3]

9.~~3~~ 2 Equipment Condition Assessment.

The equipment condition shall be the highest condition category in accordance with 9.~~3~~ 2 .1, 9.~~3~~ 2 .2, and 9.~~3~~ 2 .3 as determined by the owner or their designee.

9.~~3~~ 2 .1 Physical Condition of Electrical Equipment.

Equipment that is included in the electrical EMP shall be assessed for current equipment condition in accordance with 9.~~3~~ 2 .1.1 through 9.~~3~~ 2 .1.~~3~~ 2 .

9.~~3~~ 2 .1.1

Equipment Physical Condition 1 shall be assigned where all the following criteria apply:

(1) The equipment appears in like new condition.

(2) The enclosure is clean, free from moisture intrusion, and tight.

(3) No unaddressed notification from the continuous monitoring system has occurred.

(4) There are no active recommendations from predictive techniques.

(5) Previous maintenance has been performed in accordance with the EMP.

9.~~3~~ 2 .1.2

Equipment Physical Condition 2 shall be assigned where all of 9.~~3~~ 2 .1.1 apply, and where any of the following criteria apply:

(1) Maintenance results deviate from past results or have indicated more frequent maintenance in accordance with manufacturer's published data.

(2) The previous maintenance cycle has revealed issues requiring the repair or replacement of major equipment components.

(3) There have been notifications from the continuous monitoring system since the prior assessment.

(4) There are active recommendations from predictive techniques.

9.~~3~~ 2 .1.3

Equipment Physical Condition 3 shall be assigned where changes in operation are noted or where any of the following criteria applies:

(1) The equipment has missed the last two successive maintenance cycles in accordance with the EMP.

(2) The previous two maintenance cycles have revealed issues requiring the repair or replacement of major equipment components.

(3) There is an active or unaddressed notification from the continuous monitoring system.

(4) There are urgent actions identified from predictive techniques.

9.3.1.4 Nonserviceable Equipment.

9.~~3~~ 2 .1.4.1

Equipment that poses an imminent risk of injury or negative health effects to personnel shall be designated as nonserviceable in accordance with 8.7.1.3.

9.~~3~~ 2 .1.4.2

Access to nonserviceable equipment by unqualified persons shall be restricted.

9.3 2 .1.5 Nonconforming Equipment.

Equipment exhibiting characteristics that do not conform to any of the above conditions shall be identified as requiring corrective measures before returning it to a normal operating condition.

9.3 2 .2* Criticality Condition of Equipment.

9.3 2 .2.1*

Criticality Condition 1 or Criticality Condition 2 shall be permitted to be assigned where the failure of the equipment or system will not endanger personnel.

9.3 2 .2.2

Criticality Condition 3 shall be assigned where the failure of the equipment or system will endanger personnel.

9.3 2 .3 Operating Environment Condition of Equipment.

9.3 2 .3.1

Operating Environment Condition 1 or Operating Environment Condition 2 shall be permitted to be assigned where the equipment is used in an operating environment for which it is rated.

9.3 2 .3.2

Operating Environment Condition 3 shall be assigned where the equipment is used in an environment with harsh chemicals, contaminants, or extreme operating conditions for which it is not specifically rated or evaluated.

Statement of Problem and Substantiation for Public Input

The Equipment Condition is used in the maintenance interval table to help the reader determine the specified maintenance interval. The Equipment Condition information appears after the maintenance interval table, so the reader looks at a table with different intervals for different equipment conditions that have not yet been defined. This PI is to move the Equipment Conditions section to before the Frequency of Maintenance section. A separate linked PI renumbers the Frequency of Maintenance section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 102-NFPA 70B-2023 [Section No. 9.2]	
Public Input No. 103-NFPA 70B-2023 [Sections A.9.2.1, A.9.2.2, A.9.3.2, A.9.3.2.1]	
Public Input No. 102-NFPA 70B-2023 [Section No. 9.2]	
Public Input No. 103-NFPA 70B-2023 [Sections A.9.2.1, A.9.2.2, A.9.3.2, A.9.3.2.1]	

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Submittal Date: Wed Dec 20 13:49:06 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-48-NFPA 70B-2024

Statement: The equipment condition is used in the maintenance interval table to help the reader determine the specified maintenance interval. The existing equipment condition information appeared after the maintenance interval table, so the reader looked at a table with different intervals for different equipment conditions that have not yet been defined.

Public Input No. 18-NFPA 70B-2023 [Section No. 9.3]

~~**9.3** – Equipment Condition Assessment.~~

~~The equipment condition shall be the highest condition category in accordance with 9.3.1 , 9.3.2 , and 9.3.3 as determined by the owner or their designee.~~

~~**9.3.1** – Physical Condition of Electrical Equipment.~~

~~Equipment that is included in the electrical EMP shall be assessed for current equipment condition in accordance with 9.3.1.1 through 9.3.1.3 .~~

~~**9.3.1.1** –~~

~~Equipment Physical Condition 1 shall be assigned where all the following criteria apply:~~

(1) ~~The equipment appears in like new condition.~~

(2) ~~The enclosure is clean, free from moisture intrusion, and tight.~~

(3) ~~No unaddressed notification from the continuous monitoring system has occurred.~~

(4) ~~There are no active recommendations from predictive techniques.~~

(5) ~~Previous maintenance has been performed in accordance with the EMP.~~

~~**9.3.1.2** –~~

~~Equipment Physical Condition 2 shall be assigned where all of 9.3.1.1 apply, and where any of the following criteria apply:~~

(1) ~~Maintenance results deviate from past results or have indicated more frequent maintenance in accordance with manufacturer's published data.~~

(2) ~~The previous maintenance cycle has revealed issues requiring the repair or replacement of major equipment components.~~

(3) ~~There have been notifications from the continuous monitoring system since the prior assessment.~~

(4) ~~There are active recommendations from predictive techniques.~~

~~**9.3.1.3** –~~

~~Equipment Physical Condition 3 shall be assigned where changes in operation are noted or where any of the following criteria applies:~~

(1) ~~The equipment has missed the last two successive maintenance cycles in accordance with the EMP.~~

(2) ~~The previous two maintenance cycles have revealed issues requiring the repair or replacement of major equipment components.~~

(3) ~~There is an active or unaddressed notification from the continuous monitoring system.~~

(4) ~~There are urgent actions identified from predictive techniques.~~

~~**9.3.1.4** – Nonserviceable Equipment.~~

~~**9.3.1.4.1** –~~

~~Equipment that poses an imminent risk of injury or negative health effects to personnel shall be designated as nonserviceable in accordance with 8.7.1.3 .~~

~~**9.3.1.4.2** –~~

~~Access to nonserviceable equipment by unqualified persons shall be restricted.~~

~~**9.3.1.5** – Nonconforming Equipment.~~

~~Equipment exhibiting characteristics that do not conform to any of the above conditions shall be identified as requiring corrective measures before returning it to a normal operating condition.~~

~~**9.3.2** * – Criticality Condition of Equipment.~~

~~**9.3.2.1** * –~~

~~Criticality Condition 1 or Criticality Condition 2 shall be permitted to be assigned where the failure of the equipment or system will not endanger personnel.~~

~~**9.3.2.2** –~~

~~Criticality Condition 3 shall be assigned where the failure of the equipment or system will endanger personnel.~~

~~**9.3.3** – Operating Environment Condition of Equipment.~~

~~**9.3.3.1** –~~

~~Operating Environment Condition 1 or Operating Environment Condition 2 shall be permitted to be assigned where the equipment is used in an operating environment for which it is rated.~~

~~**9.3.3.2** –~~

~~Operating Environment Condition 3 shall be assigned where the equipment is used in an environment with harsh chemicals, contaminants, or extreme operating conditions for which it is not specifically rated or evaluated.~~

Statement of Problem and Substantiation for Public Input

Since safety is the basis for the table per 9.2.2 and condition 3 per 9.3.2.2, none of these condition assessment factors have any influence.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 17-NFPA 70B-2023 [Section No. 9.2.2]	
Public Input No. 17-NFPA 70B-2023 [Section No. 9.2.2]	

Submitter Information Verification

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Submittal Date: Thu Dec 07 12:32:12 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-47-NFPA 70B-2024
Statement: The first revision addresses a conflict between 9.2.2 and 9.3.2.2. Section 9.3.2.2 was forcing the application of Condition 3 column in all cases.

Public Input No. 106-NFPA 70B-2023 [Section No. 9.3.1]

9.3.1 Physical Condition of ~~Electrical~~ Equipment.

Equipment that is included in the electrical EMP shall be assessed for current equipment condition in accordance with 9.3.1.1 through 9.3.1.3.

9.3.1.1

Equipment Physical Condition 1 shall be assigned where all the following criteria apply:

(1) The equipment appears in like new condition.

(2) The enclosure is clean, free from moisture intrusion, and tight.

(3) No unaddressed notification from the continuous monitoring system has occurred.

(4) There are no active recommendations from predictive techniques.

(5) Previous maintenance has been performed in accordance with the EMP.

9.3.1.2

Equipment Physical Condition 2 shall be assigned where all of 9.3.1.1 apply, and where any of the following criteria apply:

(1) Maintenance results deviate from past results or have indicated more frequent maintenance in accordance with manufacturer's published data.

(2) The previous maintenance cycle has revealed issues requiring the repair or replacement of major equipment components.

(3) There have been notifications from the continuous monitoring system since the prior assessment.

(4) There are active recommendations from predictive techniques.

9.3.1.3

Equipment Physical Condition 3 shall be assigned where changes in operation are noted or where any of the following criteria applies:

(1) The equipment has missed the last two successive maintenance cycles in accordance with the EMP.

(2) The previous two maintenance cycles have revealed issues requiring the repair or replacement of major equipment components.

(3) There is an active or unaddressed notification from the continuous monitoring system.

(4) There are urgent actions identified from predictive techniques.

9.3.1.4 Nonserviceable Equipment.

9.3.1.4.1

Equipment that poses an imminent risk of injury or negative health effects to personnel shall be designated as nonserviceable in accordance with 8.7.1.3.

9.3.1.4.2

Access to nonserviceable equipment by unqualified persons shall be restricted.

9.3.1.5 Nonconforming Equipment.

Equipment exhibiting characteristics that do not conform to any of the above conditions shall be identified as requiring corrective measures before returning it to a normal operating condition.

Statement of Problem and Substantiation for Public Input

The scope of NFPA 70B includes electrical, electronic, and communication systems and equipment. The current language in this section only refers to electrical equipment and systems. The term "electrical" is removed with this proposed change to make it more clear the requirement applies to all the equipment and systems covered by NFPA 70B, not just electrical systems.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-3-NFPA 70B-2024
Statement: The title was simplified to address the variety of the content contained in Chapter 9.

Public Input No. 104-NFPA 70B-2023 [Sections 9.3.1.1, 9.3.1.2, 9.3.1.3]

Sections 9.3.1.1, 9.3.1.2, 9.3.1.3

9.3.1.1

Equipment Physical Condition 1 shall be assigned where all the following criteria apply:

(1) The equipment appears in like new condition.

(2) The enclosure is clean, free from moisture intrusion, and tight.

(3) No unaddressed notification from the continuous monitoring system has occurred.

(4) There are no active recommendations from ~~predictive techniques~~ maintenance activities .

(5) Previous maintenance has been performed in accordance with the EMP.

9.3.1.2

Equipment Physical Condition 2 shall be assigned where all of 9.3.1.1 apply, and where any of the following criteria apply:

(1) Maintenance results deviate from past results or have indicated more frequent maintenance in accordance with manufacturer's published data.

(2) The previous maintenance cycle has revealed issues requiring the repair or replacement of major equipment components.

(3) There have been notifications from the continuous monitoring system since the prior assessment.

(4) There are active recommendations from ~~predictive techniques~~ maintenance activities .

9.3.1.3

Equipment Physical Condition 3 shall be assigned where changes in operation are noted or where any of the following criteria applies:

(1) The equipment has missed the last two successive maintenance cycles in accordance with the EMP.

(2) The previous two maintenance cycles have revealed issues requiring the repair or replacement of major equipment components.

(3) There is an active or unaddressed notification from the continuous monitoring system.

(4) There are urgent actions identified from ~~predictive techniques~~ maintenance activities .

Statement of Problem and Substantiation for Public Input

The existing language refers to "predictive techniques". That term is not really used in NFPA 70B. A better term is proposed. The proposed term eliminates "predictive" as not all indications of a problem are based on some "predictive" test. For example, a visual inspection of a fuse holder can reveal a problem but that inspection is not a "predictive" item.

Submitter Information Verification

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Submittal Date: Wed Dec 20 14:01:00 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-49-NFPA 70B-2024

Statement: Predictive techniques are utilized in decision making processes. Maintenance activities provide data for decision making.

First revision removes the requirement to apply Conditions 3 and 4 in 9.3.1.1 as they were in conflict with the criteria in 9.3.1.2.

Public Input No. 105-NFPA 70B-2023 [Section No. 9.3.1.2]

9.3.1.2

Equipment Physical Condition 2 shall be assigned where ~~all~~ items (1), (2), and (5) of 9.3.1.1 apply, and where any of the following criteria apply:

(1) Maintenance results deviate from past results or have indicated more frequent maintenance in accordance with manufacturer's published data.

(2) The previous maintenance cycle has revealed issues requiring the repair or replacement of major equipment components.

(3) There have been unaddressed notifications from the continuous monitoring system since the prior assessment.

(4) There are active recommendations from predictive techniques.

Statement of Problem and Substantiation for Public Input

The current requirements in 9.3.1.2 for Condition 2 are conflicting. Requirements (3) and (4) are different than (3) and (4) in 9.3.1.1 BUT the requirements for Condition 2 requirement meeting the (3) and (4) requirements for Condition 1 equipment AND meeting at least one of the Condition 2 requirements. The equipment cannot meet the (3) and (4) requirements for Condition 1 and then meet either condition (3) or (4) for Condition 2 equipment. The revised wording provides an "exception" to the (3) and (4) requirements for Condition 1 as it applies to Condition 2 equipment.

Submitter Information Verification

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Submittal Date: Wed Dec 20 14:06:41 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-49-NFPA 70B-2024

Statement: Predictive techniques are utilized in decision making processes. Maintenance activities provide data for decision making.

First revision removes the requirement to apply Conditions 3 and 4 in 9.3.1.1 as they were in conflict with the criteria in 9.3.1.2.

Public Input No. 156-NFPA 70B-2023 [Section No. 9.3.1.3]

9.3.1.3

Equipment Physical Condition 3 shall be assigned where changes in operation are noted or where any of the following criteria applies:

(1) The equipment has missed the last two successive maintenance cycles in accordance with the EMP.

(2) The previous two maintenance cycles have revealed issues requiring the repair or replacement of major equipment components.

(3) There is an active or unaddressed notification from the continuous monitoring system.

(4) There are urgent actions identified from predictive techniques.

(5) Equipment has been in service for 15 years or more.

Statement of Problem and Substantiation for Public Input

Data from a large industrial fortune 100 company has established that failure rates begin to increase in year 17 of service for major electrical systems and equipment. As such, to detect and prevent these failures it is necessary to perform electrical tests annually prior to year 17. Selecting the 15 year slot allows another year to test by year 16 to detect any degradation of insulation, etc.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:

Submittal Date: Fri Dec 22 09:23:56 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Substantiation for the application of a 15-year service period was not provided in the proposal.

Public Input No. 21-NFPA 70B-2023 [Sections 9.3.1.4, 9.3.1.5]

Sections 9.3.1.4, 9.3.1.5

9.3.1.

~~4 Nonserviceable Equipment.~~

~~**9.3.1.4.1** –~~

~~Equipment that poses an imminent risk of injury or negative health effects to personnel shall be designated as nonserviceable in accordance with 8.7.1.3 .~~

~~**9.3.1.4.2** –~~

~~Access to nonserviceable equipment by unqualified persons shall be restricted.~~

~~9.3.1.~~

5 Nonconforming Equipment.

Equipment exhibiting characteristics that do not conform to any of the above conditions shall be identified as requiring corrective measures before returning it to a normal operating condition.

9.3.1.5.1 Anticipating Failure.

When there is evidence that electric equipment could fail and injure employees, the electric equipment shall be de-energized, unless the employer can demonstrate that de-energizing introduces additional hazards or increased risk or is infeasible because of equipment design or operational limitation. Until the equipment is de-energized or repaired, employees shall be protected from hazards associated with the impending failure of the equipment by suitable barricades and other alerting techniques necessary for safety of the employees

Statement of Problem and Substantiation for Public Input

This section is somewhat repetitive and is improved by utilizing the same wording for similar hazard situation from NFPA 70E 130.8(K) Anticipating Failure. When there is evidence that electric equipment could fail and injure employees, the electric equipment shall be de-energized, unless the employer can demonstrate that de-energizing introduces additional hazards or increased risk or is infeasible because of equipment design or operational limitation. Until the equipment is de-energized or repaired, employees shall be protected from hazards associated with the impending failure of the equipment by suitable barricades and other alerting techniques necessary for safety of the employees.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 07 15:17:19 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-149-NFPA 70B-2024

Statement: The requirement has been revised to more closely align with 70E. It includes content regarding equipment failure and criticality of equipment to clarify that these are associated with frequency of maintenance activities in Section 9.2.

Public Input No. 6-NFPA 70B-2023 [Sections 9.3.1.4, 9.3.1.5]

Sections 9.3.1.4, 9.3.1.5

9.3.1.4 ~~– Nonserviceable Equipment.~~ Anticipating Failure

9.3.1.4.1

~~Equipment that poses an imminent risk of injury or negative health effects to personnel shall be designated as nonserviceable in accordance with 8.7.1.3 .~~ When there is evidence that electric equipment could fail and injure employees, the electric equipment shall be de-energized, unless the employer can demonstrate that de-energizing introduces additional hazards or increased risk or is infeasible because of equipment design or operational limitation. Until the equipment is de-energized or repaired, employees shall be protected from hazards associated with the impending failure of the equipment by suitable barricades and other alerting techniques necessary for safety of the employees.

9.3.1.4.2

~~Access to nonserviceable equipment by unqualified persons shall be restricted.~~

9.3.1.5

~~Nonconforming Equipment.~~

~~Equipment exhibiting characteristics that do not conform to any of the above conditions shall be identified as requiring corrective measures before returning it to a normal operating condition.~~

Statement of Problem and Substantiation for Public Input

The language used is not clear where as the proposed language meets the same intent and is the same language used in NFPA 70E 130.8(K).

Submitter Information Verification

Submitter Full Name: Karl Cunningham
Organization: Self Employed
Affiliation: Aluminum Association
Street Address:
City:
State:
Zip:

Submittal Date: Mon Nov 27 13:53:22 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-149-NFPA 70B-2024

Statement: The requirement has been revised to more closely align with 70E. It includes content regarding equipment failure and criticality of equipment to clarify that these are associated with frequency of maintenance activities in Section 9.2.

Public Input No. 4-NFPA 70B-2023 [New Section after 9.3.3.2]

9.4 Scheduling Repairs to Correct Defects

9.4.1 - .The EPM shall include a time line when repairs and/or corrections discovered during the inspection and testing phase shall be completed.

9.4.2 - The severity of the defect and physical condition of the equipment listed in Section 9.3.1 shall be considered for the time interval a required repair is scheduled.

9.4.3 - Severity of a defect shall be listed as follows:

9.4.3.1 - Severe - Connections greater than 40C (104F) above ambient temperature and/or broken, non operable mechanisms required for circuit or personnel protection

9.4.3.2 - Critical - Connections 21C to 40C (70F to 104F) above ambient temperature and/or poor or difficult functioning mechanisms required for circuit or personnel protection

9.4.3.3 - Serious - Connections 11C to 20C (51F to 70F) above ambient temperature and/or restricted functioning mechanisms required for circuit or personnel protection

9.4.3.4 - Minor - Connections 1C to 10C (34F to 50F) above ambient temperature and/or functioning mechanisms required for circuit or personnel protection with cosmetic or minor operating issues.

9.4.4 - Correction Intervals:

9.4.4.1 - All Severe Defects shall be corrected immediately or monitored and corrected as soon as the equipment can be de-energized safely and no more then 7 days from discovery of the defect.

9.4.4.2 - All Critical Defects shall be monitored and corrected as soon as the equipment can be de-energized safely and no more then 30 days from discovery of the defect.

9.4.4.3 - All Serious Defects shall be monitored and corrected at the next shutdown or no more then 180 days from discovery of the defect.

9.4.4.4 - All Minor Defects shall be monitored and corrected at the next shutdown after the discovery of the defect.

Statement of Problem and Substantiation for Public Input

NFPA 70B provides information on the required intervals when EPMs should be conducted but does not provide intervals requiring the repairs or corrections to be completed. There are instances where the EPM has been completed, but the repairs are excessively delayed or not performed at all.

Submitter Information Verification

Submitter Full Name: Robert Neary
Organization: Sea, Limited
Affiliation: NFPA 70B Technical Committee
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jul 26 17:59:26 EDT 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-43-NFPA 70B-2024

Statement: This adds requirements to include a timeline for repairs to avoid excess delays or lack of action.

Public Input No. 123-NFPA 70B-2023 [New Section after 10.1]

10.1 Scope

This chapter identifies the maintenance requirements for power and distribution transformers.

Statement of Problem and Substantiation for Public Input

All other equipment chapters have a scope. Chapter 10 does not. This Pi would add a new 10.1 Scope section. The remaining parts of the chapter would need to be renumbered to allow for the insertion of a new 10.1.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 07:29:24 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-50-NFPA 70B-2024
Statement: First revision adds “scope” to Chapter 10.1 to be consistent with numbering in other chapters.

Public Input No. 107-NFPA 70B-2023 [Section No. 10.1.3]

10.1.3

~~Electrical maintenance~~ Maintenance documentation shall identify where the maintenance is to be performed and what precautions are necessary.

Statement of Problem and Substantiation for Public Input

The word "electrical" is not required and is removed by this PI. Documentation might include torque requirements for enclosure covers. That information is not "electrical".

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 14:19:06 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-10-NFPA 70B-2024
Statement: Removing the word “electrical” aligns with the scope statement in Section 1.1

Public Input No. 125-NFPA 70B-2023 [Section No. 10.1.4]

10.1.4

A thorough inspection of the maintained equipment shall be performed after any maintenance work to ensure the equipment is restored to a safe operational condition.

Statement of Problem and Substantiation for Public Input

Adding text to clearly indicate what is to be inspected. The existing wording just states an inspection must be performed but does not clearly identify what needs to be inspected.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 07:39:03 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The requirements of Section 10.1 General are adequate and clear and a change to 10.1.4 as submitted is not necessary.

Public Input No. 109-NFPA 70B-2023 [Section No. 10.3]

10.3 Elimination of Hazardous Atmospheres.

For maintenance involving permanent ~~electrical~~ installations, the following procedures shall be followed:

(1) Hazardous vapors, dust, or fibers/flyings shall be removed from the area.

(2) Enclosed or trapped hazardous vapors shall be cleared.

(3) Atmosphere shall be tested to confirm it is within safe limits for the required maintenance.

Statement of Problem and Substantiation for Public Input

The word "electrical" is not required and is removed with this proposed change.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 14:22:37 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-14-NFPA 70B-2024
Statement: The word “electrical” is not necessary and does not add clarity.

Public Input No. 126-NFPA 70B-2023 [Section No. 10.4.2]

10.4.2

Before opening any enclosure, time shall be allowed for parts internal to the enclosure to cool and electrical charges to dissipate, as identified in the risk assessment or manufacturer's instructions.

Statement of Problem and Substantiation for Public Input

Revising the text to more clearly indicate to the reader what parts are needed to cool.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 07:41:16 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-15-NFPA 70B-2024
Statement: The addition of "…internal to the enclosure to…" provides clarity.

Public Input No. 110-NFPA 70B-2023 [Section No. 10.5.2.1]

10.5.2.1*

~~Prior to reinstalling~~ After reinstalling covers, they shall be checked for proper closure of mating joints and seals.

Statement of Problem and Substantiation for Public Input

The existing language states to check for proper closure of joints and seals "before" the covers are installed. Since the covers are not yet installed, those joints and seals cannot be checked. The language is updated to perform the check once the covers are reinstalled.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Wed Dec 20 14:24:10 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-16-NFPA 70B-2024
Statement: The process of visually inspecting covers during the reinstallation process assures verification of proper mating of joints and seals.

Public Input No. 127-NFPA 70B-2023 [Section No. 10.8.1]

10.8.1

Where ~~grease, paint, or dirt~~ material must be cleaned from machined joints, a nonmetallic bristle brush, an acceptable noncorrosive solvent, or other methods recommended by the manufacturer shall be used.

Statement of Problem and Substantiation for Public Input

There could be other "contaminants" on the machined joint. The revised language is more generic than listing just three types of items that may be on the machined joint and might need to be removed.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 07:44:23 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-17-NFPA 70B-2024
Statement: The addition of “material such as” provides a generic descriptor to possible contaminates and adds clarity,

Public Input No. 128-NFPA 70B-2023 [Section No. 11.2]

11.2 Frequency of Maintenance.

The periodic maintenance procedures specified in Section 11.3 shall be performed in accordance with the frequencies specified in Chapter 9, unless otherwise specified in Table 11.2.

Table 11.2 Frequency of Maintenance

Scope of Work	Equipment Condition Assessment			
	Condition 1	Condition 2	Condition 3	Notes
Sample and testing of insulating fluid ~~and tests~~	12 months	12 months	6 months	See 11.3.5.

Statement of Problem and Substantiation for Public Input

The text of the requirement is rearranged to make it clear the tests are on the fluids.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 21 07:46:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-150-NFPA 70B-2024
Statement: Rearrangement of the text provides clarity that the tests are on the fluid.

Adding the specific item number to the notes directs the reader where to find the associated content.

Public Input No. 130-NFPA 70B-2023 [Section No. 11.2]

11.2 Frequency of Maintenance.

The periodic maintenance procedures specified in Section 11.3 shall be performed in accordance with the frequencies specified in Chapter 9, unless otherwise specified in Table 11.2.

Table 11.2 Frequency of Maintenance

Scope of Work	Equipment Condition Assessment			Notes
	Condition 1	Condition 2	Condition 3	
Sample insulating fluid and tests	12 months	12 months	6 months	See Table 11.3.5, Item 16 .

Statement of Problem and Substantiation for Public Input

The Note is updated to provide a more direct link to the proper information in Table 11.3.5 for the fluid testing requirements. This gets the reader to the associated content more quickly than a general reference to section 11.3.5.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 21 08:02:09 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-150-NFPA 70B-2024
Statement: Rearrangement of the text provides clarity that the tests are on the fluid.

Adding the specific item number to the notes directs the reader where to find the associated content.

Public Input No. 131-NFPA 70B-2023 [Section No. 11.3.1]

11.3.1 Visual Inspections.

Transformers shall be visually inspected in accordance with Table 11.3.1.

Table 11.3.1 Transformer Visual Inspections

No.	Task	- Small, Windings, ≤600 Volts, ≤167 kVA 1-ph, ≤500 kVA 3-ph Test Type*	- Large, Windings, >600 Volts, >167 kVA 1-ph, >500 kVA 3-ph Test Type*	Dry Type, Air-Cooled - Liquid-Filled Test Type*	- Notes
1	Bolted connections	2	2	2	-
2	Cooling devices	2	2	1 or 2	-
3	Liquid level gauge(s) and alarm(s)	NA	NA	1 or 2	-
4	Neutral grounding impedance devices	2	2	2	-
5	Nitrogen bottle pressure system	NA	NA	1 or 2	-
6	Pressure relief device(s)	NA	NA	2	-
7	Sudden pressure relay(s)	NA	NA	2	-
8	Tank over/under pressure gauge and alarms	NA	NA	1 or 2	-
9	Transformer enclosure	1 or 2	1 or 2	1 or 2	Ensure ventilation and equipment enclosure integrity has not been compromised.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test;Type 1A = online enhanced test;Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The table is modified to indicate that some of the inspections for the liquid filled equipment could also be an online test.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 08:05:34 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-88-NFPA 70B-2024

Statement: Changing the layout of the top of the table to include “test type” simplifies the column titles and is consistent with other tables like 11.3.4.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline. The table is modified to allow online tests for some items since they can be inspected with the equipment online depending on installation or by continuous monitoring devices.

Public Input No. 134-NFPA 70B-2023 [Section No. 11.3.1]

11.3.1 Visual Inspections.

Transformers shall be visually inspected in accordance with Table 11.3.1.

Table 11.3.1 Transformer Visual Inspections

		Test Type*				
		Dry Type, Air-Cooled				
No.	Task	Small, Windings, ≤600 Volts, ≤167 kVA 1-ph, ≤500 kVA 3-ph ~~Test Type*~~	Large, Windings, >600 Volts, >167 kVA 1-ph, >500 kVA 3-~~ph~~ ~~Test Type*~~ ph	Liquid-Filled ~~Test~~ ~~Type*~~		Notes
1	Bolted connections	2	2	2	-	
2	Cooling devices	2	2	2	-	
3	Liquid level gauge(s) and alarm(s)	NA	NA	2	-	
4	Neutral grounding impedance devices	2	2	2	-	
5	Nitrogen bottle pressure system	NA	NA	2	-	
6	Pressure relief device(s)	NA	NA	2	-	
7	Sudden pressure relay(s)	NA	NA	2	-	
8	Tank over/under pressure gauge and alarms	NA	NA	2	-	
9	Transformer enclosure	1 or 2	1 or 2	1 or 2	Ensure ventilation and equipment enclosure integrity has not been compromised.	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test;Type 1A = online enhanced test;Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Changing the layout of the top of the table to make it have Test Type at the top of the table like Table 11.3.4 and simplify the column titles.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 08:27:08 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-88-NFPA 70B-2024

Statement: Changing the layout of the top of the table to include “test type” simplifies the column titles and is consistent with other tables like 11.3.4.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline. The table is modified to allow online tests for some items since they can be inspected with the equipment online depending on installation or by continuous monitoring devices.

Public Input No. 132-NFPA 70B-2023 [Section No. 11.3.4]

11.3.4 Mechanical Servicing.

Transformers shall be mechanically serviced in accordance with Table 11.3.4.

Table 11.3.4 Transformer Mechanical Servicing

No.	Task	Test Type*			Notes
		Dry Type, Air-Cooled			
		Small, Windings ≤600 V ≤167 kVA 1-ph, ≤500 kVA 3-ph	Large, Windings >600 V >167 kVA 1-ph, >500 kVA 3-ph	Liquid-Filled	
1	~~Bolted connection~~	~~2~~	~~2~~	~~2~~	~~1A~~ Verify tightness of accessible bolted electrical connections
2	~~1B~~	Verify as-left tap connections are as specified	2	2	1 or 2
3	~~2~~	Inspect anchorage, alignment, and grounding	2	2	2
4	~~3~~	Cooling devices	2	2	2
5	~~4~~	Transformer enclosures, ventilation filters, and screens inspected and replaced or cleaned, as needed	2	2	NA
6	~~5~~	Control cabinets connections and cleaning	2	2	2

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The existing table has the tap connections as a subset of bolted connections. For a liquid filled transformer, the tap changer is not an accessible bolted connection as it is a system that installed

inside the transformer tank and is under the insulating fluid. The table is modified to make the tap changer a separate line. With that change, there is not need for a subset of bolted connections so the table is changed accordingly.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Thu Dec 21 08:08:06 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Task No.1 is to service the bolted connections between transformers and close coupled electrical distribution equipment.

Public Input No. 133-NFPA 70B-2023 [Section No. 11.3.5]

11.3.5* Electrical Testing.

Transformers shall be electrically tested in accordance with Table 11.3.5.

Table 11.3.5 Transformer Electrical Tests

		Test Type*			
			Dry Type, Air-Cooled		
No.	Task	Small, Windings, ≤600 Volts, ≤167 kVA 1-ph, ≤500 kVA 3-ph ~~Test Type*~~	Large, Windings, >600 Volts, >167 kVA 1-ph, >500 kVA 3-ph ~~Test Type*~~	Liquid-Filled ~~Test Type*~~	Notes
1	Core insulation resistance	NA	2A	2A	
2	Excitation current on each phase	NA	2	2	
3	Insulation power factor	NA	2	2	
4	Insulation power factor tip-up	NA	2A	NA	
5	Main insulation resistance	2	2	2	
6	Neutral grounding impedance devices	NA	2	2	
7	Online partial discharge on MV/HV windings	NA	1A	1A	
8	Insulation power factor on each bushing	NA	NA	2†	
9	Sweep frequency response analysis	NA	NA	2A	
10	Turns ratio on all load tap changer (LTC) taps	NA	NA	2A	
11	Turns ratio on all no-load tap changer (NLTC) taps	2A	2A	2A	
12	Turns ratio on designated tap	2	2	2	
13	Winding resistance at designated tap	2A	2A	2	
14	Bolted connection resistance	2	2	2	
15	Applied voltage test	NA	2A	NA	
16	Sample insulating fluid and test for:				
	Dielectric breakdown	NA	NA	1 or 2	
	Acid neutralization number	NA	NA	1 or 2	
	Specific gravity	NA	NA	1 or 2	
	Interfacial tension	NA	NA	1 or 2	
	Color	NA	NA	1 or 2	
	Visual condition	NA	NA	1 or 2	
	Water content	NA	NA	1 or 2	

		Test Type*			
		-	Dry Type, Air-Cooled		- -
No.	Task	Small, Windings, ≤600 Volts, ≤167 kVA 1-ph, ≤500 kVA 3-ph ~~Test Type*~~	Large, Windings, >600 Volts, >167 kVA 1-ph, >500 kVA 3-ph ~~Test Type*~~	Liquid-Filled ~~Test Type*~~	Notes
	Power factor	NA	NA	1 or 2	-
	-	Dissolved gas analysis	NA	NA	1, 1A or 2, 2A -
	-	Furan analysis	NA	NA	1, 1A or 2, 2A -
17	Sweep frequency response analysis	NA	NA	2A	-
18	Percent oxygen in insulating blanket	NA	NA	2A	-
19	Testing of transformer alarms, including temperature, liquid level, nitrogen bottle pressure, tank over/under pressure, sudden pressure	NA	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

†Transformers applied at voltages greater than 1000 volts.

Statement of Problem and Substantiation for Public Input

Changing the layout of the top of the table to make it have Test Type at the top of the table like Table 11.3.4 and simplify the column titles.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 21 08:24:30 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-90-NFPA 70B-2024
Statement: Changing the layout of the top of the table to include “test type” simplifies the column titles and is consistent with other tables like 11.3.4.

The table shows a DGA and Furan analysis as a standard and enhanced test. The DGA should be a standard test, so the enhanced test indicators were removed. The Furan analysis is not done for some applications and does not have a direct effect on safety.

Public Input No. 135-NFPA 70B-2023 [Section No. 11.3.5]

11.3.5* Electrical Testing.

Transformers shall be electrically tested in accordance with Table 11.3.5.

Table 11.3.5 Transformer Electrical Tests

				Dry Type, Air-Cooled	
No.	Task	Small, Windings, ≤600 Volts, ≤167 kVA 1-ph, ≤500 kVA 3-ph Test Type*	Large, Windings, >600 Volts, >167 kVA 1-ph, >500 kVA 3-ph Test Type*	Liquid-Filled Test Type*	Notes
1	Core insulation resistance	NA	2A	2A	-
2	Excitation current on each phase	NA	2	2	-
3	Insulation power factor	NA	2	2	-
4	Insulation power factor tip-up	NA	2A	NA	-
5	Main insulation resistance	2	2	2	-
6	Neutral grounding impedance devices	NA	2	2	-
7	Online partial discharge on MV/HV windings	NA	1A	1A	-
8	Insulation power factor on each bushing	NA	NA	2†	-
9	Sweep frequency response analysis	NA	NA	2A	-
10	Turns ratio on all load tap changer (LTC) taps	NA	NA	2A	-
11	Turns ratio on all no-load tap changer (NLTC) taps	2A	2A	2A	-
12	Turns ratio on designated tap	2	2	2	-
13	Winding resistance at designated tap	2A	2A	2	-
14	Bolted connection resistance	2	2	2	-
15	Applied voltage test	NA	2A	NA	-
16	Sample insulating fluid and test for:	-	-	-	-
-	Dielectric breakdown	NA	NA	1 or 2	-
-	Acid neutralization number	NA	NA	1 or 2	-
-	Specific gravity	NA	NA	1 or 2	-
Interfacial tension		NA	NA	1 or 2	-
-	Color	NA	NA	1 or 2	-
Visual condition		NA	NA	1 or 2	-
-	Water content	NA	NA	1 or 2	-

No.	Task	Small, Windings, ≤600 Volts, ≤167 kVA 1-ph, ≤500 kVA 3-ph Test Type*	Large, Windings, >600 Volts, >167 kVA 1-ph, >500 kVA 3-ph Test Type*	Dry Type, Air-Cooled Liquid-Filled Test Type*	Notes
	Power factor	NA	NA	1 or 2	
	Dissolved gas analysis	NA	NA	~~1, 1A or 2, 2A~~	
1 or 2	Furan analysis	NA	NA	~~1, 1A or 2, 2A~~	1 or 2
17	Sweep frequency response analysis	NA	NA	2A	
18	Percent oxygen in insulating blanket	NA	NA	2A	
19	Testing of transformer alarms, including temperature, liquid level, nitrogen bottle pressure, tank over/under pressure, sudden pressure, as applicable	NA~~NA~~	2	2	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

†Transformers applied at voltages greater than 1000 volts.

Statement of Problem and Substantiation for Public Input

Two tests were listed as "1, 1A or 2, 2A". If something is a 1 or 2, then it is a standard test, not an enhanced test. It does not make sense to list something as both a standard and an enhanced test. Therefore the enhanced test is removed.

Larger dry type transformers often have winding temperature monitors. They also need to be tested. Therefore the NA for dry type alarm testing was changed to 2 and an "as applicable" was added to the requirement to help indicate not all of the alarm tests would apply to each transformer type.

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Submittal Date: Thu Dec 21 08:31:00 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-90-NFPA 70B-2024

Statement: Changing the layout of the top of the table to include “test type” simplifies the column titles and is consistent with other tables like 11.3.4.

The table shows a DGA and Furan analysis as a standard and enhanced test. The DGA should be a standard test, so the enhanced test indicators were removed. The Furan analysis is not done for some applications and does not have a direct effect on safety.

Public Input No. 136-NFPA 70B-2023 [Section No. 12.3.1]

12.3.1* Visual Inspection.

Substations and switchgear shall be visually inspected in accordance with Table 12.3.1.

Table 12.3.1 Substation and Switchgear Visual Inspections

No.	Task	1000 Volts or Below Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Inspect external physical condition	1 or 2	1 or 2	This includes condition and integrity of applied labels.
2	Inspect anchorage and grounding	1 or 2	1 or 2	Document if anchorage is not appropriate in accordance with current seismic requirements so improvements can be considered.
3	Ensure maintenance devices and tools are available for equipment servicing	1	1	-
4	Verify circuit breakers, fuses, protective relays, and other type of overload elements are the right sizes and types and correspond to the drawings and the power system studies	1 or 2	1 or 2	~~Verify against plans, drawings, and pertinent records, as well as against evidence of current load levels.~~ Some devices might be able to be checked while panel doors are closed.
5	For connected communicating addressable devices, verify the device addresses are set in accordance with documentation	1 or 2	1 or 2	Confirm addressing or correct device association where protective devices or the human-machine interface (HMI) are connected to multiple devices via a communication network.
6	Verify instrument transformer ratios are correct as installed	2A	2A	-
7	Inspect insulators for damage or contaminated surfaces	2	2	-
8	Verify air filters or screens are clean and in place	1 or 2	1 or 2	-
9	Check all ventilation openings for obstructions and correct operation of any flap or automatic cover intended to assist in arc resistant ratings	2	2	-
10	Inspect arc resistant equipment to ensure all doors are secured and in place	1 or 2	1 or 2	-
11	Verify switch phase barriers are in place and in good condition	2	2	-
12	For individual components, refer to the appropriate chapter(s) of this standard	NA	NA	-
13	Visually inspect environmental controls, where provided	1 or 2	1 or 2	Includes, but is not limited to, fans, heaters, thermostats and humidity control equipment and settings.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Items 1 and 2 in the table can also be done with the system deenergized so the table is updated to add "or 2" for the test type. Item 4 Note has been updated to remove some content as part of the content is restating the requirement and part of it refers to "evidence of current load levels" which is unclear.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-93-NFPA 70B-2024

Statement: Tasks No. 1 and 2 can also be done de-energized so the table is updated. Unclear language was removed in the notes section that was restating the requirement.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Public Input No. 137-NFPA 70B-2023 [Section No. 12.3.4]

12.3.4* Mechanical Servicing.

Substation and switchgear shall be mechanically serviced in accordance with Table 12.3.4.

Table 12.3.4 Substation and Switchgear Mechanical Servicing

No.	Task	1000 Volts or Below Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Check circuit breakers and switches — mechanical operation	2	2	See manufacturer's instructions, Chapter 15, and Chapter 17.
2	Check bolted connection resistance	2	2	See Chapter 7.
3	Verify lubrication on moving current-carrying parts and sliding surfaces	2	2	See manufacturer's instructions.
4	Verify mechanical interlock systems for correct sequencing	2	2	-
5	Verify mechanical systems for correct sequencing, including shutters, racking mechanisms, and similar	2	2	-
6	Verify mechanical indicating devices are functional	2	2	-
7	Verify filters or screens are clean and in place	1 or 2	1 or 2	Include filters and screens in the room related to the substation or switchgear.
8	Verify fuse holders provide mechanical support and contact integrity	2	2	- See Chapter 16.
9	For individual components, refer to the appropriate chapter(s) of this standard	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Adding a reference to Chapter 16 for the fuse holder inspection requirements in line 8 as the detailed requirements are in Chapter 16.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-94-NFPA 70B-2024
Statement: Task No. 8: Text was added to refer to the chapter on fuses.

Public Input No. 140-NFPA 70B-2023 [Section No. 13.3.1]

13.3.1 Visual Inspection.

Panelboards and switchboards shall be visually inspected in accordance with Table 13.3.1.

Table 13.3.1 Panelboard and Switchboard Visual Inspections

No.	Task	Test Type*	Notes
1	Inspect external physical condition	1	This includes condition and integrity of applied labels.
2	Inspect anchorage and grounding	1	-
3	Verify circuit breakers, fuses, and overload elements are the right sizes and types and correspond to the drawings and power system studies	2	-
4	For connected communicating addressable devices, verify the device addresses are set in accordance with documentation	2	Confirm addressing or correct device association where protective devices or the human machine interface (HMI) are connected to multiple devices via a communication network.
5	Verify instrument transformer ratios are correct	~~2~~ 2A	-
6	Inspect insulators for damage or contaminated surfaces	2	-
7	Verify filters are clean and in place	2	-
8	Ensure maintenance devices and tools are available for equipment servicing	1	-
9	Verify phase barriers are in place	2	-
10	Visually inspect environmental controls, where provided	1 or 2	Includes, but is not limited to, fans, heaters, thermostats and humidity control equipment and settings.
11	For individual components, refer to the appropriate chapter(s) of this standard	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

There is not a reason to require an inspection of instrument transformer ratios at every maintenance cycle as these ratios do not randomly change while the equipment is installed. The proposed change make this an enhanced test and makes the test type consistent with the same ratio check requirement in Chapter 12.

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Submittal Date: Thu Dec 21 09:14:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-96-NFPA 70B-2024

Statement: Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Task No. 5: Instrument transformer ratios should be inspected only if there is a suspected issue so changed to an enhanced test.

Public Input No. 141-NFPA 70B-2023 [Section No. 13.3.2]

13.3.2 Cleaning.

Bus insulation, cable insulation, terminals or terminations, electrical equipment surfaces, enclosures, and insulating materials shall be kept ~~in a clean and contaminant-free state~~ clean to prevent a buildup of contaminants that negatively affect performance, reduce life expectancy, or create a safety hazard .

Statement of Problem and Substantiation for Public Input

It is not possible or necessary to keep equipment "contaminant free" as a contaminant could be defined as dust. the language is updated to match the cleaning requirement language in Chapter 12. Other PIs are making similar changes to the "cleaning" text in other chapters in order to provide more consistent requirements for cleaning.

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Submittal Date: Thu Dec 21 09:17:33 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-97-NFPA 70B-2024
Statement: The language was modified to require cleaning and it is not possible to keep equipment “contaminant free” as a contaminant could be defined as dust. The language was updated to match the language used in Chapter 12.

Public Input No. 142-NFPA 70B-2023 [Section No. 13.3.4]

13.3.4 Mechanical Servicing.

Panelboards and switchboards shall be mechanically serviced in accordance with Table 13.3.4.

Table 13.3.4 Panelboard and Switchboard Mechanical Servicing

No.	Task	Test Type*	Notes
1	Inspect mechanical condition	2	-
2	Ensure maintenance devices and tools are available for equipment servicing	1 or 2	-
3	Inspect anchorage and grounding	2	-
4	Mechanically operate circuit breakers and switches	2	-
5	Inspect bolted connection integrity	2	See Chapter 7.
6	Verify lubrication on moving current-carrying parts and sliding surfaces	2	See the manufacturer's instructions.
7	Verify mechanical interlock systems for correct sequencing	2	-
8	Verify mechanical indicating devices are functional	2	-
9	Verify filters are clean and in place	2	-
10	Verify fuse holders provide mechanical support and contact integrity	2	- See Chapter 16.
11	For individual components, refer to the appropriate chapter(s) of this standard	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Adding a reference to Chapter 16 for the fuse holder inspection requirements in line 10 as the detailed requirements are in Chapter 16.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-98-NFPA 70B-2024

Statement: Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Task No. 10: Text was added to refer to the chapter on fuses.

Public Input No. 143-NFPA 70B-2023 [Section No. 13.3.5]

13.3.5 Electrical Testing.

Panelboards and switchboards shall be electrically tested in accordance with Table 13.3.5.

Table 13.3.5 Panelboard and Switchboard Electrical Testing

No.	Task	Test Type*	Notes
1	Check electrical hardware connections	NA	See Chapter 7.
2	Measure insulation resistance of the main bus	2	-
3	Measure insulation resistance of control wiring	2A	-
4	Test protective devices and systems	2	For surge protective devices, surge arresters, and arc-fault energy reduction systems, see the manufacturer's instructions.
5	Perform system operational tests	1 or 2	Includes emergency or standby power systems.
6	Test control power transformers, instrument transformers, and metering to ensure correct operation	1 or 2	-
7	For individual components, refer to the appropriate chapter(s) of this standard	NA	-
8	Where environmental controls are provided, check for correct operating condition	1 or 2	Includes, but is not limited to, fans, heaters, thermostats, and humidity control equipment and settings.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Changing item 6 to be test type 1 or 2 as the verification of operation can be done while the system is only. The change makes this requirement with the same requirement in Chapter 12.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-99-NFPA 70B-2024
Statement: Task 6 is changed to a 2A because it is not necessary to test control power transformers every maintenance outage.

Public Input No. 145-NFPA 70B-2023 [Chapter 15]

Chapter 15– AC Circuit Breakers, Low- and Medium-Voltage

15.1 Scope.

15.1.1

This chapter identifies electrical maintenance requirements for the following circuit breakers and their enclosures:

(1) Molded-case circuit breakers (MCCBs) rated less than or equal to 1000 V ac

(2) Insulated-case circuit breakers (ICCBs) rated less than or equal to 1000 V ac

(3) Low-voltage power circuit breakers (LVPCBs) rated less than or equal to 1000 V ac

(4) Medium-voltage power circuit breakers (MVPCBs) rated greater than 1000 V ac to less than or equal to 69 kV ac

15. 1. 2

Circuit breakers for dc systems are not covered.

15.2 Frequency of Maintenance.

The periodic maintenance procedures in Section 15.3 and Section 15.4 shall be performed in accordance with the frequencies in Chapter 9, unless otherwise specified in this chapter.

15.3 Periodic Maintenance Procedures for Low-Voltage Power Circuit (LVPCB), Molded Case Circuit Breaker (MCCB), and Insulated Case Circuit Breakers (ICCB).

15.3.1 Visual Inspections.

A visual inspection shall be conducted in accordance with Table 15.3.1.

Table 15.3.1 MCCB, ICCB, and LVPCB Visual Inspections

No.	Task	MCCB Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Verify ratings for proper system application.	1 or 2	1 or 2	1 or 2	-
2	Inspect insulating materials and frame for evidence of physical damage, cracks from stresses of operation, or contamination.	2	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition, including corrosion.	2	2	2	-
4	Inspect visible current-carrying parts and control devices if applicable for signs of overheating or deterioration.	2	2	2	-
5	Inspect arc chutes for cracks or excessive erosion if applicable.	NA	2	2	-
6	Check for cracks or lack of visual indication for all associated indicating status devices.	1 or 2	1 or 2	1 or 2	-
7	Check all markings on the circuit breaker are legible.	1 or 2	1 or 2	1 or 2	-
8	Inspect operating mechanism.	NA	2	2	-
9	Check main contact over travel and arcing contact engagement.	NA	2	2	-
10	Check condition of main and arcing contacts.	NA	2	2	-
11	Check insulating links/push rods and interphase barriers for cracks and defects.	NA	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

15.3.2 Cleaning.

15.3.2.1

Electrical equipment surfaces, enclosures, and insulating materials shall be kept in a clean and contaminant-free state.

15.3.2.2

If contamination such as dust, dirt, soot, grease, or moisture is found, cleaning shall be performed in accordance with Table 15.3.2.2.

Table 15.3.2.2 MCCB, ICCB, and LVPCB Cleaning

No.	Task	MCCB Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Clean insulating surfaces of the circuit breaker using a lint-free dry cloth, brush, or vacuum cleaner (avoid blowing material into the circuit breaker or into surrounding equipment)	2	2	2	-
2	Clean contact surfaces in accordance with the manufacturer's instructions	NA	2	2	-
3	Clean circuit breaker interior frame	NA	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.3.3 Lubrication.

Moving and sliding surfaces shall be lubricated in accordance with Table 15.3.3.

Table 15.3.3 MCCB, ICCB, and LVPCB Lubrication

No.	Task	MCCB Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Apply a thin coating of conductive lubricant to exposed contacts as specified by the manufacturer	NA	2	2	-
2	Apply nonconductive lubricant as needed to mechanism parts as specified by the manufacturer	NA	2	2	-
3	Apply conductive lubricant to pivot points, as well as moving and sliding surfaces as specified by the manufacturer	NA	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.3.4 Mechanical Servicing.

Circuit breakers shall be mechanically serviced in accordance with Table 15.3.4.

Table 15.3.4 MCCB, ICCB, and LVPCB Mechanical Servicing

No.	Task	MCCB Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Check all accessible electrical hardware connections for correct torque	2	2	2	See Chapter 7.
2	Operate the circuit breaker three times	2	2	2	-
3	Verify operation and alignment of mechanical safety interlocks, where applicable	2	2	2	-
4	Verify correct operation of shutter assemblies on draw-out circuit breakers	2	2	2	-
5	Measure and record trip bar force	NA	2A	2A	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.3.5* Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.3.5.

Table 15.3.5 MCCB, ICCB, and LVPCB Electrical Tests

No.	Task	MCCB† 250 Amperes and Less Frame Test Type*	MCCB† Over 250 Amperes Frame Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Perform infrared thermography	1	1	1	1	-
2	Measure contact resistance of each switching pole	2A	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2A	2	2	2	-
4	Operate circuit breaker auxiliary and control devices such as local and remote-control switches, shunt trips coils, close coils, motors, auxiliary switches, and under-voltage coils	2	2	2	2	-
5	Verify the calibration of all functions of the trip unit by means of the manufacturer's specified test set for circuit breakers equipped with electronic trip units	2A	2	2	2	-
6	Perform inverse time trip test at 300% of rated continuous current of thermal magnetic circuit breakers	2A	2	NA	NA	-
7	Perform inverse time trip test at 300% of rated continuous current of electronic trip circuit breakers	2A	2A	2A	2A	-
8	Perform the instantaneous overcurrent trip test for thermal-magnetic circuit breakers by "run-up" or "pulse" method	2A	2	NA	2	-
9	Perform the instantaneous overcurrent trip test for electronic trip breakers by "run-up" or "pulse" method	2A	2A	2A	2A	-
10	Perform rated hold-in test	2A	2A	2A	2A	-
11	Test current-limiter resistance	2	2	2	2	-
12	Check status of rating plug battery	2	2	2	2	-

No.	Task	MCCB† 250 Amperes and Less Frame Test Type*	MCCB† Over 250 Amperes Frame Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
13	Perform millivolt drop test	2A	2A	2A	2A	-
14	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

†The rating of adjustable-trip circuit breakers shall be the maximum setting possible.

15.3.6 Special. (Reserved)

15.4 Periodic Maintenance Procedures for Medium-Voltage Power Circuit Breakers.

Medium-voltage power circuit breakers shall be maintained in accordance with this section.

15.4.1

Circuit breakers shall be visually inspected in accordance with Table 15.4.1.

Table 15.4.1 Medium-Voltage Power Circuit Breakers Visual Inspections

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Verify ratings for proper system application	1 or 2	1 or 2	1 or 2	1 or 2	-
2	Inspect insulating materials and frame for evidence of physical damage, cracks from stresses of operation, or contamination	2	2	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition including corrosion	2	2	2	2	-
4	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	2	2	-
5	Inspect each arc chute for cracks or excessive erosion	2	NA	NA	NA	-
6	Inspect ground contact, secondary disconnect, close and trip interlocks, levering latch, mechanism-operated contact (MOC), and truck-operated contact (TOC) switches, and all other interlocks	2	2	2	2	-
7	Check all markings on the circuit breaker are legible	1 or 2	1 or 2	1 or 2	1 or 2	-
8	Inspect contact erosion indicator mark on vacuum interrupter moving stem	NA	2	NA	NA	Some manufacturers have visual inspections to determine contact erosion.

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
9	Inspect contact	NA	2	NA	NA	Some manufacturers have visual inspections to determine contact wipe.
10	Verify correct oil level	NA	NA	NA	2	-
11	Check for oil leaks	NA	NA	NA	2	-
12	Visually inspect bushings for cracks, chips, loss of porcelain, evidence of corona damage, or other physical damage	2	2	2	2	-
13	Check for low gas pressure	NA	NA	2A	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.2 Cleaning.

Electrical equipment surfaces, enclosures, and insulating materials shall be kept in a clean and contaminant-free state in accordance with Table 15.4.2.

Table 15.4.2 Medium-Voltage Power Circuit Breakers Cleaning

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Clean insulating surfaces of the circuit breaker using a lint-free dry cloth, brush, or vacuum cleaner (avoid blowing material into the circuit breaker or into surrounding equipment)	2	2	NA	NA	For vacuum circuit breakers, follow the manufacturer's instructions to avoid shock due to inherent capacitance from the technology used in the circuit breaker.
2	Clean contact surfaces	2	NA	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.3 Lubrication.

Moving and sliding surfaces shall be lubricated in accordance with Table 15.4.3.

Table 15.4.3 Medium-Voltage Power Circuit Breakers Lubrication

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Apply a thin coating of conductive lubricant to exposed contacts as specified by the manufacturer	2	2	2	2	-
2	Apply nonconductive lubricant as needed to mechanism parts as specified by the manufacturer	2	2	2	2	-
3	Apply conductive lubricant to pivot points, as well as moving and sliding surfaces, as specified by the manufacturer	2	2	2	2	-

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.4 Mechanical Servicing.

Circuit breakers shall be mechanically serviced in accordance with Table 15.4.4.

Table 15.4.4 Medium-Voltage Power Circuit Breakers Mechanical Servicing

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulted Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Check all accessible electrical hardware connections for proper torque	2	2	2	2	See Chapter 7.
2	Replace any barriers and parts that have been removed for maintenance	2	2	2	2	-
3	Close and open the circuit breaker	2	2	2	2	-
4	Verify operation and alignment of mechanical safety interlocks, where applicable	2	2	2	2	-
5	Verify the proper operation of all circuit breaker/cell accessories, shutters, auxiliary switches, cell MOC and TOC switches, and key interlocks	2	2	2	2	-
6	Verify proper operation of all cell status indicators	2	2	2	2	-
7	Charge closing spring and close manually	2	2	2	2	-
8	Measure and record trip bar force	2A	2A	2A	2A	-
9	Perform gas leakage detection	NA	NA	2	NA	-
10	Inspect pneumatic and hydraulic fittings and connections for leaks	2	2	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.5 Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.4.5.

Table 15.4.5 Medium-Voltage Power Circuit Breakers Electrical Tests

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*	Notes
1	Inspect electrical connections for high resistance	1 or 2	1 or 2	1 or 2	1 or 2	See Section 7.2.
2	Measure contact resistance of each switching pole	2	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2	2	2	2	-
4	Verify control power for close and trip functions	2	2	2	2	-
5	Perform trip and close tests with control switch	2	2	2	2	-
6	Verify operating mechanism charge, anti-pump, and trip-free functions	2	2	2	2	-
7	Perform vacuum integrity test by ac overpotential across each vacuum bottle	NA	2	NA	NA	-
8	Verify proper operation of space heaters, if equipped	2	2	2	2	-
9	Perform an ac overpotential test one pole at a time with the other poles and structure grounded	2A	2A	2A	2A	-
10	Perform an ac overpotential test on control wiring	2A	2A	2A	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
11	Verify blow-out coil continuity	2	NA	NA	NA	-
12	Perform circuit breaker motion analysis	2A	2A	2	2	-
13	Perform circuit breaker contact timing test	2	2	2	2	-

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*		Notes
14	Perform trip/close coil current signature analysis	2A	2A	2A	2A	-	
15	Perform pickup test on trip and/or close coil	2A	2A	2A	2A	-	
16	Measure power/dissipation factor	2A	NA	2A	2	-	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The text "ac" is added to the title to readily let the reader know that dc circuit breakers are not covered. A sentence is added to the scope to specifically state dc circuit breakers are not covered to make it clearer to the reader what is covered.

Submitter Information Verification

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Submittal Date: Fri Dec 22 07:14:38 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The scope indicates that Chapter 15 only applies to AC circuit breakers.

Public Input No. 146-NFPA 70B-2023 [Section No. 15.3.2.1]

15.3.2.1

Electrical equipment surfaces, enclosures, and insulating materials shall be kept ~~in a clean and contaminant-free state~~ clean to prevent a buildup of contaminents that negatively affect performance, reduce life expectancy, or create a safety hazard .

Statement of Problem and Substantiation for Public Input

It is not possible or necessary to keep equipment "contaminant free" as a contaminant could be defined as dust. the language is updated to match the cleaning requirement language in Chapter 12. Other PIs are making similar changes to the "cleaning" text in other chapters in order to provide more consistent requirements for cleaning.

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Submittal Date: Fri Dec 22 07:17:38 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-100-NFPA 70B-2024
Statement: The language was modified to require cleaning and it is not possible to keep equipment “contaminant free” as a contaminant could be defined as dust. The language was updated to match the language used in Chapter 12.

Public Input No. 147-NFPA 70B-2023 [Section No. 15.3.4]

15.3.4 Mechanical Servicing.

Circuit breakers shall be mechanically serviced in accordance with Table 15.3.4.

Table 15.3.4 MCCB, ICCB, and LVPCB Mechanical Servicing

No.	Task	MCCB Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Check all accessible electrical hardware connections for correct torque	2	2	2	See Chapter 7.
2	Operate the circuit breaker at least three times	2	2	2	- Operating the circuit breaker helps ensure the mechanism functions properly.
3	Verify operation and alignment of mechanical safety interlocks, where applicable	2	2	2	-
4	Verify correct operation of shutter assemblies on draw-out circuit breakers	2	2	2	-
5	Measure and record trip bar force	NA	2A	2A	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The requirement to operate the circuit breaker "three times" is written as restrictive as the requirement can be interpreted to not allow operating the circuit breaker more than three times. The requirement is modified to allow operation of the circuit breaker more than three times. A Note is added to help explain the reason for operating the circuit breaker.

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Submittal Date: Fri Dec 22 07:24:31 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-101-NFPA 70B-2024

Statement: Task No. 2: The existing requirement was restrictive and could have been interpreted that the circuit breaker could only be operated three times when in fact it can be operated more.

Public Input No. 148-NFPA 70B-2023 [Section No. 15.3.5]

15.3.5* Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.3.5.

Table 15.3.5 MCCB, ICCB, and LVPCB Electrical Tests

No.	Task	MCCB† 250 Amperes and Less Frame Test Type*	MCCB† Over 250 Amperes Frame Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Perform infrared thermography	1	1	1	1	-
2	Measure contact resistance of each switching pole	2A	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2A	2	2	2	-
4	Operate circuit breaker auxiliary and control devices such as local and remote-control switches, shunt trips coils, close coils, motors, auxiliary switches, and under-voltage coils	2	2	2	2	-
5	Verify the calibration of all functions of the trip unit by means of the manufacturer's specified test set or high current test set for circuit breakers equipped with electronic trip units	2A	2	2	2	-
6	Perform inverse time trip test at 300% of rated continuous current of thermal magnetic circuit breakers	2A	2	NA	NA	-
7	Perform inverse time trip test at 300% of rated continuous current of electronic trip circuit breakers	2A	2A	2A	2A	-
8	Perform the instantaneous overcurrent trip test for thermal-magnetic circuit breakers by "run-up" or "pulse" method	2A	2	NA	2	-
9	Perform the instantaneous overcurrent trip test for electronic trip breakers by "run-up" or "pulse" method	2A	2A	2A	2A	-
10	Perform rated hold-in test	2A	2A	2A	2A	-
11	Test current-limiter resistance	2	2	2	2	-
12	Check status of rating plug battery	2	2	2	2	-

No.	Task	MCCB† 250 Amperes and Less Frame Test Type*	MCCB† Over 250 Amperes Frame Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
13	Perform millivolt drop test	2A	2A	2A	2A	-
14	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

†The rating of adjustable-trip circuit breakers shall be the maximum setting possible.

Statement of Problem and Substantiation for Public Input

Manufacturers provide their own secondary injection test set. There are also high current test sets that may be used to test the operation of the circuit breakers. Manufacturers do not specifically list each manufacturer and model of high current test set that could test their circuit breaker. The proposed revised language includes the allowance to use a high current test set for testing the circuit breaker trip unit.

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Submittal Date: Fri Dec 22 07:33:44 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-102-NFPA 70B-2024

Statement: The correct demarcation is 225 A per the circuit breaker standard so the table has been updated.

Some tasks were updated to "1 or 2" reflecting that the task can be performed online or offline.

Task No. 5: Circuit breakers with electronic trip units can be tested by use of a high current test set or by the manufacturer's specified test set.

Public Input No. 149-NFPA 70B-2023 [Section No. 15.3.5]

15.3.5* Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.3.5.

Table 15.3.5 MCCB, ICCB, and LVPCB Electrical Tests

No.	Task	MCCB† 250 Amperes and Less Frame Test Type*	MCCB† Over 250 Amperes Frame Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
1	Perform infrared thermography	1	1	1	1	-
2	Measure contact resistance of each switching pole	2A	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2A	2	2	2	-
4	Operate circuit breaker auxiliary and control devices such as local and remote-control switches, shunt trips coils, close coils, motors, auxiliary switches, and under-voltage coils	2	2	2	2	-
5	Verify the calibration of all functions of the trip unit by means of the manufacturer's specified test set for circuit breakers equipped with electronic trip units	2A	2	2	2	-
6	Perform inverse time trip test at 300% of rated continuous current of thermal magnetic circuit breakers	2A	2	NA	NA	-
7	Perform inverse time trip test at 300% of rated continuous current of electronic trip circuit breakers	2A	2A	2A	2A	-
8	Perform the instantaneous overcurrent trip test for thermal-magnetic circuit breakers by "run-up" or "pulse" method	2A	2	NA	2	-
9	Perform the instantaneous overcurrent trip test for electronic trip breakers by "run-up" or "pulse" method	2A	2A	2A	2A	-
10	Perform rated hold-in test	2A	2A	2A	2A	-
11	Test current-limiter resistance	2	2	2	2	-
12	Check status of rating plug battery	2	2	2	2	-

No.	Task	MCCB† 250 Amperes and Less Frame Test Type*	MCCB† Over 250 Amperes Frame Test Type*	ICCB Test Type*	LVPCB Test Type*	Notes
13	Perform millivolt drop test	2A	2A	2A	2A	-
~~14~~	~~Test arc reduction technology in accordance with the manufacturer's instructions~~	~~2~~	~~2~~	~~2~~	~~2~~	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

†The rating of adjustable-trip circuit breakers shall be the maximum setting possible.

Statement of Problem and Substantiation for Public Input

The circuit breaker trip unit would be the device that provides the operation for any arc-flash incident energy reduction associated with the circuit breaker. A separate requirement in the table already requires all trip unit functions to be tested. Those tests include all functions of the trip unit (LSIG, maintenance modes, communication trips, etc.) A separate requirement for testing arc-reduction technology of the circuit breaker is not required and should be deleted.

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Submittal Date: Fri Dec 22 07:35:38 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Some arc reduction technology uses a separate trip element or is an external device to the circuit breaker trip unit so a call-out to test those devices is needed.

Public Input No. 9-NFPA 70B-2023 [Section No. 15.3.5]

15.3.5* Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.3.5.

Table 15.3.5 MCCB, ICCB, and LVPCB Electrical Tests

No.	Task		MCCB† ~~250 Amperes and Less Frame Test Type*~~	MCCB † ~~Over 250 Amperes Frame Test Type*~~	ICCB Test Type*	LVPCB Test Type*	Notes
1	Perform infrared thermography		1	1	1	~~1~~	-
2	Measure contact resistance of each switching pole	~~2A~~		2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	~~2A~~		2	2	2	-
4	Operate circuit breaker auxiliary and control devices such as local and remote-control switches, shunt trips coils, close coils, motors, auxiliary switches, and under-voltage coils		2	2	2	~~2~~	-
5	Verify the calibration of all functions of the trip unit by means of the manufacturer's specified test set for circuit breakers equipped with electronic trip units	~~2A~~		2	2	2	-
6	Perform inverse time trip test at 300% of rated continuous current of thermal magnetic circuit breakers	~~2A~~		2	NA	NA	-
7	Perform inverse time trip test at 300% of rated continuous current of electronic trip circuit breakers		2A	2A	2A	~~2A~~	-
8	Perform the instantaneous overcurrent trip test for thermal-magnetic circuit breakers by "run-up" or "pulse" method	~~2A~~		2	NA	2	-
9	Perform the instantaneous overcurrent trip test for electronic trip breakers by "run-up" or "pulse" method		2A	2A	2A	~~2A~~	-

No.	Task	MCCB† ~~250 Amperes and Less Frame Test Type*~~	~~MCCB † Over 250 Amperes Frame Test Type*~~	ICCB Test Type*	LVPCB Test Type*	Notes
10	Perform rated hold-in test	2A	2A	2A	~~2A~~	-
11	Test current-limiter resistance	2	2	2	~~2~~	-
12	Check status of rating plug battery	2	2	2	~~2~~	-
13	Perform millivolt drop test	2A	2A	2A	~~2A~~	-
14	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	2	~~2~~	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

†The rating of adjustable-trip circuit breakers shall be the maximum setting possible.

Statement of Problem and Substantiation for Public Input

Delineating based on the ampere rating of the breaker is contrary to entire NFPA 70B scope and purpose to address safety. The only decision should be whether it is critical based on the impact to safety of personnel and environment. This will depend on the hazards associated with the failure of the breaker to operate properly without regard to the ampere rating.

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Submittal Date: Fri Dec 01 12:11:39 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Smaller frame size circuit breakers are built to different standards and have different servicing requirements. Some tests for larger frame breakers can damage smaller frame circuit breakers.

Public Input No. 150-NFPA 70B-2023 [Section No. 15.4]

15.4 Periodic Maintenance Procedures for Medium-Voltage Power Circuit Breakers.

~~Medium-voltage power circuit breakers shall be maintained in accordance with this section.~~

15.4.1

Visual Inspections. Circuit breakers shall be visually inspected in accordance with Table 15.4.1 .

Table 15.4.1 Medium-Voltage Power Circuit Breakers Visual Inspections

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Verify ratings for proper system application	1 or 2	1 or 2	1 or 2	1 or 2	-
2	Inspect insulating materials and frame for evidence of physical damage, cracks from stresses of operation, or contamination	2	2	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition including corrosion	2	2	2	2	-
4	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	2	2	-
5	Inspect each arc chute for cracks or excessive erosion	2	NA	NA	NA	-
6	Inspect ground contact, secondary disconnect, close and trip interlocks, levering latch, mechanism-operated contact (MOC), and truck-operated contact (TOC) switches, and all other interlocks	2	2	2	2	-
7	Check all markings on the circuit breaker are legible	1 or 2	1 or 2	1 or 2	1 or 2	-
8	Inspect contact erosion indicator mark on vacuum interrupter moving stem	NA	2	NA	NA	Some manufacturers have visual inspections to determine contact erosion.
9	Inspect contact	NA	2	NA	NA	Some manufacturers

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
						have visual inspections to determine contact wipe.
10	Verify correct oil level	NA	NA	NA	2	-
11	Check for oil leaks	NA	NA	NA	2	-
12	Visually inspect bushings for cracks, chips, loss of porcelain, evidence of corona damage, or other physical damage	2	2	2	2	-
13	Check for low gas pressure	NA	NA	2A	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.2 Cleaning.

Electrical equipment surfaces, enclosures, and insulating materials shall be kept in a clean and contaminant-free state in accordance with Table 15.4.2.

Table 15.4.2 Medium-Voltage Power Circuit Breakers Cleaning

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Clean insulating surfaces of the circuit breaker using a lint-free dry cloth, brush, or vacuum cleaner (avoid blowing material into the circuit breaker or into surrounding equipment)	2	2	NA	NA	For vacuum circuit breakers, follow the manufacturer's instructions to avoid shock due to inherent capacitance from the technology used in the circuit breaker.
2	Clean contact surfaces	2	NA	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.3 Lubrication.

Moving and sliding surfaces shall be lubricated in accordance with Table 15.4.3.

Table 15.4.3 Medium-Voltage Power Circuit Breakers Lubrication

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Apply a thin coating of conductive lubricant to exposed contacts as specified by the manufacturer	2	2	2	2	-
2	Apply nonconductive lubricant as needed to mechanism parts as specified by the manufacturer	2	2	2	2	-
3	Apply conductive lubricant to pivot points, as well as moving and sliding surfaces, as specified by the manufacturer	2	2	2	2	-

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.4 Mechanical Servicing.

Circuit breakers shall be mechanically serviced in accordance with Table 15.4.4.

Table 15.4.4 Medium-Voltage Power Circuit Breakers Mechanical Servicing

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulted Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Check all accessible electrical hardware connections for proper torque	2	2	2	2	See Chapter 7.
2	Replace any barriers and parts that have been removed for maintenance	2	2	2	2	-
3	Close and open the circuit breaker	2	2	2	2	-
4	Verify operation and alignment of mechanical safety interlocks, where applicable	2	2	2	2	-
5	Verify the proper operation of all circuit breaker/cell accessories, shutters, auxiliary switches, cell MOC and TOC switches, and key interlocks	2	2	2	2	-
6	Verify proper operation of all cell status indicators	2	2	2	2	-
7	Charge closing spring and close manually	2	2	2	2	-
8	Measure and record trip bar force	2A	2A	2A	2A	-
9	Perform gas leakage detection	NA	NA	2	NA	-
10	Inspect pneumatic and hydraulic fittings and connections for leaks	2	2	2	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.5 Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.4.5.

Table 15.4.5 Medium-Voltage Power Circuit Breakers Electrical Tests

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*	Notes
1	Inspect electrical connections for high resistance	1 or 2	1 or 2	1 or 2	1 or 2	See Section 7.2.
2	Measure contact resistance of each switching pole	2	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2	2	2	2	-
4	Verify control power for close and trip functions	2	2	2	2	-
5	Perform trip and close tests with control switch	2	2	2	2	-
6	Verify operating mechanism charge, anti-pump, and trip-free functions	2	2	2	2	-
7	Perform vacuum integrity test by ac overpotential across each vacuum bottle	NA	2	NA	NA	-
8	Verify proper operation of space heaters, if equipped	2	2	2	2	-
9	Perform an ac overpotential test one pole at a time with the other poles and structure grounded	2A	2A	2A	2A	-
10	Perform an ac overpotential test on control wiring	2A	2A	2A	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
11	Verify blow-out coil continuity	2	NA	NA	NA	-
12	Perform circuit breaker motion analysis	2A	2A	2	2	-
13	Perform circuit breaker contact timing test	2	2	2	2	-

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*		Notes
14	Perform trip/close coil current signature analysis	2A	2A	2A	2A	-	
15	Perform pickup test on trip and/or close coil	2A	2A	2A	2A	-	
16	Measure power/dissipation factor	2A	NA	2A	2	-	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

15.4.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The text is revised to remove the first sentence in 15.4. A similar first sentence is not in 15.3 so this change makes these two sections consistent.

A missing title is added to 15.4.1 to make the section match other Visual Inspection sections.

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Submittal Date: Fri Dec 22 07:39:58 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-103-NFPA 70B-2024
Statement: Removing unnecessary language to make consistency between sections.

Public Input No. 151-NFPA 70B-2023 [Section No. 15.4.1]

15.4.1

Circuit breakers shall be visually inspected in accordance with Table 15.4.1.

Table 15.4.1 Medium-Voltage Power Circuit Breakers Visual Inspections

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Verify ratings for proper system application	1 or 2	1 or 2	1 or 2	1 or 2	-
2	Inspect insulating materials and frame for evidence of physical damage, cracks from stresses of operation, or contamination	2	2	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition including corrosion	2	2	2	2	-
4	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	2	2	-
5	Inspect each arc chute for cracks or excessive erosion	2	NA	NA	NA	-
6	Inspect ground contact, secondary disconnect, close and trip interlocks, levering latch, mechanism-operated contact (MOC), and truck-operated contact (TOC) switches, and all other interlocks	2	2	2	2	-
7	Check all markings on the circuit breaker are legible	1 or 2	1 or 2	1 or 2	1 or 2	-
8	Inspect contact erosion indicator mark on vacuum interrupter moving stem	NA	2	NA	NA	Some manufacturers have visual inspections to determine contact erosion.

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
9	Inspect contact wipe	NA	2	NA	NA	Some manufacturers have visual inspections to determine contact wipe.
10	Verify correct oil level	NA	NA	NA	2	-
11	Check for oil leaks	NA	NA	NA	2	-
12	Visually inspect bushings for cracks, chips, loss of porcelain, evidence of corona damage, or other physical damage	2	2	2	2	-
13	Check for low gas pressure	NA	NA	2A	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 9 is changed to include "wipe" as that is the check to be performed per the guidance in the Note for this item.

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Submittal Date: Fri Dec 22 07:43:54 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-151-NFPA 70B-2024
Statement: Task No. 9: Added the word “wipe” for clarification of the task requirement.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Public Input No. 152-NFPA 70B-2023 [Section No. 15.4.2]

15.4.2 Cleaning.

Electrical equipment surfaces, enclosures, and insulating materials shall be kept in a clean ~~and contaminant-free state~~ to prevent a buildup of contaminents that negatively affect performance, reduce life expectancy, or create a safety hazard in accordance with Table 15.4.2.

Table 15.4.2 Medium-Voltage Power Circuit Breakers Cleaning

No.	Task	Air Magnetic Circuit Breakers Test Type*	Vacuum Circuit Breakers Test Type*	Gas Insulated Circuit Breakers Test Type*	Oil Circuit Breakers Test Type*	Notes
1	Clean insulating surfaces of the circuit breaker using a lint-free dry cloth, brush, or vacuum cleaner (avoid blowing material into the circuit breaker or into surrounding equipment)	2	2	NA	NA	For vacuum circuit breakers, follow the manufacturer's instructions to avoid shock due to inherent capacitance from the technology used in the circuit breaker.
2	Clean contact surfaces	2	NA	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

It is not possible or necessary to keep equipment "contaminant free" as a contaminant could be defined as dust. the language is updated to match the cleaning requirement language in Chapter 12. Other PIs are making similar changes to the "cleaning" text in other chapters in order to provide more consistent requirements for cleaning.

Submitter Information Verification

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Submittal Date: Fri Dec 22 07:45:52 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-105-NFPA 70B-2024

Statement: The language was modified to require cleaning and it is not possible to keep equipment “contaminant free” as a contaminant could be defined as dust. The language was updated to match the language used in Chapter 12.

Public Input No. 153-NFPA 70B-2023 [Section No. 15.4.5]

15.4.5 Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.4.5.

Table 15.4.5 Medium-Voltage Power Circuit Breakers Electrical Tests

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*	Notes
1	Inspect electrical connections for high resistance	1 or 2	1 or 2	1 or 2	1 or 2	See Section 7.2.
2	Measure contact resistance of each switching pole	2	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2	2	2	2	-
4	Verify control power for close and trip functions	2	2	2	2	-
5	Perform trip and close tests with control switch	2	2	2	2	-
6	Verify operating mechanism charge, anti-pump, and trip-free functions	2	2	2	2	-
7	Perform vacuum integrity test by ac overpotential across each vacuum bottle	NA	2	NA	NA	-
8	Verify proper operation of space heaters, if equipped	2	2	2	2	-
9	Perform an ac overpotential test one pole at a time with the other poles and structure grounded	2A	2A	2A	2A	-
10	Perform an ac overpotential test on control wiring	2A	2A	2A	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
11	Verify blow-out coil continuity	2	NA	NA	NA	-
12	Perform circuit breaker motion analysis	2A	2A~~2~~	2A	2	-
13	Perform circuit breaker contact timing test	2	2	2	2	-

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*		Notes
14	Perform trip/close coil current signature analysis	2A	2A	2A	2A	-	
15	Perform pickup test on trip and/or close coil	2A	2A	2A	2A	-	
16	Measure power/dissipation factor	2A	NA	2A	2	-	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

For requirement 12, this should be an enhanced test for gas insulated circuit breakers. The test is not required for all voltage classes of gas insulated circuit breakers.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Street Address:
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Submittal Date: Fri Dec 22 07:50:23 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-106-NFPA 70B-2024

Statement: Task No. 4: The close and trip functions are tested in Task 5 which would verify control power.

Task No. 12: This test is not required for all voltage classes of gas insulated breakers so changed to an enhanced test.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Public Input No. 154-NFPA 70B-2023 [Section No. 15.4.5]

15.4.5 Electrical Testing.

Circuit breakers shall be electrically tested in accordance with Table 15.4.5.

Table 15.4.5 Medium-Voltage Power Circuit Breakers Electrical Tests

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*	Notes
1	Inspect electrical connections for high resistance	1 or 2	1 or 2	1 or 2	1 or 2	See Section 7.2.
2	Measure contact resistance of each switching pole	2	2	2	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with circuit breaker closed and across each open pole	2	2	2	2	-
4	~~Verify control power for close and trip functions~~	~~2~~	~~2~~	~~2~~	~~2~~	-
5	~~6~~ Verify operating mechanism charge, anti-pump, and trip-free functions	2	2	2	2	
6	~~7~~ Perform vacuum integrity test by ac overpotential across each vacuum bottle	NA	2	NA	NA	
7	~~8~~ Verify proper operation of space heaters, if equipped	2	2	2	2	
8	~~9~~ Perform an ac overpotential test	2A	2A	2A	2A	

~~5~~ Perf trip clos test with cont swit

No.	Task	Air Magnetic Circuit Breaker Test Type*	Vacuum Circuit Breaker Test Type*	Gas Insulated Circuit Breaker Test Type*	Oil Insulated Circuit Breaker Test Type*	Notes	
		one pole at a time with the other poles and structure grounded					
9	~~10~~	Perform an ac overpotential test on control wiring	2A	2A	2A	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
~~11~~ 10	Verify blow-out coil continuity	2	NA	NA	NA		
11	~~12~~	Perform circuit breaker motion analysis	2A	2A	2	2	
12	~~13~~	Perform circuit breaker contact timing test	2	2	2	2	
13	~~14~~	Perform trip/close coil current signature analysis	2A	2A	2A	2A	
14	~~15~~	Perform pickup test on trip and/or close coil	2A	2A	2A	2A	
15	~~16~~	Measure power/dissipation factor	2A	NA	2A	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Requirement 4 states to "verify control power". The requirement to "verify" if vague and provides no specific thing to verify. It's not clear if the person is to verify the power is present, not present, the right voltage type (ac or dc), the right level (120 V or 125 V), or the right frequency (50 HZ or 60 Hz.) Therefore the recommendation is to delete the requirement. Note - another option is to clarify the requirement to clearly state what is to be verified concerning control power.

Submitter Information Verification

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Submittal Date: Fri Dec 22 07:51:34 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-106-NFPA 70B-2024

Statement: Task No. 4: The close and trip functions are tested in Task 5 which would verify control power.

Task No. 12: This test is not required for all voltage classes of gas insulated breakers so changed to an enhanced test.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Public Input No. 157-NFPA 70B-2023 [Section No. 16.1]

16.1 Scope.

This chapter identifies electrical maintenance requirements for fuses to protect ~~branch,~~ feeder and service conductors.

Statement of Problem and Substantiation for Public Input

The current scope of this chapter includes branch circuit fuses. Per the 2023 NEC®, a branch circuit is "the circuit conductors between the final overcurrent device protecting the circuit and the outlet(s)." The branch circuit fuse would be the last fuse before the connected load(s). At many industrial facilitates, there may be thousands of branch circuit fuses in equipment such as DCS and PLC systems. The requirements in this chapter would require performing the required maintenance on this equipment per the frequency requirements of Chapter 9. It's not practical or necessary to perform the currently required maintenance on fuses in these types of systems. This PI proposed to remove the term "branch" from the requirements to remove the requirement to perform the maintenance required per this chapter for branch circuits. This change would remove all branch circuits from the scope and not just those associated with DCS and PLC types of systems. Another revision possibility would be to make an exclusion for fuses in those sorts of systems so they are not covered by this chapter. Some action needs to be taken to address this issue and not require the required maintenance on all branch circuit fuses.

Submitter Information Verification

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Submittal Date: Fri Dec 22 11:37:17 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Deleting the word "branch" would remove the requirement for maintaining all fuses used to protect all branch circuits which is overly broad. There is no current or voltage limit for branch circuits.

Public Input No. 158-NFPA 70B-2023 [Section No. 16.3.2]

16.3.2 Cleaning.

If contamination is present, fuses shall be cleaned in accordance with Table 16.3.2.

Table 16.3.2 Fuse Cleaning

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Clean fuse, fuse terminals, and fuse clips that have become corroded or oxidized	2	2	-
2	Clean fuses and insulators of accumulated dust and foreign matter	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The current cleaning requirements do not have any requirements for cleaning the actual fuses. The proposed changes add a requirement to clean the actual fuses and not just the clips, insulators, and temrinals.

Submitter Information Verification

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State:
Zip:

Submittal Date: Fri Dec 22 11:49:45 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-70-NFPA 70B-2024

Statement: The word "fuse" was added in three locations to provide cleaning requirements for fuses in addition to fuse clips and fuse terminals.

Item 2 was changed to allow optional cleaning.

Public Input No. 10-NFPA 70B-2023 [Section No. 16.3.5]

16.3.5* Electrical Testing.

Fuses shall be electrically tested in accordance with Table 16.3.5.

Table 16.3.5 Fuse Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography	1	1	When equipment has infrared viewing port or is accessible while in operation.
2 3	Insulation Resistance Test (of fuse holder) Measure fuse connection resistance	2 2A	2	2
~~3~~ 4	Measure fuse resistance	2A	2	-

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Fuse block failures leading to arc flash events are very common and can be easily prevented through regular insulation resistance testing.

Submitter Information Verification

Submitter Full Name: Karl Cunningham
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Submittal Date: Fri Dec 01 12:18:11 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-30-NFPA 70B-2024

Statement: To verify insulation resistance integrity the fuse holder should have an insulation-resistance test performed, phase-to-phase and phase-to-ground as test type 2A for 1000 volts and less, and a test type 2 for greater than 1000 volts. Test type 2A is to allow the user flexibility in complex equipment arrangements to perform the task.

Public Input No. 28-NFPA 70B-2023 [Chapter 17]

Chapter 17 Switches

17.1 Scope.

17.1.1

This chapter identifies electrical maintenance requirements for the following:

(1) Enclosed and dead-front (safety) switches, bolted-pressure switches (BPS), high-pressure contact switches (HPC), ~~automatic transfer switches, bypass-isolation switches, and other transfer switch equipment rated~~ rated 1000 volts or less

(2) Switches used in metal-enclosed load interrupter ~~switchgear and automatic transfer switches, bypass-isolation switches, and other transfer switch equipment rated~~ switchgear rated over 1000 volts

17.2 Frequency of Maintenance.

The periodic maintenance procedures specified in Section 17.3 shall be performed in accordance with the frequencies specified in Chapter 9, unless otherwise specified in this chapter.

17.3* Periodic Maintenance Procedures.

17.3.1 Visual Inspection.

Switches shall be visually inspected in accordance with Table 17.3.1.

Table 17.3.1 Switch Visual Inspections

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Inspect doors and latches for fit, dents, corrosion, and missing hardware	1 or 2	1 or 2	-
2	Inspect insulating materials and switch base for evidence of physical damage, cracks from stresses of operation, or contamination	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition, including corrosion	2	2	-
4	Check that exposed switch contacts, both moving and stationary, are free from environmental contamination	2	NA	-
5	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	-
6	Check that fuses are secured	2	2	-
7	Examine switches with exposed contacts for evidence of high short-circuit closing operation	2	NA	-
8	Check the main body of the switch blades and the arcing contacts for arc erosion	2	2	Mild pitting and burning is permitted.
9	Inspect each arc chute for cracks or excessive erosion	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

17.3.2 Cleaning.

If contamination is present, switches shall be cleaned in accordance with Table 17.3.2.

Table 17.3.2 Switch Cleaning

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Clean the switch and barriers	2	2	-
2	Clean exposed switch contacts with a multi-purpose precision lubricant before lubricating	2	NA	-
3	Wipe contact surfaces with a lint-free cleaning cloth	2	NA	-
4	Wipe contact surfaces with a noncorrosive cleaning agent	NA	2	-
5	Clean insulators	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

17.3.3* Lubrication.

Switches shall be lubricated in accordance with Table 17.3.3 and the manufacturer's published instructions.

Table 17.3.3 Switch Lubrication

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Apply a thin coating of conductive lubricant to exposed switch contacts.	2	NA	Enclosed and dead-front (safety) switches do not require lubrication.
2	Apply nonconductive lubricant as needed to mechanism parts as specified by the manufacturer.	2	NA	-
3	Apply conductive lubricant to pivot points, as well as moving and sliding surfaces.	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

17.3.4 Mechanical Servicing.

Switches shall be mechanically serviced in accordance with Table 17.3.4.

Table 17.3.4 Switch Mechanical Servicing

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	If accessible, verify main blade alignment, penetration, travel stops, and mechanical operation	2	2	-
2	Check all accessible electrical hardware connections	2	2	See Chapter 7.
3	Operate the switch three times to work the lubricant between the contacts	2	NA	-
4	Verify operation and alignment of mechanical interlocks	2	2	-
5	Verify the contact pressure is within specification using a force gauge or other device that measures forces	NA	2	-
6	With the door closed and latched, close and open the switch three times to confirm the switch and operator lever is operating; view switch position through the window after each operation, where available; when open, verify that switch blades have cleared the arc chutes; when closed, verify that the switch blades are inside the arc chutes and vertical; if they are not, perform alignment adjustments per the manufacturer's instructions	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

17.3.5* Electrical Testing.

Switches shall be electrically tested in accordance with Table 17.3.5.

Table 17.3.5 Switch Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography	1A	1	-
2	Measure contact resistance of each switching pole	2A	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with switch closed and across each open pole	2A	2	-
4	Functional tests only for switches with motor operators:	2	2	-
	-	Verify control power for close and trip functions	-	- -
	-	Verify the electrical operation of switch	-	- -
	-	Perform trip and close tests	-	- -
	-	Verify operation of the switch from local switches or terminal blocks	-	- -
5	Functional tests only for switches with shunt trip capabilities	2	2	-
6	Measure the resistance between the line and load terminal pads on each phase	NA	2	-
7	Verify operation of space heaters, if equipped	NA	2	-
8	Perform overpotential test one pole at a time with the other poles and structure grounded	NA	2A	-
9	Perform overpotential test on control wiring	NA	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
10	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	-
~~11~~	~~Perform functional tests for automatic transfer switches, bypass switches, and other transfer switch equipment~~	~~1A or 2A~~	~~1A or 2A~~	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

17.3.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The ability to reliably transfer loads between two power sources without disrupting power is critical in many applications, including healthcare, data centers, oil and gas and others. Proper maintenance of the equipment that accomplishes this transfer is important.
Although transfer switches were addressed in previous editions of NFPA 70B it appears that their content was inadvertently reduced in the 2023 edition. References to transfer switches existed in the 2019 edition of NFPA 70B in multiple locations including but not limited to 6.3.4, 9.7.2, 11.26, 12.2.1.1, 12.2.5.1, Chapter 28, Figures H.23 and H.49 and other locations.
The 2023 edition included Transfer Switches in Chapter 17; however, Transfer switches are a separate offering with unique requirements and should be addressed by a dedicated chapter.
There are a total of three related public inputs being submitted: One to remove transfer switches from Chapter 17, One to create a new Chapter 39 dedicated to Transfer Switch Equipment, and one to address maintenance intervals for Transfer Switch Equipment in Table 9.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 29-NFPA 70B-2023 [Section No. 9.2.2]	
Public Input No. 30-NFPA 70B-2023 [Global Input]	

Submitter Information Verification

Submitter Full Name: Walter Dolinski
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Street Address:
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Submittal Date: Mon Dec 11 13:06:51 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-107-NFPA 70B-2024 Item 11 was deleted. The scope change is handled under a separate revision.

Statement: A new equipment chapter for transfer switch equipment has been created as they have different scope and application to other switches.

Public Input No. 160-NFPA 70B-2023 [Section No. 17.3.1]

17.3.1 Visual Inspection.

Switches shall be visually inspected in accordance with Table 17.3.1.

Table 17.3.1 Switch Visual Inspections

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Inspect doors and latches for fit, dents, corrosion, and missing hardware	1 or 2	1 or 2	-
2	Inspect insulating materials and switch base for evidence of physical damage, cracks from stresses of operation, or contamination	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition, including corrosion	2	2	-
4	Check that ~~exposed~~ switch contacts, both moving and stationary, are free from environmental contamination	2~~NA~~	2	-
5	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	-
6	Check that fuses are secured	2	2	-
7	Examine switches with ~~exposed~~ contacts for evidence of high short-circuit closing operation	2~~NA~~	2	-
8	Check the main body of the switch blades and the arcing contacts for arc erosion	2	2	Mild pitting and burning is permitted.
9	Inspect each arc chute for cracks or excessive erosion	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The word "exposed" is used in a couple of requirements in the table. It is unclear if the term is meant to refer to switches that have no enclosure or if they are not contained in a sealed compartment and are not accessible. Removing the word "exposed" seems appropriate to requirement checking of all switch contacts. The word "exposed" could be change to "accessible" if the issue is possibly having switch contacts that are not able to be visibly inspected due to the equipment construction.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
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Submittal Date: Fri Dec 22 11:59:55 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-71-NFPA 70B-2024 Deleting the word "exposed" would expand the requirement to all switch contacts, even if they were not exposed.

Statement: Item 1 was reworded to emphasize the inspection is focused on finding improper items. Missing and unreadable labels have been added because that information can be necessary for maintenance.

Item 4 and 7 were changed to Test Type 2 because the inspection should occur on all switches.

Public Input No. 161-NFPA 70B-2023 [Section No. 17.3.1]

17.3.1 Visual Inspection.

Switches shall be visually inspected in accordance with Table 17.3.1.

Table 17.3.1 Switch Visual Inspections

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Inspect ~~doors and latches for fit, dents, corrosion, and missing hardware~~ the switch enclosure for dents, deteriorated paint, missing or unreadable labels, corrosion, missing hardware, and doors and latches for improper fit	1 or 2	1 or 2	-
2	Inspect insulating materials and switch base for evidence of physical damage, cracks from stresses of operation, or contamination	2	2	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition, including corrosion	2	2	-
4	Check that exposed switch contacts, both moving and stationary, are free from environmental contamination	2	NA	-
5	Inspect visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	-
6	Check that fuses are secured	2	2	-
7	Examine switches with exposed contacts for evidence of high short-circuit closing operation	2	NA	-
8	Check the main body of the switch blades and the arcing contacts for arc erosion	2	2	Mild pitting and burning is permitted.
9	Inspect each arc chute for cracks or excessive erosion	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

All but one of the inspection items in item 1 are "bad" things (such as "dents"). The text is modified to clearly indicate that the inspection should be looking for "improper fit" so the person doing the inspection knows that each of the inspection items is a negative item (something bad to look for.) The requirement is modified to clearly state it is the equipment enclosure that needs to be inspected for

these items. The sentence is rearranged for better readability. Requirements were added to also look for missing labels and check for bad paint condition.

Submitter Information Verification

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Street Address:
City:
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Submittal Date: Fri Dec 22 12:02:57 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-71-NFPA 70B-2024 Deleting the word "exposed" would expand the requirement to all switch contacts, even if they were not exposed.

Statement: Item 1 was reworded to emphasize the inspection is focused on finding improper items. Missing and unreadable labels have been added because that information can be necessary for maintenance.

Item 4 and 7 were changed to Test Type 2 because the inspection should occur on all switches.

Public Input No. 162-NFPA 70B-2023 [Section No. 17.3.4]

17.3.4 Mechanical Servicing.

Switches shall be mechanically serviced in accordance with Table 17.3.4.

Table 17.3.4 Switch Mechanical Servicing

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	If accessible, verify main blade alignment, penetration, travel stops, and mechanical operation	2	2	-
2	Check all accessible electrical hardware connections	2	2	See Chapter 7.
3	Operate the switch at least three times to work the lubricant between the contacts	2	NA	-
4	Verify operation and alignment of mechanical interlocks	2	2	-
5	Verify the contact pressure is within specification using a force gauge or other device that measures forces	NA	2	-
6	With the door closed and latched, close and open the switch at least three times to confirm the switch and operator lever is operating; view switch position through the window after each operation, where available; when open, verify that switch blades have cleared the arc chutes; when closed, verify that the switch blades are inside the arc chutes and vertical; if they are not, perform alignment adjustments per the manufacturer's instructions	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The requirement to operate the switch "three times" is written as restrictive as the requirement can be interpreted to not allow operating the switch more than three times. The requirement is modified to allow operation of the switch more than three times.

Submitter Information Verification

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Submittal Date: Fri Dec 22 12:06:52 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-72-NFPA 70B-2024

Statement: The phrases under Item 4 were separated into subsets 4A, 4B, 4C, and 4D to clearly show what equipment needs those tests. This is consistent with Table 11.3.4.

Tests (Task 11) specific to transfer switch equipment is deleted and revised in new equipment chapter for transfer switch equipment.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline

Public Input No. 163-NFPA 70B-2023 [Section No. 17.3.4]

17.3.4 Mechanical Servicing.

Switches shall be mechanically serviced in accordance with Table 17.3.4.

Table 17.3.4 Switch Mechanical Servicing

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	If accessible, verify main blade alignment, penetration, travel stops, and mechanical operation	2	2	-
2	Check all accessible electrical hardware connections	2	2	See Chapter 7.
3	Operate the switch three times to work the lubricant between the contacts	2	NA	-
4	Verify operation and alignment of mechanical interlocks	2	2	-
5	Verify the contact pressure is within specification using a force gauge or other device that measures forces	NA~~2~~	2A	-
6	With the door closed and latched, close and open the switch three times to confirm the switch and operator lever is operating; view switch position through the window after each operation, where available; when open, verify that switch blades have cleared the arc chutes; when closed, verify that the switch blades are inside the arc chutes and vertical; if they are not, perform alignment adjustments per the manufacturer's instructions	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 5 is an enhanced test and should be done if there is an expectation of a problem with the switch mechanism. This item is changed from a "2" to "2A" with this PI.

Submitter Information Verification

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City:
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Submittal Date: Fri Dec 22 12:10:01 EST 2023

Committee: EEM-AAA

Committee Statement

Resolution: FR-72-NFPA 70B-2024

Statement: The phrases under Item 4 were separated into subsets 4A, 4B, 4C, and 4D to clearly show what equipment needs those tests. This is consistent with Table 11.3.4.

Tests (Task 11) specific to transfer switch equipment is deleted and revised in new equipment chapter for transfer switch equipment.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline

Public Input No. 164-NFPA 70B-2023 [Section No. 17.3.5]

17.3.5* Electrical Testing.

Switches shall be electrically tested in accordance with Table 17.3.5.

Table 17.3.5 Switch Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography	1A	1	-
2	Measure contact resistance of each switching pole	2A	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with switch closed and across each open pole	2A	2	-
4	Functional tests only for switches with motor operators:	2	2	
4A	-	Verify control power for close and trip functions	-	- -
-	4B	Verify the electrical operation of switch	-	- -
-	4C	Perform trip and close tests	-	- -
-	4D	Verify operation of the switch from local switches or terminal blocks	-	- -
5	Functional tests only for switches with shunt trip capabilities	2	2	-
6	Measure the resistance between the line and load terminal pads on each phase	NA	2	-
7	Verify operation of space heaters, if equipped	NA	2	-
8	Perform overpotential test one pole at a time with the other poles and structure grounded	NA	2A	-
9	Perform overpotential test on control wiring	NA	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
10	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	-
11	Perform functional tests for automatic transfer switches, bypass switches, and other transfer switch equipment	1A or 2A	1A or 2A	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The table entry for the items included as part of line 4 are modified to show them as a subset if item 4. Without that designation it is not clear what equipment requires those tests. This matches the format of subtest items as done in Table 11.3.4.

Submitter Information Verification

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Submittal Date: Fri Dec 22 12:13:07 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-73-NFPA 70B-2024

Statement: Tests specific to transfer switch equipment is moved to a new equipment chapter for transfer switch equipment.

The phrases under Item 4 were separated into subsets 4A, 4B, 4C, and 4D to clearly show what equipment needs those tests. This is consistent with Table 11.3.4.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Public Input No. 7-NFPA 70B-2023 [Section No. 17.3.5]

17.3.5* Electrical Testing.

Switches shall be electrically tested in accordance with Table 17.3.5.

Table 17.3.5 Switch Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Greater than 1000 Volts Test Type*	Notes
1	Perform infrared thermography	1A	1	-
2	Measure contact resistance of each switching pole	2A	2	-
3	Perform insulation-resistance tests, phase-to-phase and phase-to-ground with switch closed and across each open pole	~~2A~~ 2	2	-
4	Functional tests only for switches with motor operators:	2	2	-
	-	Verify control power for close and trip functions	-	- -
	-	Verify the electrical operation of switch	-	- -
	-	Perform trip and close tests	-	- -
	-	Verify operation of the switch from local switches or terminal blocks	-	- -
5	Functional tests only for switches with shunt trip capabilities	2	2	-
6	Measure the resistance between the line and load terminal pads on each phase	NA	2	-
7	Verify operation of space heaters, if equipped	NA	2	-
8	Perform overpotential test one pole at a time with the other poles and structure grounded	NA	2A	-
9	Perform overpotential test on control wiring	NA	2A	**WARNING:** Do not perform this test on wiring connected to solid-state components.
10	Test arc reduction technology in accordance with the manufacturer's instructions	2	2	-
11	Perform functional tests for automatic transfer switches, bypass switches, and other transfer switch equipment	1A or 2A	1A or 2A	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The chart indicates that insulation resistance is an optional test where as it should be a required test. The submitter has numerous experiences where switches have failed that were not tested in a regular interval as well as a significant number of switches that were taken out of service due to low insulation resistance values measured during regular preventive maintenance tests. It is also a specified test by NETA MTS.

Submitter Information Verification

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Submittal Date: Mon Nov 27 14:04:00 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: An enhanced test is more appropriate because the conductors would have to be removed for every application.

Public Input No. 165-NFPA 70B-2023 [Section No. 18.1.1 [Excluding any Sub-Sections]]

This chapter identifies electrical maintenance requirements for power cables and conductors operating at 1000 volts or less and those that are purpose-built, multilayered, and operating at ~~over 1000 volts~~ greater than 1000 volts to less than or equal to 69 kV .

Statement of Problem and Substantiation for Public Input

The text is modified to state "greater than 1000 V" to match the language in Chapter 15. An upper limit of 69 kV was added to: 1) match Chapter 15 limit, 2) for the realization that NFPA 70B may not provide appropriate maintenance guidance for equipment operating at greater than 69 kV, and 3) there may be expected and necessary tests for this equipment at greater than 69 kV that are not included in this chapter and therefore guidance we would be providing would be incomplete.

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Submittal Date: Fri Dec 22 12:20:55 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-81-NFPA 70B-2024
Statement: The phrase "greater than 1000 volts to less than or equal to 69 kV" replaced "over 1000 volts" to be consistent with the wording in Chapter 15 and elsewhere in this standard.

Public Input No. 170-NFPA 70B-2023 [Section No. 18.3.5]

18.3.5* Electrical Testing.

Power cables and conductors shall be electrically tested in accordance with Table 18.3.5.

Table 18.3.5 Power Cable and Conductor Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Over 1000 Volts Test Type*	Notes
1	Airborne ultrasonic acoustic emissions	NA	1A	-
2	Insulation resistance	2A	NA	~~For cables and conductors 1000 volts or less.~~
3	Insulation resistance:	-	-	~~For cables and conductors over 1000 volts.~~
-	3A	Very low frequency (VLF <1 Hz)	NA	2-
3B	Overpotential test (hi-pot)	NA	2	
3C	-	Dissipation factor/tan delta	NA	2
3D	-	Partial discharge	NA	1 or 2
3E	-	Power frequency	NA	2
3F	-	Oscillating wave	NA	2 -
4	Connection quality	1 or 2	1 or 2	Millivolt drop, digital low-resistance ohmmeter, infrared thermography. Circuits tested are based on criticality of the circuit.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The notes for requirements 2 and 3 are removed as they are not needed. The markings in the Test Type columns indicate where the tests apply.

The numbers for subitems for item 3 are added to make the table easier to understand and to be consistent with the formatting used in Table 11.3.4.

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Submittal Date: Fri Dec 22 12:54:18 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-80-NFPA 70B-2024

Statement: The notes for requirements Item 2 was removed because that is covered by the test type column headings.

Terms were changed to be consistent with 7.3.2.1. The phrases under Item 3 were separated into subsets 3A, 3B, 3C, 3D, and 3E to clearly show what equipment needs those tests. This is consistent with Table 11.3.4.

Public Input No. 171-NFPA 70B-2023 [Section No. 18.3.5]

18.3.5* Electrical Testing.

Power cables and conductors shall be electrically tested in accordance with Table 18.3.5.

Table 18.3.5 Power Cable and Conductor Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Over 1000 Volts Test Type*	Notes
1	Airborne ultrasonic acoustic emissions	NA	1A	-
2	Insulation resistance	2A	NA	For cables and conductors 1000 volts or less.
3	Insulation resistance:	-	-	For cables and conductors over 1000 volts.
	-	Very low frequency (VLF <1 Hz)	NA	2
	-	~~Overpotential~~ DC overpotential test (hi-pot)	NA	2 - -
	AC insulation power factor/ Dissipation factor~~/tan delta~~	NA	2	-
	-	Partial discharge	NA	1 or 2 -
	-	Power frequency	NA	2 -
-	~~Oscillating wave~~	~~NA~~	~~2~~	-
4	Connection quality	1 or 2	1 or 2	Millivolt drop, digital low-resistance ohmmeter, infrared thermography. Circuits tested are based on criticality of the circuit.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The test names/descriptions in the table do not align with the allowed test types in 7.3.2.1. The oscillating wave test is not listed in 7.3.2.1. The table should be modified to match the test descriptions in 7.3.2.1 and/or section 7.3.2.1 needs to be modified to have better test descriptions and all the

appropriate tests. The changes proposed by this PI are not likely all of the changes that are needed but it will at least allow discussion of the issue.

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Submittal Date: Fri Dec 22 12:58:41 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-80-NFPA 70B-2024

Statement: The notes for requirements Item 2 was removed because that is covered by the test type column headings.

Terms were changed to be consistent with 7.3.2.1. The phrases under Item 3 were separated into subsets 3A, 3B, 3C, 3D, and 3E to clearly show what equipment needs those tests. This is consistent with Table 11.3.4.

Public Input No. 8-NFPA 70B-2023 [Section No. 18.3.5]

18.3.5* Electrical Testing.

Power cables and conductors shall be electrically tested in accordance with Table 18.3.5.

Table 18.3.5 Power Cable and Conductor Electrical Tests

No.	Task	1000 Volts or Less Test Type*	Over 1000 Volts Test Type*	Notes	
1	Airborne ultrasonic acoustic emissions	NA	1A	-	
2	Insulation resistance	~~2A~~ 2	NA	For cables and conductors 1000 volts or less.	
3	Insulation resistance:	-	-		For cables and conductors over 1000 volts.
	-	Very low frequency (VLF <1 Hz)	NA	2	
	-	Overpotential test (hi-pot)	NA	2	-
	-	Dissipation factor/tan delta	NA	2	-
	-	Partial discharge	NA	1 or 2	-
	-	Power frequency	NA	2	-
	-	Oscillating wave	NA	2	-
4	Connection quality	1 or 2	1 or 2	Millivolt drop, digital low-resistance ohmmeter, infrared thermography. Circuits tested are based on criticality of the circuit.	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Insulation resistance testing is THE basic test necessary to prove that LV power cables are in condition to continue in service and/or may be degraded to the point of requiring a planned replacement. This can't be considered an enhanced test especially with no other test specified.

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Submittal Date: Fri Dec 01 12:06:23 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Type 2A offline enhanced test is to allow the user to determine appropriate testing processes within the EMP and should not be changed to a Type 2 standard test.

Public Input No. 172-NFPA 70B-2023 [Section No. 19.3.1]

19.3.1 Visual Inspections.

Cable tray shall be visually inspected in accordance with Table 19.3.1.

Table 19.3.1 Cable Tray Visual Inspections

No.	Task	Test Type*	Notes
1	Verify equipment grounding and bonding for the following:	-	-
	-	Cable tray	1 or 2 -
	-	Transition raceways	1 or 2 -
2	Check for overfilling	1 or 2	-
3	Inspect for the following:	-	-
	-	Incorrect cables (small, not TC listed)	1A or 2A -
	-	Cable damage	1A or 2A -
	-	Cables support damage	1 or 2 -
	-	Intrusive items (e.g., pipes, hangers)	1 or 2 -
~~4~~	~~Inspect for the following:~~	-	-
	-	Spacing of cables, for cables that have minimum spacing requirements	1 or 2 -
	-	Cable tie-downs	1 or 2 -
-	~~Supports of cable trays~~	~~1 or 2~~	-
-	~~Damaged tray or supports~~	~~1 or 2~~	-
	-	Expansion joints in sufficient distances	1 or 2 -

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The title for requirements 3 and 4 are the same so both titles are not needed. The title for 4 was removed. The inspection needs for cable support was in both requirements 3 and 4 so one set of requirements has been deleted.

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Submittal Date: Fri Dec 22 13:04:31 EST 2023

Committee: EEM-AAA

Committee Statement

Resolution: The items in 3 and 4 are not the same other than the titles. Deleting the items in 4 would remove the requirement for cable tray support inspection.

Public Input No. 175-NFPA 70B-2023 [Section No. 21.3.2.2]

21.3.2.2 Cleaning.

If contamination is ~~found~~ present , low-voltage ground-fault protection systems shall be cleaned in accordance with Table 21.3.2.2.

Table 21.3.2.2 Low-Voltage Ground-Fault Protection System Cleaning

No.	Task	Circuit Breaker Trip Units or Switches with Integral Ground-Fault Protection Test Type*	Circuit-Breakers or Switches with External Ground-Fault Protection Test Type*	Notes
1	Clean the relay case and cover	NA	2	-
2	Clean sensors and associated ground faults protection system components	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Changing the word "found" to "present" to match the wording in 21.3.3.2.

Submitter Information Verification

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Submittal Date: Fri Dec 22 13:35:14 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-18-NFPA 70B-2024
Statement: Changing “found” to “present” provides consistency with Section 21.3.3.2.

Public Input No. 176-NFPA 70B-2023 [Section No. 21.3.3.2]

21.3.3.2 Cleaning.

If contamination is present, medium-voltage ground-fault protection systems shall be cleaned in accordance with Table 21.3.3.2.

Table 21.3.3.2 Medium-Voltage Ground-Fault Protection System Cleaning

No.	Task	Circuit Breaker Trip Units or Switches with Integral Ground-Fault Protection Test Type*	Circuit-Breakers or Switches with External Ground-Fault Protection Test Type*	Notes
1	Clean the relay case and cover	NA	2	
2	Clean sensors and associated ground-fault protection system components	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Adding a new task 1 that is copied from Table 21.3.2.2 and also appropriate for this table.

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Submittal Date: Fri Dec 22 13:36:08 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-31-NFPA 70B-2024
Statement: Adding the task “clean the relay case and cover” is consistent with language in Table 21.3.2.1 and adds clarity.

Public Input No. 177-NFPA 70B-2023 [Section No. 21.3.3.5]

21.3.3.5 Electrical Testing.

21.3.3.5.1

Medium-voltage ground-fault protection systems utilizing protection relays shall be electrically tested in accordance with Chapter 35.

21.3.3.5.2

Medium-voltage ground-fault protection systems utilizing circuit breakers with integral trip units shall verify the calibration of the trip unit ground fault functions as recommended by the trip unit manufacturer.

Statement of Problem and Substantiation for Public Input

The proposed language makes it clearer to the reader that a ground fault protection relay must be tested per the protection relay section.

Wording is added to try and address testing of ground fault protection systems that are based on an integral trip unit of a circuit breaker. The existing wording does not provide clear guidance for how to test those systems. They are not addressed in the circuit breaker chapter. The requirements in this section might be better put into a table since there is more than one requirement.

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Submittal Date: Fri Dec 22 13:40:26 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-32-NFPA 70B-2024
Statement: Adding “utilizing protective relays” adds clarity.

The addition of 21.3.3.5.2 integral trip units electrical testing provides requirements for equipment not previously addressed.

Public Input No. 180-NFPA 70B-2023 [Section No. 22.3.3]

22.3.3* Maintenance Program.

~~A maintenance program for any lighting system~~ In addition to the required inspection, servicing, and testing requirements in this chapter, the EMP shall include the following elements for lighting systems :

(1) ~~Periodic inspections~~

(2) Criteria for determining group or spot replacement options to maintain the required illuminance levels

(3) Repair and replacement strategy

(4) Assessment of illuminance levels

Statement of Problem and Substantiation for Public Input

This section had no requirement for the EMP to have a maintenance program for lighting systems. It only stated that the program (if one existed) needed to have the items listed. The requirement is changed with this PI to state that the EMP shall include a lighting system maintenance program and include the items listed. The first item listed was removed as it is already included in the chapter.

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Submittal Date: Fri Dec 22 13:59:07 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-75-NFPA 70B-2024

Statement: The maintenance program information was added to clarify the requirements for lighting maintenance.

The order of the section was changed to match standard headings in other Chapters.

Public Input No. 178-NFPA 70B-2023 [Sections 22.3.3, 22.3.4]

Sections 22.3.3, 22.3.4

22.3.3 * ~~– Maintenance Program.~~

~~A maintenance program for any lighting system shall include the following elements:~~

(1) ~~Periodic inspections~~

(2) ~~Criteria for determining group or spot replacement options to maintain the required illuminance levels~~

(3) ~~Repair and replacement strategy~~

(4) ~~Assessment of illuminance levels~~

Lubrication. (Reserved)

22.3.4

–

Mechanical Servicing.

Servicing shall include inspections of the luminaire system for the following conditions, where applicable:

(1) Aiming or orientation

(2) Pole and pole base condition

(3) Safety chains and/or supports

(4) Socket condition and luminaire mounting hardware when replacing lamps

(5) Compatibility of replacement lamps with existing luminaire

22.3.5 Electrical Testing. (Reserved)

22.3.6 Special. (Reserved)

22.3.6.1* Maintenance Program.

A maintenance program for any lighting system shall include the following elements:

(1) Periodic inspections

(2) Criteria for determining group or spot replacement options to maintain the required illuminance levels

(3) Repair and replacement strategy

(4) Assessment of illuminance levels

Statement of Problem and Substantiation for Public Input

The chapter is modified to include the standard headings used for all chapters. "Servicing" is changed to "Mechanical Servicing" to match standard headings for the content in that section. The Maintenance Program requirements are moved to the Special section, which is where that special information should be located.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 179-NFPA 70B-2023 [Section No. A.22.3.3]	
Public Input No. 179-NFPA 70B-2023 [Section No. A.22.3.3]	

Submitter Information Verification

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Submittal Date: Fri Dec 22 13:50:05 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-75-NFPA 70B-2024

Statement: The maintenance program information was added to clarify the requirements for lighting maintenance.

The order of the section was changed to match standard headings in other Chapters.

Public Input No. 216-NFPA 70B-2023 [New Section after 22.3.4]

22.3.5 Electrical Testing. (Reserved)

22.3.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

Adding the two reserved sections for consistency between equipment chapters.

Submitter Information Verification

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Submittal Date: Mon Dec 25 18:40:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-156-NFPA 70B-2024
Statement: This revision aligns the table and chapter section titles for consistency.

Public Input No. 181-NFPA 70B-2023 [Section No. 24.1]

24.1* Scope.

This chapter identifies electrical maintenance requirements for wiring devices such as receptacles and attachment plugs, pin-and-sleeve devices, heavy-duty industrial-type plugs, cord connectors, and receptacles rated not more than 600 volts.

Statement of Problem and Substantiation for Public Input

The scope is revised to clearly indicate the list of items in the scope are considered wiring devices.

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Submittal Date: Fri Dec 22 14:02:50 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-19-NFPA 70B-2024
Statement: The addition of “wiring devices such as” provides clarity.

Public Input No. 11-NFPA 70B-2023 [Section No. 24.3.4 [Excluding any Sub-Sections]]

Wiring devices shall be mechanically serviced in accordance with Table 24.3.4.

Table 24.3.~~4 Wiring Device Cleaning~~ 4 Mechanical Servicing

No.	Task	Test Type*	Notes
1	Confirm secure mating of plug and receptacle components.	2	Replace components with loose contact mating.
2	Confirm cable gland nut is secure and retains cable.	2	Tighten as needed, assuring no damage to the flexible cord jacket.
3	Confirm tightness of all wiring terminals.	2	Wiring terminal discoloration is indication of possible inadequate wire securement.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

This title is obviously incorrect and is a repeat of the previous section.

Submitter Information Verification

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Submittal Date: Fri Dec 01 12:25:29 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-45-NFPA 70B-2024

Statement: First revision corrects table title to reflect the actions are related to mechanical servicing and not cleaning methods.

Due to the possible complexity and overall number of possible plug and receptacle components in a facility, Table 24.3.4.1 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible cable gland nuts in a facility, Table 24.3.4.2 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible wiring terminals in a facility, Table 24.3.4.3 test type should be “2A” enhanced test, not “2” standard test.

Public Input No. 119-NFPA 70B-2023 [Section No. 24.3.4 [Excluding any Sub-Sections]]

Wiring devices shall be mechanically serviced in accordance with Table 24.3.4.

Table 24.3.4 Wiring Device ~~Cleaning~~ Mechanical Servicing

No.	Task	Test Type*	Notes
1	Confirm secure mating of plug and receptacle components.	2	Replace components with loose contact mating.
2	Confirm cable gland nut is secure and retains cable.	2	Tighten as needed, assuring no damage to the flexible cord jacket.
3	Confirm tightness of all wiring terminals.	2	Wiring terminal discoloration is indication of possible inadequate wire securement.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The title for the table is corrected in the proposed revision to be correct for the topic of the table.

Submitter Information Verification

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Submittal Date: Wed Dec 20 15:14:21 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-45-NFPA 70B-2024

Statement: First revision corrects table title to reflect the actions are related to mechanical servicing and not cleaning methods.

Due to the possible complexity and overall number of possible plug and receptacle components in a facility, Table 24.3.4.1 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible cable gland nuts in a facility, Table 24.3.4.2 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible wiring terminals in a facility, Table 24.3.4.3 test type should be “2A” enhanced test, not “2” standard test.

Public Input No. 182-NFPA 70B-2023 [Section No. 24.3.4 [Excluding any Sub-Sections]]

Wiring devices shall be mechanically serviced in accordance with Table 24.3.4.

Table 24.3.4 Wiring Device Cleaning

No.	Task	Test Type*	Notes
1	Confirm secure mating of plug and receptacle components.	2	Replace components with loose contact mating.
2	Confirm cable gland nut is secure and retains cable.	2	Tighten as needed, assuring no damage to the flexible cord jacket.
3	Confirm tightness of all wiring terminals.	~~2~~ 2A	Wiring terminal discoloration is indication of possible inadequate wire securement.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Facilities may have several thousand wiring devices. Inspecting the tightness of the connections on all wiring devices at a specific interval is not practical, necessary, and would leave to significant work place hazard exposures for personnel trying to perform the work. The checking of the tightness of connections should be an enhanced test, not a standard test.

Submitter Information Verification

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Submittal Date: Fri Dec 22 14:05:24 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-45-NFPA 70B-2024

Statement: First revision corrects table title to reflect the actions are related to mechanical servicing and not cleaning methods.

Due to the possible complexity and overall number of possible plug and receptacle components in a facility, Table 24.3.4.1 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible cable gland nuts in a facility, Table 24.3.4.2 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible wiring terminals in a facility, Table 24.3.4.3 test type should be “2A” enhanced test, not “2” standard test.

Public Input No. 184-NFPA 70B-2023 [Section No. 24.3.4 [Excluding any Sub-Sections]]

Wiring devices shall be mechanically serviced in accordance with Table 24.3.4.

Table 24.3.4 Wiring Device Cleaning

No.	Task	Test Type*	Notes
1	Confirm secure mating of plug and receptacle components.	~~2~~ 1A or 2A	Replace components with loose contact mating.
2	Confirm cable gland nut is secure and retains cable.	2	Tighten as needed, assuring no damage to the flexible cord jacket.
3	Confirm tightness of all wiring terminals.	2	Wiring terminal discoloration is indication of possible inadequate wire securement.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Facilities may have several thousand wiring devices. Inspecting the security of the mating of the plug and receptacle would require significant time, effort, and resources to complete for limited benefit. Changing this requirement to a "when used" requirement would be appropriate but there is not currently a method to indicate that type of frequency with the current test types except perhaps in the Note portion of the table.

The "1A" test type was added as this test can also be done with the system is energized (no need to turn off the circuit in order to plug something in to do this test.)

Submitter Information Verification

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Submittal Date: Fri Dec 22 14:10:05 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-45-NFPA 70B-2024

Statement: First revision corrects table title to reflect the actions are related to mechanical servicing and not cleaning methods.

Due to the possible complexity and overall number of possible plug and receptacle components in a facility, Table 24.3.4.1 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible cable gland nuts in a facility, Table 24.3.4.2 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible wiring terminals in a facility, Table 24.3.4.3 test type should be “2A” enhanced test, not “2” standard test.

Public Input No. 185-NFPA 70B-2023 [Section No. 24.3.4 [Excluding any Sub-Sections]]

Wiring devices shall be mechanically serviced in accordance with Table 24.3.4.

Table 24.3.4 Wiring Device Cleaning

No.	Task	Test Type*	Notes
1	Confirm secure mating of plug and receptacle components.	2	Replace components with loose contact mating.
2	Confirm cable gland nut is secure and retains cable.	~~2~~ 1A or 2A	Tighten as needed, assuring no damage to the flexible cord jacket.
3	Confirm tightness of all wiring terminals.	2	Wiring terminal discoloration is indication of possible inadequate wire securement.

*Types specified in accordance with Section 8.3, as follows: 1 = online standard test, 1A = online enhanced test, 2 = offline standard test, 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Facilities may have several thousand wiring devices that are cord connected depending on the process equipment. Inspecting the tightness of the connections on all wiring devices at any specific interval is not practical or necessary. The checking of the tightness of cable glands connections should be an enhanced test, not a standard test.

The "1A" test type was added as this test can also be done with the system is energized (no need to turn off the circuit in order to check the cable gland.)

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Submittal Date: Fri Dec 22 14:14:01 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-45-NFPA 70B-2024
Statement: First revision corrects table title to reflect the actions are related to mechanical servicing and not cleaning methods.

Due to the possible complexity and overall number of possible plug and receptacle components in a facility, Table 24.3.4.1 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible cable gland nuts in a facility, Table 24.3.4.2 test type should be both “1A” online and “2A” offline enhanced test, not “2” standard test.

Due to the possible complexity and overall number of possible wiring terminals in a facility, Table 24.3.4.3 test type should be “2A” enhanced test, not “2” standard test.

Public Input No. 187-NFPA 70B-2023 [Section No. 24.3.4.1]

24.3.4.1

Cracked, bent, missing, or broken spring doors or covers are to be replaced.

Statement of Problem and Substantiation for Public Input

Adding "missing" to clearly indicate to the reader that missing and damaged covers need to be replaced.

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Submittal Date: Fri Dec 22 14:17:37 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-51-NFPA 70B-2024
Statement: Adding the word “missing” provides the user additional guidance and clarity.

Public Input No. 217-NFPA 70B-2023 [New Section after 24.3.5]

24.3.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

Adding the reserved section for consistency between equipment chapters.

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Submittal Date: Mon Dec 25 18:42:00 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-156-NFPA 70B-2024
Statement: This revision aligns the table and chapter section titles for consistency.

Public Input No. 12-NFPA 70B-2023 [Section No. 24.3.5]

24.3.5 Electrical Testing.

Wiring devices shall be electrically tested in accordance with Table 24.3.5.

Table 24.3.5 Wiring Device Electrical Servicing

No.	Task	Test Type*	Notes
1	Confirm grounding and bonding for correct installation and secure connection	~~2A~~ 2	-
2	Confirm proper polarity of contacts	~~1A or 2A~~	-
3	Insulation Resistance Test	1 or 2	
4	Equipment ground impedance test	2	
5	Voltage Drop Test	1 or 2	
		1	

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Making these tests optional (enhanced) indicates no testing is required. Confirming grounding and bonding for correct installation and secure connection are basic for electrical devices. Likewise for confirming proper polarity of contacts. As well, Insulation Resistance Tests, Equipment ground impedance tests, and Voltage Drop Tests are also necessary to ensure that the electrical devices are properly installed and in good condition to ensure safe operation.

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Submittal Date: Fri Dec 01 12:29:45 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-46-NFPA 70B-2024 Test types 2A for grounding and bonding and 1A or 2A for polarity of contacts are retained.

Statement: First revision adds tests to clarify the need to assess wiring devices with regard to insulation resistance, grounding impedance and voltage drop. Equipment grounding impedance tests, and voltage drop tests are also necessary to ensure that the electrical devices are in good condition to ensure safe operation.

Public Input No. 189-NFPA 70B-2023 [Section No. 25.3.1]

25.3.1 Visual Inspections.

UPS shall be visually inspected in accordance with Table 25.3.1.

Table 25.3.1 UPS Visual Inspections

No.	Task	Static Test Type*	Rotary Test Type*	Notes
1	Inspect ~~doors and latches for fit,~~ the UPS enclosure for dents, ~~corrosion~~ deteriorated paint , ~~and~~ missing or unreadable labels, missing hardware, and doors and latches for improper fit	1	1	-
2	Check fans for operation	1	1	-
3	Inspect wiring, bus, cables, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition including corrosion	2	2	-
4	Inspect capacitors for swelling and discoloration	2	NA	-
5	Check visible current-carrying parts and control devices, if applicable, for signs of overheating or deterioration	2	2	-
6	Inspect rectifier and inverter assembly	2	NA	Inspect for signs of overheating or deterioration.
7	Inspect static switch module	2	NA	Inspect for signs of overheating or deterioration.
8	Inspect interface, control, I/O boards, and dc capacitor boards	2	2	Inspect for signs of overheating or deterioration.
9	For individual components, refer to the appropriate chapter(s) of this standard	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

All but one of the inspection items in item 1 are "bad" things (such as "dents"). The text is modified to clearly indicate that the inspection should be looking for "improper fit" so the person doing the inspection knows that each of the inspection items is a negative item (something bad to look for.) The requirement is modified to clearly state it is the equipment enclosure that needs to be inspected for these items. The sentence is rearranged for better readability. Requirements were added to also look for missing labels and check for bad paint condition.

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Submittal Date: Fri Dec 22 14:25:22 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-34-NFPA 70B-2024
Statement: Item 1 was modified to add clarity and address improper condition assessment visual inspection tasks with a specific focus on the UPS enclosure.

Public Input No. 190-NFPA 70B-2023 [Section No. 25.3.2]

25.3.2 Cleaning.

~~If contamination is present,~~ The UPS shall be cleaned in accordance with Table 25.3.2 to prevent a buildup of contaminants that negatively affect performance, reduce life expectancy, or create a safety hazard .

Table 25.3.2 UPS Cleaning

No.	Task	Static Test Type*	Rotary Test Type*	Notes
1	Replace the air filters and verify the vents are clear	2	2	-
2	Vacuum enclosure	2	2	-
3	Clean exposed switch contacts with a multipurpose precision lubricant before lubricating	2	2	-
4	Wipe contact surfaces with a lint-free cleaning cloth	2	2	-
5	Wipe contact surfaces with a noncorrosive cleaning agent	2	2	-
6	Clean insulators	2~~NA~~	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The text about cleaning is revised to make it match requirements in other chapters. The insulator cleaning for a rotary machine was changed from NA to 2 as rotary machines have electrical systems that may have insulators that may need cleaning.

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Submittal Date: Fri Dec 22 14:28:37 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-35-NFPA 70B-2024
Statement: The wording of 25.3.2 was modified for clarity and usability.

Item 3: Removed duplicative statement “before lubricating” for editorial clarity.

Rotary Test Type Item 6 was changed to “2” as these systems may have insulators that require cleaning.

Public Input No. 191-NFPA 70B-2023 [Section No. 25.3.2]

25.3.2 Cleaning.

If contamination is present, UPS shall be cleaned in accordance with Table 25.3.2.

Table 25.3.2 UPS Cleaning

No.	Task	Static Test Type*	Rotary Test Type*	Notes
1	Replace the air filters and verify the vents are clear	2	2	-
2	Vacuum enclosure	2	2	-
3	Clean exposed switch contacts with a multipurpose precision lubricant~~- before lubricating~~	2	2	-
4	Wipe contact surfaces with a lint-free cleaning cloth	2	2	-
5	Wipe contact surfaces with a noncorrosive cleaning agent	2	2	-
6	Clean insulators	2	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The existing language in requirement 3 does not make any sense since it requires cleaning with a lubricant before lubricating. The requirement is updated to remove the apparent redundancy, but different changes may be needed based on the actual intent of the requirement.

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Submittal Date: Fri Dec 22 14:32:41 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-35-NFPA 70B-2024
Statement: The wording of 25.3.2 was modified for clarity and usability.

Item 3: Removed duplicative statement “before lubricating” for editorial clarity.

Rotary Test Type Item 6 was changed to “2” as these systems may have insulators that

require cleaning.

Public Input No. 192-NFPA 70B-2023 [Section No. 25.3.3]

25.3.3 Lubrication.

~~Rotary-type~~ UPS shall be lubricated in accordance with Table 25.3.3.

Table 25.3.3 UPS Lubrication

No.	Task	Static Test Type*	Rotary Test Type*	Notes
1	Lubricate rotating equipment	NA	2	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The table indicates the lubrication is needed only for the rotary UPS. Therefore the "rotary type" text in the sentence is not needed.

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Submittal Date: Fri Dec 22 14:34:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Removal of the term “rotary-type” does not add clarity.

Public Input No. 193-NFPA 70B-2023 [Section No. 25.3.4]

25.3.4 Mechanical Servicing.

UPS shall be mechanically serviced in accordance with Table 25.3.4.

Table 25.3.4 UPS Mechanical Servicing

No.	Task	Static Test Type*	Rotary Test Type*	Notes
1	Verify operation and alignment of mechanical safety interlocks	2	2	-
2	Check electrical hardware connections	2	2	-
3	Perform mechanical servicing for system circuit breakers	2	2	-
4 ~~Transfer systems~~	~~2~~	~~2~~	-	
~~5~~	For individual components, refer to the appropriate chapter(s) of this standard	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 4 just states "transfer system" with no requirements. Since there are no requirements the item is not needed and is deleted with this PI. The item could remain if actual servicing requirements are added to item 4.

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Submittal Date: Fri Dec 22 14:36:01 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-36-NFPA 70B-2024
Statement: There are no identified tasks for Item 4 “transfer systems,” therefore there are no test types to be identified and item 4 is to be deleted.

Public Input No. 194-NFPA 70B-2023 [Section No. 25.3.5]

25.3.5 Electrical Testing.

UPS shall be electrically tested in accordance with Table 25.3.5.

Table 25.3.5 UPS Electrical Tests

No.	Task	Static Test Type*	Rotary Test Type*	Notes
1	Perform infrared thermography of ~~lug terminals~~ UPS	1	1	~~Conduct on annual basis.~~
2	Measure the neutral output current during peak loads	1A	1A	Conduct ~~every 3 months or~~ when new ~~equipment is~~ loads are added to the system and neutral current may be a concern.
3	Record all operating parameters, such as frequency, voltage, and current, at the bypass switch, input, output, batteries, and modules, where applicable	1	1	-
4	Test static transfer from normal to bypass and back to normal	1	1	-
5	~~Electrical~~ Test electrical interlock systems, alarms, and indicator circuits	2	2	-
6	Perform operational test on all alarms and emergency shutdowns, where applicable	2	2	-
7	For individual components, refer to the appropriate chapter(s) of this standard	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 1 states to perform an infrared inspection on the UPS "lugs" but there are more components in the UPS that a person may want to infrared, such as fuse holders. The item is revised to be a more generic infrared inspection. The annual frequency listed in the Notes is removed as that is already addressed in the maintenance intervals in Table 9.2.2.

Item 2 states the neutral current should be checked every three months. There is not a need for that check if there is not a change in load. The note is revised to remove the 3 month interval. The note is also modified to indicate to perform the test when a new load is added an a possible neutral current problem may be a concern.

Item 5 is updated to indicate that a "test" of those systems is needed to be performed.

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Submittal Date: Fri Dec 22 14:37:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-37-NFPA 70B-2024

Statement: Item 1 was changed to “UPS assembly” for clarity. The notes section of Item 1 was removed as the EMP will determine frequency.

Item 2 was modified as the EMP will determine the requirement.

Item 5 added an action word to clarify the intent of the requirement.

Public Input No. 13-NFPA 70B-2023 [Section No. 25.4]

25.4 3.6 Special Procedures.

25.4 3 .6. 1 Equipment Software Upgrades and Revisions.

Equipment software upgrades and revisions shall be performed as needed.

25.4 3 .6. 2 Load Transfer and Load Testing.

System tests shall be performed in accordance with the following:

(1) When warranted by special circumstances, such as repeated failure of a system to pass routine maintenance checks

(2) Periodically, where the desired degree of reliability justifies the procedure

25.4 3 .6. 2.1 System Test Conditions.

25.4 3 .6. 2.1.1

The UPS shall be placed under load using a load bank during the tests described in 25.4.2.

25.4 3 .6. 2.1.2

If the UPS has batteries, the batteries shall be fully charged prior to the tests described in 25.4.2.

25.4 3 .6. 2.1.3

While the tests described in 25.4.2 are conducted, critical loads shall be placed on isolation bypass, if available, or connected to another source.

25.4 3 .6. 2.1.4

Manual and automatic load transfers from UPS to bypass shall be tested.

25.4 3 .6. 2.1.5

Each module shall be individually load-tested to verify that it is functioning prior to parallel load testing.

25.4 3 .6. 2.1.6

Simultaneous input and output readings of voltage, current, and frequency shall be recorded.

25.4 3 .6. 2.1.7

The external power source shall be removed and reapplied to verify output stability.

25.4 3 .6. 2.1.8

Voltage and frequency measurements of UPS operation during load testing shall be performed.

25.4 3 .6. 2.1.9

The results of the tests described in 25.4.2 shall be recorded.

25.4 3 .6. 2.2 Output Stability.

25.4 3 .6. 2.2.1*

The load shall be adjusted in steps to determine the performance of the UPS when significant load changes occur.

25.4 3 .6. 2.2.2

The voltage regulation and frequency stability shall be within the manufacturer's specifications.

25.4 3 .6. 2.2.3 Low Battery Voltage Shutdown.

25.4 3 .6. 2.2.3.1

Where applicable, UPS ac input power shall be removed while the system is supplying 100 percent power to a load bank.

25.4 3 .6. 2.2.3.2

The elapsed time until low battery voltage shutdown occurs shall be recorded and compared with specifications.

25.4 3 .6. 2.2.3.3

Voltage, current, and frequency shall be recorded during tests.

25.4 3 .6. 2.2.3.4

Upon restoration of UPS input power, the battery shall be verified as recharging properly.

Statement of Problem and Substantiation for Public Input

Renumbering to be consistent with the format as agreed by committee. This appears to be an excursion that slipped through the cracks.

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Submittal Date: Fri Dec 01 12:38:42 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-156-NFPA 70B-2024
Statement: This revision aligns the table and chapter section titles for consistency.

Public Input No. 195-NFPA 70B-2023 [Section No. 25.4.2.2.2]

25.4.2.2.2

The voltage regulation and frequency stability shall ~~be within~~ compared to the manufacturer's specifications any deviations from those specifications shall be investigated and action taken to correct those deviations .

Statement of Problem and Substantiation for Public Input

The existing wording states the "test results" shall be within the "manufacturer's specifications". The test results may very well be outside of the manufacturer's specifications if the UPS is not working properly. We can't guarantee the test results. The requirement is modified with this PI to require comparison of the test results to the manufacturer's specifications and then fix issues that created deviations from the specifications.

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Submittal Date: Fri Dec 22 14:43:49 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-38-NFPA 70B-2024
Statement: The wording was revised to provide additional clarity.

Public Input No. 196-NFPA 70B-2023 [Section No. 25.4.2.2.3.3]

25.4.2.2.3.3

Voltage, current, and frequency shall be recorded during ~~tests~~ the test .

Statement of Problem and Substantiation for Public Input

The "tests" is changed to "the test" since this is one test being performed in this section, not multiple tests.

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Submittal Date: Fri Dec 22 14:56:24 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-39-NFPA 70B-2024
Statement: Wording was updated for clarity and editorial improvement.

Public Input No. 202-NFPA 70B-2023 [Section No. 27.3.1]

27.3.1* Visual Inspections.

Rotating equipment shall be visually inspected in accordance with Table 27.3.1.

Table 27.3.1 Rotating Equipment Visual Inspections

		Test Type*						
		Low-Voltage Machines			-	Medium-Voltage Machines		
No.	Task	≤200 hp	>200 hp	dc Machines	-	Induction	Notes	Synchronous
1	Application	~~1~~ 1A or ~~2~~ 2A ~~1~~	1A or ~~2~~ 2A ~~1~~	1A or ~~2~~ 2A	-	~~1~~ 1A or ~~2~~ 2A ~~1~~	1A or ~~2~~ 2A	Ensure the machinery is installed in accordance with the manufacturer's listing and labeling and applicable codes/standards.
2	Physical condition	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
3	Indicating device status	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
4	Labeling	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
5	Grounding/bonding	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
6	Machinery alignment	~~1~~ 1A or ~~2~~ 2A ~~1~~	1A or ~~2~~ 2A ~~1~~	1A or ~~2~~ 2A	-	~~1~~ 1A or ~~2~~ 2A ~~1~~	1A or ~~2~~ 2A	Intended where signs of misalignment exist.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 1 requires the verification that the equipment is installed per the manufacturer's listing and labeling and applicable codes/standards. This would require, for every rotating machinery installation, regardless of horsepower, that the manufacturer's information be compared to the actual installation and the location requirements. This is not necessary and would be burdensome to have to do this comparison at every maintenance cycle. Therefore, this should be changed to an enhanced test and done only if there is some reason to feel that the check is necessary.

Item 4 requires an alignment check since the test type of 1 or 2. The Note for this items indicates this alignment check should be done if there are signs of a misalignment. Therefore, this is not a "standard" test and is an "enhanced" test. Therefore, the test type should be 1A or 2A instead of 1 or 2.

Submitter Information Verification

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Submittal Date: Mon Dec 25 17:02:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-40-NFPA 70B-2024
Statement: Test types in Items 1 and 6 are not a routine tests and should be “1A and 2A.”

Actionable text was added to tasks for useability and clarity.

Public Input No. 204-NFPA 70B-2023 [Section No. 27.3.1]

27.3.1* Visual Inspections.

Rotating equipment shall be visually inspected in accordance with Table 27.3.1.

Table 27.3.1 Rotating Equipment Visual Inspections

		Test Type*						
		Low-Voltage Machines			-	Medium-Voltage Machines		
No.	Task	≤200 hp	>200 hp	dc Machines	-	Induction	Notes	Synchronous
1	~~Application~~ Check the equipment application	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	Ensure the machinery is installed in accordance with the manufacturer's listing and labeling and applicable codes/standards.
2	~~Physical condition~~ Verify the equipment physical condition does not show any deficiencies	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
3	~~Indicating~~ Observe the indicating device status to determine if it functioning properly	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
4	~~Labeling~~ Check labeling to verify its readability	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
5	~~Grounding~~ Inspection grounding /bonding systems to verify they are installed and do not show any defects	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
6	~~Machinery alignment~~ Observe the machinery alignment by looking at and listening to the equipment	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	Intended where signs of misalignment exist.

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The items in the table have no "action" associated with them. Tables for all other equipment have action statements for each item and not just a listing of items. The proposed changes are a place to start for updated item descriptions.

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Submittal Date: Mon Dec 25 17:10:28 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-40-NFPA 70B-2024
Statement: Test types in Items 1 and 6 are not a routine tests and should be “1A and 2A.”

Actionable text was added to tasks for useability and clarity.

Public Input No. 205-NFPA 70B-2023 [Section No. 27.3.4]

27.3.4* Mechanical Servicing.

Rotating equipment shall be mechanically serviced in accordance with Table 27.3.4.

Table 27.3.4 Mechanical Servicing

		Test Type*						
		Low-Voltage Machines				Medium-Voltage Machines		
No.	Task	<=200 hp	>200 hp	dc Machines		Induction	Notes	Synchronous
1	~~Integrity~~ Check the integrity of accessible bolted connections	1 or 2	1 or 2	1 or 2		1 or 2	1 or 2	
2	~~Cooling system operation, as applicable~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~		
~~3~~	~~Mechanical operation~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~		
~~4~~	~~Machine guards and assemblies~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~		
Verify the cooling system operates properly	1 or 2	1 or 2	1 or 2		1 or 2	1 or2		
3	Verify mechanical operation of the equipment	1 or 2	1 or 2	1 or 2		1 or 2	1 or 2	
4	Verify machine guards and assemblies are in installed	1 or 2	1 or 2	1 or 2		1 or 2	1 or 2	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The items in the table have no "action" associated with them. Tables for all other equipment have action statements for each item and not just a listing of items. The proposed changes are a place to start for updated item descriptions.

The "as applicable" is removed from item 2 as all of the items are "as applicable".

The items could be done while the equipment is in operation so the test type is changed to 1 or 2.

Submitter Information Verification

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Submittal Date: Mon Dec 25 17:13:53 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-41-NFPA 70B-2024
Statement: Actionable text was added to tasks for useability and clarity. Due to the complexity of the tests, the actions are enhanced tests, not standard tests.

Public Input No. 206-NFPA 70B-2023 [Section No. 27.3.5]

27.3.5* Electrical Testing.

Rotating equipment shall be electrically tested in accordance with Table 27.3.5.

Table 27.3.5 Rotating Equipment Electrical Tests

~~Current transformers~~ ~~Potential transformers~~

		Low-Voltage Machines			-	Medium-Voltage Machines		
No.	Task	≤200 hp Test Type*	>200 hp Test Type*	dc Machines Test Type*	-	Induction Test Type*	Synchronous Test Type*	Notes
1	~~Bolted~~ Test bolted connection resistance	2A	2A	2A	-	2	2	-
2	~~Stator~~ Peform stator /armature winding DAR test	2A	2A	2A	-	2	2	ac stator or d armature
3	~~Wound~~ Perform wound rotor/field winding DAR test	2A	2A	2A	-	2	2	ac wound rot synchronous rotor, dc field
4	~~Stator~~ Perform stator /armature winding polarization index (PI) test	2A	2A	2A	-	2	2	-
5	~~Wound~~ Perform wound rotor/field winding PI test	2A	2A	2A	-	2A	NA	-
6	~~Stator~~ Perform stator winding dc dielectric withstand (overpotential) test	2A	2A	2A	-	2A	2A	-
7	~~Wound~~ Perform wound rotor/field winding dc dielectric withstand (overpotential) test	2A	2A	2A	-	2A	2A	-
8	~~Stator~~ Perform stator /armature winding resistance test	2A	2A	2A	-	2	2	-
9	~~Wound~~ Perform wound rotor/field winding resistance test	2A	2A	2A	-	2	2	-
10	~~Stator~~ Perform stator winding	NA	NA	NA	-	2A	2A	Insulation po factor/dissipa

No.	Task	Low-Voltage Machines			-	Medium-Voltage Machines		Notes
		≤200 hp Test Type*	>200 hp Test Type*	dc Machines Test Type*	-	Induction Test Type*	Synchronous Test Type*	
	insulation power factor test							factor
11	~~Stator~~ Perform stator winding insulation power factor tip-up test	NA	NA	NA	-	2A	2A	Insulation pov factor/dissipa factor
12	~~Stator~~ Perform stator winding surge comparison test	2A	2A	2A	-	2A	2A	-
13	~~Insulated~~ Perform insulated bearing insulation resistance test	2A	2A	2A	-	2	2	-
14	~~Temperature~~ Perform temperature detection device test	2A	2A	2A	-	2	2	-
15	~~Machine~~ Perform machine space heater test	1 or 2	1 or 2	1 or 2	-	1 or 2	1 or 2	-
16	~~Vibration~~ Perform vibration analysis	1A	1A	1A	-	1A	1A	-
17	~~Current~~ Perform current signature analysis	1A	1A	1A	-	1A	1A	-
18	~~Partial~~ Perform partial discharge test	NA	NA	NA	-	1A	1A	-
19	~~Surge~~ Perform test on surge protection device s in the rotating equipment enclosure	2A	2A	NA	-	2	2	-
~~20~~	~~Motor starter~~	~~2~~	~~2~~	~~2~~	-	~~2~~	~~2~~	-

		Low-Voltage Machines			-	Medium-Voltage Machines		
No.	Task	≤200 hp Test Type*	>200 hp Test Type*	dc Machines Test Type*	-	Induction Test Type*	Synchronous Test Type*	Notes
~~21~~	20	Perform test of current transformers in the rotating equipment enclosure	2A	2A	NA	-	2	2
~~22~~	21	Perform test of potential transformers in the rotating equipment enclosure	2A	2A	NA	-	2	2

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

The items in the table have no "action" associated with them. Tables for all other equipment have action statements for each item and not just a listing of items. The proposed changes are a place to start for updated item descriptions.

Item 15 was changed from test type 2 to test type 1 or 2 as motor space heaters can be checked for operation while the machine is running if the right circuit design has been provided.

Item 20 was deleted as the motor starter is not inside the rotating equipment and therefore maintenance on that item should not be in the rotating equipment chapter. A separate chapter in NFPA 70B addresses motor starter maintenance.

Items 19, 21 (renumbered item 20), and 22 (renumbered item 21) have text added to indicate the surge arresters, current transformers, and instrument transformer are for equipment that is in the rotating equipment housing not somewhere else, such as in a motor starter.

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Submittal Date: Mon Dec 25 17:17:15 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-42-NFPA 70B-2024

Statement: Actionable text was added to tasks for useability and clarity. Task 20 is addressed in Chapter 28 and not required in Table 27.3.5. Machine space heater tests (task 15) can be online or offline (1 or 2).

Public Input No. 208-NFPA 70B-2023 [Section No. 28.1.1]

28.1.1

This chapter identifies electrical maintenance requirements for low-voltage ~~single- and~~ three-phase ac and dc motor control equipment and medium-voltage ~~single-~~ and three-phase motor control equipment.

Statement of Problem and Substantiation for Public Input

Single-phase low-voltage motor controllers are included in the scope. Those controllers include devices like wall mounted motor switches (specific purpose wiring devices). Most of the tests in this chapter would not be appropriate for these devices yet they are mandated since these devices are included in the scope. Either the single-phase low-voltage motor controllers should be removed from the scope or the tables in each section need to have the low-voltage test types divided into single-phase and three-phase columns with appropriate tests types listed for each.

Medium-voltage motor controllers are included in the scope. I am not aware of any single-phase medium-voltage motor controllers. Therefore, the recommendation is to remove that equipment type from the scope.

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Submittal Date: Mon Dec 25 17:38:46 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The required tests are appropriate for single-phase low voltage controllers and single-phase medium voltage motor controllers.

Public Input No. 207-NFPA 70B-2023 [Section No. 28.3.1]

28.3.1 Visual Inspections.

Motor control equipment shall be visually inspected in accordance with Table 28.3.1.

Table 28.3.1 Motor Control Equipment Visual Inspections

No.	Task	Low-Voltage Test Type*	Medium-Voltage Test Type*	Notes
1	Inspect physical and mechanical condition	1 or 2	1 or 2	-
2	Inspect anchorage and grounding	1 or 2	1 or 2	-
3	~~Physical~~ Check the physical integrity of contactors	1 or 2	1 or 2	-
4	Verify circuit breakers, fuses, and overload elements are the correct sizes and types and correspond to the drawings	2	2	EMP determines when these inspections can be done energized.
5	Verify instrument transformer ratios are correct	~~2~~ 2A ~~2~~	2A	-
6	Inspect insulators for damage, tracking, or contaminated surfaces	2	2	-
7	Verify filters are clean and in place	2	2	-
8	Ensure maintenance devices are available for servicing	NA	1	-
9	Verify switch phase barriers are in place	2	2	-
10	Verify fuse expulsion-limiting devices are in place	NA	2	-
11	For individual components and exposed conductors, refer to the appropriate chapter(s) of this standard	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 3 is changed to include an action for the task description. The test type of changed to 1 or 2 as that work can be done online or offline (offline is preferred).

Item 5 is changed to 2A as those tests are not needed to be done at each maintenance cycle unless a problem is expected. Ratios of these devices do not have a history of changing and therefore doing ratio tests each maintenance cycle are not needed.

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Submittal Date: Mon Dec 25 17:35:13 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-109-NFPA 70B-2024

Statement: Task No. 3: Wording is rearranged to provide greater clarity.

Task No. 5: Instrument transformer ratios should be inspected only if there is a suspected issue so changed to an enhanced test.

Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Public Input No. 209-NFPA 70B-2023 [Section No. 28.3.4]

28.3.4 Mechanical Servicing.

Motor control equipment shall be mechanically serviced in accordance with Table 28.3.4.

Table 28.3.4 Motor Control Equipment Mechanical Servicing

		Test Type*						
		Low-Voltage Machines				Medium-Voltage Machines		
No.	Task	≤200 hp	>200 hp	dc Machines		Induction	Notes	Synchronous
1	~~Integrity~~ Check the integrity of accessible bolted connections	2	2	2	-	2	2	-
2	~~Cooling~~ Check the cooling system operation~~, as applicable~~	2	2	2	-	2	2	-
3	~~Mechanical~~ Check the mechanical operation	2	2	2	-	2	2	-
~~4~~	~~Machine guards and assemblies~~	~~2~~	~~2~~	~~2~~	- ~~2~~	~~2~~	-	

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Action words are needed for each item so proposed actions words are added.

Machine guards and assemblies seems to be directed to the rotating equipment and not the starter. Therefore, that item is deleted.

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Submittal Date: Mon Dec 25 17:57:58 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-110-NFPA 70B-2024

Statement: Columns were consolidated for consistency with other tables in this Chapter.

Action words are added to the task text to provide clarity of the requirement.

Task No. 4: Task is deleted since machine guards and assemblies are not part of motor control equipment.

Public Input No. 210-NFPA 70B-2023 [Section No. 29.1.1]

29.1.1*

This chapter identifies electrical maintenance requirements for cord and plug connected portable electrical tools and equipment~~, both cord and plug connected and temporarily hard-wired~~ .

Statement of Problem and Substantiation for Public Input

There is no definition of temporarily wired equipment. Hard-wired equipment would be covered by other sections of NFPA 70B (such as the wiring is covered by Chapter 18. The scope is modified to include only cord and plug connected portable equipment.

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Submittal Date: Mon Dec 25 18:02:31 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-111-NFPA 70B-2024
Statement: There is no definition of “temporary hard-wired” and “hard-wired” equipment is covered in Chapter 18 (Wiring).

Public Input No. 211-NFPA 70B-2023 [Section No. 29.3.1]

29.3.1 Visual Inspection.

29.3.1.1*

Portable electrical tools and equipment shall be visually inspected before each use for the following conditions:

(1) Pinched, crushed, nicked, or frayed cord jacket

(2) Damaged plug or missing pins

(3) Damage to grounding means, such as terminals, straps, or pins

(4) Signs of loosening, fraying, or overheating of the plug, cord, or tool

(5) External casing defects, such as cracks, damaged or loose components, or missing screws

(6) Damaged or missing guards

(7) Damaged wheels or blades

(8) Signs of leaking fluids

(9) Missing cover plates

(10) Loose or frayed conductors at termination points

(11) Damaged strain relief cord connectors

29.3.1.2

If the visual inspection in 29.3.1.1 identifies defects with the tools or equipment, those tools or equipment shall be removed from service.

29.3.1.3

Portable equipment and flexible cord sets (extension cords) that remain connected once they are put in place and are not exposed to damage shall not be required to be visually inspected until they are relocated.

Statement of Problem and Substantiation for Public Input

A new requirement is added to make it clear the defective tool or equipment shall be removed from service if a defect is found.

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Submittal Date: Mon Dec 25 18:05:13 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Adding a specific recommendation to remove an item from service dependent on findings in an equipment chapter is not consistent with the rest of the NFPA 70B equipment chapters.

Public Input No. 155-NFPA 70B-2023 [Section No. 29.3.5]

29.3.5* Electrical Testing.

~~When a GFCI or an assured equipment grounding conductor program is not implemented, electrical~~ Electrical testing of portable electrical tools and equipment shall be conducted to verify the following, at a minimum:

(1) Equipment grounding from the tool or equipment to the plug ground pin

(2) Insulation resistance

(3) Correct polarity

Statement of Problem and Substantiation for Public Input

GFCI protection for personnel is a great secondary protection method but the GFCI is a mechanical device that does not fail safe, as such, it can not be depended on as the primary method of protection. Maintenance is required to ensure that the devices are properly wired, have a well connected low impedance equipment grounding conductor, and good insulation on the conductors for safe continued operation. The assured equipment grounding program is a repeat of the equipment grounding portion of the required maintenance.

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Submittal Date: Fri Dec 22 08:36:49 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: OSHA allows for the use of GFCI protection in lieu of a portable tool inspection program. There isn't a need to have a requirement that supersedes the requirements of OSHA concerning tool inspections.

Public Input No. 212-NFPA 70B-2023 [Section No. 30.2.2]

~~30.2.2~~ ~~*~~ –

~~The EMP shall identify events that trigger more frequent inspections or maintenance activities.~~

Statement of Problem and Substantiation for Public Input

The EMP already has requirements that will change the frequency of maintenance based events and maintenance activities. There is no need to list this requirement here. If this requirement is kept here, it should be added to all other equipment chapters for consistency. The annex material for this requirement is good and will be moved in a separate PI to 30.2.1.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 213-NFPA 70B-2023 [Sections A.30.2.1, A.30.2.2]	
Public Input No. 213-NFPA 70B-2023 [Sections A.30.2.1, A.30.2.2]	

Submitter Information Verification

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Submittal Date: Mon Dec 25 18:09:30 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-82-NFPA 70B-2024

Statement: This subdivision has been deleted because the requirements are already covered by Section 4.2. Annex A.30.2.2 information is amended to A.30.2.1.

Public Input No. 214-NFPA 70B-2023 [Sections 30.3, 30.4]

Sections 30.3~~, 30.4~~

30.3 ~~Documentation and Labeling.~~

~~30.3.1~~ ~~*~~ –

~~The equipment owner shall ensure that supporting documentation, including the following, is available:~~

(1) ~~System designer/installer, with installation and commissioning dates~~

(2) ~~Emergency contacts for system owner~~

(3) ~~Specifications~~

(4) ~~Electrical schematics and as-built drawings~~

(5) ~~Signage, markings, and labels~~

(6) ~~Mechanical drawings~~

(7) ~~Commissioning manual, test plan, and appropriate test results~~

(8) ~~Operations and maintenance manuals~~

(9) ~~Materials list of expendable maintenance items, such as filters and fuses~~

~~30.3.2~~ ~~*~~ –

~~A label that identifies the highest internal dc voltage shall be affixed to combiners, disconnects, and other enclosures with dc voltage.~~

~~30.4~~ – Periodic Maintenance Procedures.

30.4 3 .1* Visual Inspections.

PV systems and their associated equipment shall be visually inspected in accordance with Table 30.4.1.

Table 30.4 3 .1 PV System Visual Inspections

No.	Task	Test Type*	Notes
1	Front of PV modules	1 or 2	Damage, debris, soiling, discoloration, cracks, and broken glass.
2	Backs of PV modules	1 or 2	Damage, debris, discoloration, cracks, and tears.
3	No unintentional shading of the array	1 or 2	Foliage, weeds, trees, or structures.
4	Conductors, connectors, and wiring harnesses are secured	1 or 2	Damaged insulation, melted plastic, broken or missing wiring and raceway supports.
5	Signage, markings, and labels	1 or 2	Arc flash, shock, mechanical hazards, means of isolation location.
6	String fuses are sized in accordance with system design	1A or 2A	Array fires can be caused by improperly sized string fuses. Replacement fuses should be matched to the design criteria.
7	Ensure all electrical equipment enclosures, raceways, structures, and mechanical apparatus are secured	1 or 2	Loose connections or connectors, broken raceways, and supports, missing hardware.
8	Electrical terminations, module interconnections	1	Damage, corrosion, discoloration.
9	Tracking and mechanical systems (e.g., gearbox, drivetrain)	1 or 2	Leaking fluids, bent, broken or damaged drivetrains, array alignment.
10	Grounding and bonding	1 or 2	Secure attachment, missing, damaged or broken connections, protection from physical damage.
11	Battery cells and jumpers	1 or 2	Leaking, bulging, corrosion, fluid levels, damage, melted plastic, discoloration.
12	Roof or wall penetrations	1 or 2	Moisture, dust, and dirt ingress.
13	Site	1 or 2	Storm water runoff channels clear of debris, erosion around piers and pads, vegetation management, animal infestation/nesting/burrowing.
14	Verify required label indicating highest dc voltage label is installed on combiners, disconnects, and other enclosures with dc voltage	1 or 2	

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

30.4 3 .2* Cleaning.

The EMP shall determine when and if the installed system requires cleaning.

30.4 3 .3 Lubrication. (Reserved)

30.~~4~~ 3 .4 Mechanical Servicing.

PV systems and their associated equipment shall be mechanically serviced in accordance with Table 30.~~4~~ 3 .4.

Table 30.~~4~~ 3 .4 PV System Mechanical Servicing

No.	Task	Test Type*	Notes
1	Tracking and mechanical systems (e.g., gearbox, drivetrain)	1 or 2	Torque of bolted mechanical systems, mechanical alignment.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

30.~~4~~ 3 .5* Electrical Testing.

PV systems and their associated equipment shall be electrically tested in accordance with Table 30.~~4~~ 3 .5.

Table 30.~~4~~ 3 .5 PV System Electrical Tests

No.	Task	Test Type*	Notes
1	Electrical terminations	1 or 2	Any or all the following could be utilized: infrared thermography, contact resistance, millivolt drop, calibrated torque device.
2	Grounding and bonding	1 or 2	Any or all the following could be utilized: infrared thermography, contact resistance, fall of potential, point to point, current reading, calibrated torque device.
3	PV strings and modules	1 or 2	IV curve trace, insulation resistance, operating voltage, and current readings, electroluminescence imaging, infrared thermography.
4	Module interconnections	1	Infrared thermography.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

30.~~4~~ 3 .6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The layout of this chapter does not follow the other equipment chapters. Section 30.3 should be Periodic Maintenance Procedures. This PI corrects the chapter numbering. Any special requirements should be listed in 30.3.6.

The labeling information in 30.3.2 is moved to the visual inspection table as that is a visual inspection item and not needed to be listed separately in 30.3.2.

The documentation requirements in 30.3.1 are deleted. There are too many instances where this information is not available and would not be possible to get that information, especially as companies are bought and sold. Though the list of documentation would be nice to have and could be listed elsewhere (such as in annex material to Chapter 4), it should not be a requirement for this equipment. The same type of requirement does not exist for other equipment types up to this chapter. Requiring the information in the documentation section would make the remaining requirements in NFPA 70B for this section unnecessary so all other parts of this chapter should be deleted if the documentation information is kept in NFPA 70B.

The annex material for 30.3.1 and 30.3.2 is moved to annex material for the renumbered 30.3.1 Periodic Maintenance Procedures as the annex material is still good information.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 215-NFPA 70B-2023 [Sections A.30.3.1, A.30.3.2, A.30.4.1, A.30.4.2, A.30.4.5]	
Public Input No. 215-NFPA 70B-2023 [Sections A.30.3.1, A.30.3.2, A.30.4.1, A.30.4.2, A.30.4.5]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Mon Dec 25 18:21:25 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: PV systems are special systems that require all documentation in the list. The associated annex is not modified since the requirement is unchanged. The label required by 30.3.2 needs to be affixed if it is missing. Renumbering is addressed by a global revision.

Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]

Sections 30.3, 30.4

30.~~3~~ 4 Documentation and Labeling.

30.~~3~~ 4 .1*

The equipment owner shall ensure that supporting documentation, including the following, is available:

(1) System designer/installer, with installation and commissioning dates

(2) Emergency contacts for system owner

(3) ~~Specifications~~

(4) ~~Electrical schematics and as-built drawings~~

(5) Signage, markings, and labels

(6) ~~Mechanical drawings~~

(7) ~~Commissioning manual, test plan, and appropriate test results~~

(8) ~~Operations and maintenance manuals~~

(9) ~~Materials list of expendable maintenance items, such as filters and fuses~~

~~30.3~~ 30.4 .2*

A label that identifies the highest internal dc voltage shall be affixed to combiners, disconnects, and other enclosures with dc voltage.

30.~~4~~ 3 Periodic Maintenance Procedures.

30.~~4~~ 3 .1* Visual Inspections.

PV systems and their associated equipment shall be visually inspected in accordance with Table 30.~~4~~ 3 .1.

Table 30.~~4~~ 3 .1 PV System Visual Inspections

No.	Task	Test Type*	Notes
1	Front of PV modules	1 or 2	Damage, debris, soiling, discoloration, cracks, and broken glass.
2	Backs of PV modules	1 or 2	Damage, debris, discoloration, cracks, and tears.
3	No unintentional shading of the array	1 or 2	Foliage, weeds, trees, or structures.
4	Conductors, connectors, and wiring harnesses are secured	1 or 2	Damaged insulation, melted plastic, broken or missing wiring and raceway supports.
5	Signage, markings, and labels	1 or 2	Arc flash, shock, mechanical hazards, means of isolation location.
6	String fuses are sized in accordance with system design	1A or 2A	Array fires can be caused by improperly sized string fuses. Replacement fuses should be matched to the design criteria.
7	Ensure all electrical equipment enclosures, raceways, structures, and mechanical apparatus are secured	1 or 2	Loose connections or connectors, broken raceways, and supports, missing hardware.
8	Electrical terminations, module interconnections	1	Damage, corrosion, discoloration.
9	Tracking and mechanical systems (e.g., gearbox, drivetrain)	1 or 2	Leaking fluids, bent, broken or damaged drivetrains, array alignment.
10	Grounding and bonding	1 or 2	Secure attachment, missing, damaged or broken connections, protection from physical damage.
11	Battery cells and jumpers	1 or 2	Leaking, bulging, corrosion, fluid levels, damage, melted plastic, discoloration.
12	Roof or wall penetrations	1 or 2	Moisture, dust, and dirt ingress.
13	Site	1 or 2	Storm water runoff channels clear of debris, erosion around piers and pads, vegetation management, animal infestation/nesting/burrowing.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

30.~~4~~ 3 .2* Cleaning.

The EMP shall determine when and if the installed system requires cleaning.

30.~~4~~ 3 .3 Lubrication. (Reserved)

30.4 3 .4 Mechanical Servicing.

PV systems and their associated equipment shall be mechanically serviced in accordance with Table 30.4 3 .4.

Table 30.4 3 .4 PV System Mechanical Servicing

No.	Task	Test Type*	Notes
1	Tracking and mechanical systems (e.g., gearbox, drivetrain)	1 or 2	Torque of bolted mechanical systems, mechanical alignment.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

30.4 3 .5* Electrical Testing.

PV systems and their associated equipment shall be electrically tested in accordance with Table 30.4 3 .5.

Table 30.4 3 .5 PV System Electrical Tests

No.	Task	Test Type*	Notes
1	Electrical terminations	1 or 2	Any or all the following could be utilized: infrared thermography, contact resistance, millivolt drop, calibrated torque device.
2	Grounding and bonding	1 or 2	Any or all the following could be utilized: infrared thermography, contact resistance, fall of potential, point to point, current reading, calibrated torque device.
3	PV strings and modules	1 or 2	IV curve trace, insulation resistance, operating voltage, and current readings, electroluminescence imaging, infrared thermography.
4	Module interconnections	1	Infrared thermography.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

30.4 3 .6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The documentation requirements of this chapter can be eliminated if PI23 is accepted in Chapter 4 to cover all equipment. At the very least, this section needs to be relocated to align with the standard organization of the specific equipment chapters.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2023 [New Section after 4.4]	Needs to be done to work
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	Sister
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	Sister
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	Sister
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	

Submitter Information Verification

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Submittal Date: Sun Dec 10 11:10:05 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: No substantiation was provided to remove the listed items from this chapter.

Public Input No. 219-NFPA 70B-2023 [Section No. 31.3.1]

31.3.1* Visual Inspection and Mechanical Testing.

Wind power electric systems and associated equipment shall be visually inspected and mechanically tested in accordance with Table 31.3.1.

Table 31.3.1 Wind Power Electric Systems and Associated Equipment Visual Inspections and Mechanical Tests

No.	Task	Test Type*	Notes
1	Check towers and foundations for:	-	-
	-	Grounding and bonding	1 or 2 -
	-	Functional navigational warning lights	1 or 2 -
	-	Weather measurement devices	1 or 2 -
	-	Lightning protection	1 or 2 -
2	Check yaw systems for damage, wear, and signs of overheating	1 or 2	-
3	Check pitch systems for damage, wear, and signs of overheating	1 or 2	-
4	Check cables, terminations, and cable support systems for:	-	-
	-	Structural integrity	1 or 2 -
	-	Signs of vibration damage or abrasion	1 or 2 -
	-	Overheating	1 or 2 -
5	~~In~~ Verify in -tower emergency lighting is functioning	1	-
6	For other individual components, refer to the appropriate chapter(s) of this standard or manufacturer's instructions	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Changing the item to be an action and not just a list of an item.

Submitter Information Verification

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Submittal Date: Mon Dec 25 18:50:59 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-112-NFPA 70B-2024
Statement: Task No. 5: Action words are added to the task text to provide clarity of the requirement.

Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]

32.1.1

This chapter identifies electrical maintenance requirements

~~and applies to all~~
for all stationary batteries (SB) and battery energy storage systems (

~~ESS) having a capacity greater than 3.6 MJ (1 kWh) that could be stand-alone or interactive with other electric power production sources. These systems are primarily intended to store and provide energy during normal operating conditions~~
BESS).

Informational note: This chapter does not apply to flywheels. It does apply to flow batteries and electric double layer capacitors .

Additional Proposed Changes

File Name	Description	Approved
70B_Scope_Graphic.pdf	This demonstrates the issue with the current scope of chapters 32 and 36	

Statement of Problem and Substantiation for Public Input

There is a significant issue between the scopes of chapters 32 and 36. See attached graphic. The original intent was for chapter 36 to be only for lead-acid and NiCd standby applications. Chapter 32 was to be for all other chemistries and applications. However, several exceptions were added to the scope of 32 that created a situation where neither chapter would apply to many situations. Also, this change also clarifies the flywheels do not apply, but flow batteries and electric double layer capacitors do apply.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 255-NFPA 70B-2024 [Section No. 32.1.2]	
Public Input No. 256-NFPA 70B-2024 [Section No. 32.2]	
Public Input No. 257-NFPA 70B-2024 [Chapter 36]	
Public Input No. 258-NFPA 70B-2024 [Section No. 32.4.1]	
Public Input No. 259-NFPA 70B-2024 [Section No. 32.4.5]	
Public Input No. 255-NFPA 70B-2024 [Section No. 32.1.2]	
Public Input No. 256-NFPA 70B-2024 [Section No. 32.2]	
Public Input No. 257-NFPA 70B-2024 [Chapter 36]	
Public Input No. 258-NFPA 70B-2024 [Section No. 32.4.1]	
Public Input No. 259-NFPA 70B-2024 [Section No. 32.4.5]	

Submitter Information Verification

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Submittal Date: Tue Jan 02 16:41:02 EST 2024
Committee: EEM-AAA

Committee Statement

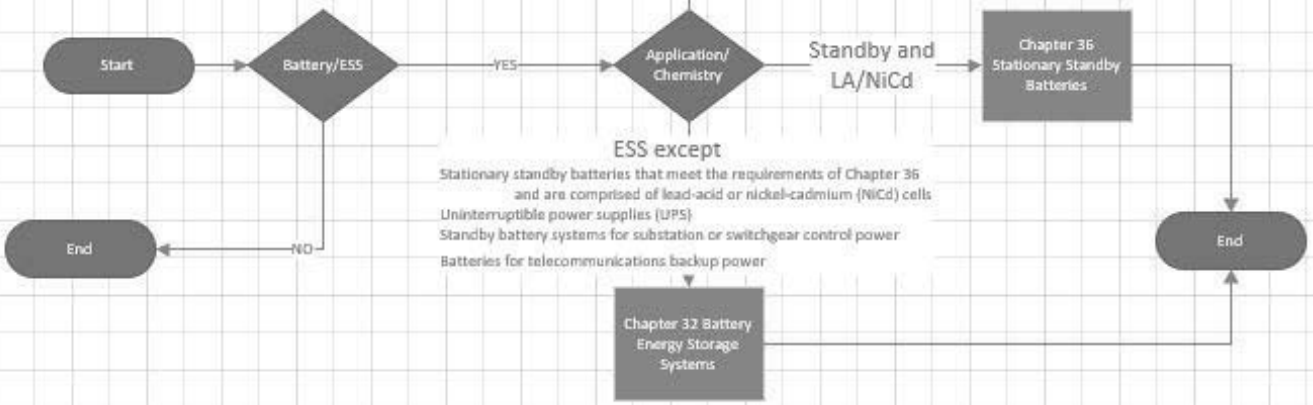
Resolution: Chapter 36 has not been incorporated into Chapter 32.

3.3.55 * Stationary Standby Battery.
A battery that spends the majority of the time on continuous float charge or in a high state of charge, in readiness for a discharge event.

A.3.3.55 Stationary Standby Battery.
Uninterruptible power supply (UPS) batteries fall under this definition.

	32	36
Li UPS	NO	NO
Solar LA (48V)	?	?
House Li	?	NO
LA Grid	YES	NO

NFPA 70B 2023



???????????????????
???????????????????

These applications non- LA or NiCd
Uninterruptible power supplies (UPS)
Standby battery systems for substation or switchgear control power
Batteries for telecommunications backup power

ESS except
Stationary standby batteries that meet the requirements of Chapter 36 and are comprised of lead-acid or nickel-cadmium (NiCd) cells
Uninterruptible power supplies (UPS)
Standby battery systems for substation or switchgear control power
Batteries for telecommunications backup power

Public Input No. 255-NFPA 70B-2024 [Section No. 32.1.2]

~~32.1.2~~ ~~*~~ –

~~This chapter does not apply to the following:~~

(1) ~~Stationary standby batteries that meet the requirements of Chapter~~ 36 ~~and are comprised of lead-acid or nickel-cadmium (NiCd) cells~~

(2) ~~Uninterruptible power supplies (UPS)~~

(3) ~~Standby battery systems for substation or switchgear control power~~

(4) ~~Batteries for telecommunications backup power~~

Statement of Problem and Substantiation for Public Input

This chapter will have the maintenance requirements for all batteries so no exceptions are needed

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 256-NFPA 70B-2024 [Section No. 32.2]	

Submitter Information Verification

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Submittal Date: Tue Jan 02 19:45:50 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Chapter 36 has not been incorporated into Chapter 32.

Public Input No. 222-NFPA 70B-2023 [Section No. 32.2]

32.2 Frequency of Maintenance.

The periodic maintenance procedures in Section 32.4 shall be performed in accordance with the frequencies in Chapter 9, unless otherwise specified in Table 32.2.

Table 32.2 Maintenance Intervals

Test to be Performed	Equipment Condition Assessment			Notes
	Condition 1	Condition 2	Condition 3	
~~Visual~~	~~12 months~~	~~12 months~~	~~1 month~~	~~When batteries are accessible, see Section 36.2 for specific battery technology and maintenance test intervals.~~
Connection resistances	12 months	12 months	1 month	-
Battery management system data and associated alarms	12 months	12 months	1 month	-
Battery performance testing	36 months	36 months	12 months	-

Statement of Problem and Substantiation for Public Input

The visual inspection frequency in this table contradicts the visual inspection listed in chapter 9 for the BESS. Either the visual frequency in this table needs to be deleted and the frequency specified in chapter 9 OR the visual inspection frequency in chapter 9 for the BESS needs to be deleted OR the visual inspection frequency in chapter for BESS needs to be updated to show the frequency in this table and the entry in this table deleted.

Submitter Information Verification

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Submittal Date: Mon Dec 25 18:57:33 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: Chapter 32 can modify the frequencies in Chapter 9 as stated in 32.2.

Public Input No. 256-NFPA 70B-2024 [Section No. 32.2]

32.2 Frequency of Maintenance.

The periodic maintenance procedures in ~~Section~~ Section 32.4 shall be performed in accordance with the frequencies in ~~Chapter~~ Chapter 9 , unless otherwise specified in Table 32.2 .1 for VLA/VRLA/aqueous alkaline chemistries (AAC) or 32.2.2 for other chemistries (OC).

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Table 32.2~~ Maintenance Intervals~~ 2.2 Maintenance Intervals for all chemistries (OC) not covered in Table 32.2.1

Test to be Performed	Equipment Condition Assessment			Notes
	Condition 1	Condition 2	Condition 3	
Visual	12 months	12 months	1 month	~~When batteries are accessible, see Section 36.2 for specific battery technology and maintenance test intervals.~~
~~Connection resistances~~	~~12 months~~	~~12 months~~	~~1 month~~	-
~~Battery management system data and associated alarms~~	~~12 months~~	~~12 months~~	~~1 month~~	-
~~Battery performance testing~~	~~36 months~~	~~36 months~~	~~12 months~~	
Electrical - all but battery performance testing	12 months	12 months	1 month	
Electrical - Battery performance testing	36 months	36 months	12 months	

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Table 32.2.1 Maintenance Intervals for all VRLA, VLA and aqueous alkaline chemistries.

Test to be performed	Conditon 1	Condition 2	Condition 3
VLA - Visual	12 months	12 months	1 months
VLA - Electrical – Cell Unit Voltages	12 months	12 months	1 month
VLA – Electrical Connections	12 months	12 months	1 month
VLA – Electrical – Performance Testing	60 months	60 months	12 months
VLA Electrical – all other items	3 months	3 months	1 month
Test to be performed	Conditon 1	Condition 2	Condition 3
VRLA - Visual	12 months	12 months	1 months
VRLA – Electrical – overall voltage and float current	1 month	1 month	1 month

VRLA – Electrical Connections	12 months	12 months	1 month
VRLA – Electrical – Performance Testing	24 months	24 months	12 months
VRLA Electrical – all other items	**3 months**	3 months	1 month

*aqueous alkaline chemistries(AAC)

Test to be performed	Conditon 1	Condition 2	Condition 3
AAC - Visual	12 months	12 months	1 months
AAC - Electrical – Cell Unit Voltages	12 months	12 months	1 month
AAC – Electrical Connections	12 months	12 months	1 month
AAC – Electrical – Performance Testing	60 months	60 months	12 months
AAC Electrical – all other items	3 months	3 months	1 month

* Ni-Cd, Ni-Zn, Ni-Fe, ZnMnO2

Statement of Problem and Substantiation for Public Input

Chapters 32 and 36 should be consolidated for ease of use. The intervals from chapter 36 are added here. The interval tables have been modified to be consistent with the categories in the chapter and consistent with the categories for the maintenance intervals in chapter 9

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 255-NFPA 70B-2024 [Section No. 32.1.2]	
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 258-NFPA 70B-2024 [Section No. 32.4.1]	
Public Input No. 259-NFPA 70B-2024 [Section No. 32.4.5]	

Submitter Information Verification

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Submittal Date: Tue Jan 02 19:52:45 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Chapter 36 has not been incorporated into Chapter 32. Proposed revision is not appropriate for Chapter 32.

Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]

Sections 32.3, 32.4

32.~~3~~ 4 Documentation.

An installed ESS shall include supporting documentation to include the following:

(1) System designer and installer with installation and commissioning dates

(2) Emergency contacts for system owner

(3) ~~Specifications~~

(4) ~~Electrical schematics and as-built drawings~~

(5) Signage, markings, and labels

(6) ~~Mechanical drawings~~

(7) ~~Commissioning manual, test plan, and appropriate test results~~

(8) ~~Operations and maintenance manuals~~

(9) Materials list of expendable maintenance items, such as filters and fuses

32.~~4~~ 3 Periodic Maintenance Procedures.

32.4 3 .1 Visual Inspections.

ESS shall be visually inspected in accordance with Table 32.4 3 .1.

Table 32.4 3 .1 Battery ESS Visual Inspections

No.	Task	Test Type*	Notes
1	Physical condition, including operating environment	1 or 2	Damage or deterioration, supports or restraints, bending radius, excessive tension, signs of overheating.
2	Correct labeling or identification	1 or 2	Phasing, cable ID, multiple sources, hazard, or other warning labels.
3	Grounding/bonding	1 or 2	Damage, missing or loose terminations, clearance from energized parts, protection from physical damage.
4	Batteries	1 or 2	Damage, leaking, swelling, discolored or melted plastic, terminal corrosion, electrolyte level, restraint systems. - - See Chapter 36 for stationary standby batteries.
5	Cables	1 or 2	Damage, deterioration, supports, bending radius, excessive tension, discoloration, or evidence of overheating.
6	Fire alarm notification, detection, and suppression systems	1 or 2	Damaged heads, physical obstruction to spray, leaking, corrosion, suppression agent is charged.
7	Raceway/cable tray	1 or 2	Damage or deterioration, cable jacket abrasion or wear when exposed, continuity, tight joints, missing or loose bonding jumpers, corrosion.
8	Barriers, guards, and assemblies	1 or 2	Damage or signs of deterioration, arcing, tracking, supports, and mounting hardware.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

32.4 3 .2 Cleaning.

Electrical equipment surfaces, enclosures, insulating materials, terminals, or terminations shall be kept in a clean and contaminant-free state.

32.4 3 .3 Lubrication. (Reserved)

32.4 3 .4 Mechanical Servicing.

The ventilation system shall be serviced to ensure that airflow is maintained in accordance with the design requirements.

32.4 3 .5 Electrical Testing.

Energy storage systems shall be electrically tested in accordance with Table 32.4 3 .5.

Table 32.4 3 .5 Battery ESS Electrical Tests

No.	Task	Test Type*	Notes
1	Infrared thermography or equivalent thermal inspection	1 or 2	Overall battery case(s) and terminations; should be performed under load.
2	Airborne ultrasonic acoustic emissions	1A	-
3	Insulation resistance	2	Cables/conductors.
4	Bolted connection resistance	1 or 2	Includes intercell resistance, when accessible.
5	Battery performance test	2	-
6	Review of battery management system data and associated alarms	1 or 2	-

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

32.4 3 .6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The documentation requirements of this chapter can be eliminated if PI23 is accepted in Chapter 4 to cover all equipment. At the very least, this section needs to be relocated to align with the standard organization of the specific equipment chapters.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2023 [New Section after 4.4]	Needs to be done to make it work
Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	sister
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	sister
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	sister
Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	

Submitter Information Verification

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Submittal Date: Sun Dec 10 11:15:56 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: No substantiation was provided to remove the listed items from this chapter.

Public Input No. 220-NFPA 70B-2023 [Sections 32.3, 32.4]

Sections 32.3, 32.4

32.3 ~~Documentation.~~

~~An installed ESS shall include supporting documentation to include the following:~~

(1) ~~System designer and installer with installation and commissioning dates~~

(2) ~~Emergency contacts for system owner~~

(3) ~~Specifications~~

(4) ~~Electrical schematics and as-built drawings~~

(5) ~~Signage, markings, and labels~~

(6) ~~Mechanical drawings~~

(7) ~~Commissioning manual, test plan, and appropriate test results~~

(8) ~~Operations and maintenance manuals~~

(9) ~~Materials list of expendable maintenance items, such as filters and fuses~~

~~**32.4**~~ – Periodic Maintenance Procedures.

32.4 3 .1 Visual Inspections.

ESS shall be visually inspected in accordance with Table 32.4 3 .1.

Table 32.4 3 .1 Battery ESS Visual Inspections

No.	Task	Test Type*	Notes
1	Physical condition, including operating environment	1 or 2	Damage or deterioration, supports or restraints, bending radius, excessive tension, signs of overheating.
2	Correct labeling or identification	1 or 2	Phasing, cable ID, multiple sources, hazard, or other warning labels.
3	Grounding/bonding	1 or 2	Damage, missing or loose terminations, clearance from energized parts, protection from physical damage.
4	Batteries	1 or 2	Damage, leaking, swelling, discolored or melted plastic, terminal corrosion, electrolyte level, restraint systems. - - See Chapter 36 for stationary standby batteries.
5	Cables	1 or 2	Damage, deterioration, supports, bending radius, excessive tension, discoloration, or evidence of overheating.
6	Fire alarm notification, detection, and suppression systems	1 or 2	Damaged heads, physical obstruction to spray, leaking, corrosion, suppression agent is charged.
7	Raceway/cable tray	1 or 2	Damage or deterioration, cable jacket abrasion or wear when exposed, continuity, tight joints, missing or loose bonding jumpers, corrosion.
8	Barriers, guards, and assemblies	1 or 2	Damage or signs of deterioration, arcing, tracking, supports, and mounting hardware.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

32.4 3 .2 Cleaning.

Electrical equipment surfaces, enclosures, insulating materials, terminals, or terminations shall be kept in a clean and contaminant-free state.

32.4 3 .3 Lubrication. (Reserved)

32.4 3 .4 Mechanical Servicing.

The ventilation system shall be serviced to ensure that airflow is maintained in accordance with the design requirements.

32.~~4~~ 3 .5 Electrical Testing.

Energy storage systems shall be electrically tested in accordance with Table 32.~~4~~ 3 .5.

Table 32.~~4~~ 3 .5 Battery ESS Electrical Tests

No.	Task	Test Type*	Notes
1	Infrared thermography or equivalent thermal inspection	1 or 2	Overall battery case(s) and terminations; should be performed under load.
2	Airborne ultrasonic acoustic emissions	1A	-
3	Insulation resistance	2	Cables/conductors.
4	Bolted connection resistance	1 or 2	Includes intercell resistance, when accessible.
5	Battery performance test	2	-
6	Review of battery management system data and associated alarms	1 or 2	-

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

32.~~4~~ 3 .6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The layout of this chapter does not follow the other equipment chapters. Section 32.3 should be Periodic Maintenance Procedures. This PI corrects the chapter numbering. Any special requirements should be listed in 32.3.6.

The documentation requirements in 32.3.1 are deleted. There are too many instances where this information is not available and would not be possible to get that information, especially as companies are bought and sold. Though the list of documentation would be nice to have and could be listed elsewhere (such as in annex material to Chapter 4), it should not be a requirement for this equipment. The same type of requirement does not exist for other equipment types up to this chapter. Requiring the information in the documentation section would make the remaining requirements in NFPA 70B for this section unnecessary so all other parts of this chapter should be deleted if the documentation information is kept in NFPA 70B.

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Submittal Date: Mon Dec 25 18:52:01 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: ESS are special systems that require all documentation in the list.

Public Input No. 258-NFPA 70B-2024 [Section No. 32.4.1]

32.4.1 Visual Inspections.

SB and ESS shall be visually inspected in accordance with Table 32.4.1.

Table 32.4.1 Battery 1 SB and ESS Visual Inspections

No.	Task	Test Type*	Notes
1	Physical condition, including operating environment	1 or 2	Damage or deterioration, supports or restraints, bending radius, excessive tension, signs of overheating.
2	Correct labeling or identification	1 or 2	Phasing, cable ID, multiple sources, hazard, or other warning labels.
3	Grounding/bonding	1 or 2	Damage, missing or loose terminations, clearance from energized parts, protection from physical damage.
4	Batteries	1 or 2	Damage Inspect containers , leaking, swelling, discolored or melted plastic, terminal corrosion, electrolyte level, restraint systems.
-	-	-	See Chapter 36 for stationary standby batteries.
covers, and vent caps for cracks and structural damage. Inspect plates and internal parts when visible (Document excessive positive plate growth, sulfate crystal formation, buckling, warping, scaling, swelling, cracking, hydration rings, excessive sedimentation, mossing, copper contamination, internal post seal cracks, and changes in color.)Inspect interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion, and discoloration. Inspect battery racks for corrosion, cleanliness, proper grounding, and structural integrity, seismic protection. Inspect electrolyte (where applicable) for containment, leaking, spills, and levels.			
5	Cables	1 or 2	Damage, deterioration, supports, bending radius, excessive tension, discoloration, or evidence of overheating.

No.	Task	Test Type*	Notes
6	Fire alarm notification, detection, and suppression systems	1 or 2	Damaged heads, physical obstruction to spray, leaking, corrosion, suppression agent is charged.
7	Raceway/cable tray	1 or 2	Damage or deterioration, cable jacket abrasion or wear when exposed, continuity, tight joints, missing or loose bonding jumpers, corrosion.
8	Barriers, guards, and assemblies	1 or 2	Damage or signs of deterioration, arcing, tracking, supports, and mounting hardware.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Added battery specific visual inspections copied from chapter 36

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 256-NFPA 70B-2024 [Section No. 32.2]	
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	

Submitter Information Verification

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Submittal Date: Tue Jan 02 21:23:14 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Chapter 36 has not been incorporated into Chapter 32. Proposed revision is not appropriate for Chapter 32.

Public Input No. 221-NFPA 70B-2023 [Section No. 32.4.2]

32.4.2 Cleaning.

Electrical equipment surfaces, enclosures, insulating materials, terminals, or terminations shall be kept ~~in a clean and contaminant-free state~~ clean to prevent a buildup of contaminants that negatively affect performance, reduce life expectancy, or create a safety hazard .

Statement of Problem and Substantiation for Public Input

Text is revised to provide more consistency between chapters concerning cleaning of equipment.

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Submittal Date: Mon Dec 25 18:55:18 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-113-NFPA 70B-2024
Statement: The language was modified to require cleaning and it is not possible to keep equipment “contaminant free” as a contaminant could be defined as dust. The language was updated to match the language used in Chapter 12.

Public Input No. 259-NFPA 70B-2024 [Section No. 32.4.5]

32.4.5 Electrical Testing.

~~Energy storage systems~~ SB and ESS shall be electrically tested in accordance with Table 32.4.5.

Table 32.4.~~5 Battery~~ 5 SB and ESS Electrical Tests

No.	Task	Test Type*	Notes
1	Infrared thermography or equivalent thermal inspection	1 or 2	Overall battery case(s) and terminations; should be performed under load.
2	Airborne ultrasonic acoustic emissions	1A	-
3	Insulation resistance	2	Cables/conductors.
4	Bolted connection resistance	1 or 2	Includes intercell resistance, when accessible.
5	Battery performance test	2	-
6	Review of battery management system data and associated alarms	1 or 2	-
7	Overall float voltage	1	Measured at the battery and verified to be in accordance with the battery manufacturer's instructions.
8	Measure cell temperature	1	
9	Ohmic testing VRLA only	1A	Resistance, impedance, or conductance.
10	Float current	1	
11	Individual cell/unit float voltage	1	Record voltage measurements on individual cells or units to two decimal places.

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*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Added electrical tests from chapter 36 that were not already present in this chapter

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 257-NFPA 70B-2024 [Chapter 36]	
Public Input No. 256-NFPA 70B-2024 [Section No. 32.2]	
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	

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Submittal Date: Tue Jan 02 21:30:19 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Chapter 36 has not been incorporated into Chapter 32. Proposed revision is not appropriate for Chapter 32.

Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]

Sections 33.3, 33.4

33.~~3~~ 4 Documentation.

33.~~3~~ 4 .1

The following electric vehicle transfer power system markings shall be maintained:

(1) Emergency contacts for system owner

(2) Signage, markings, and labels

(3) Rating or adjusted rating

(4) Identification that load management is used, if applicable

33.3~~.2~~

~~The following supporting documentation shall be available for maintenance:~~

(1) ~~Mechanical drawings (mounting and structural)~~

(2) ~~Operations and maintenance manuals~~

(3) ~~Electrical schematics and drawings~~

~~33.4~~ – Periodic Maintenance Procedures.

33.~~4~~ 3 .1 Visual Inspection.

33.4 3 .1.1

Electric vehicle power transfer system equipment shall be visually inspected in accordance with Table 33.4 3 .1.1.

Table 33.4 3 .1.1 Electric Vehicle Power Transfer System Equipment Visual Inspections

No.	Task	Test Type*	Notes
1	Inspect doors and latches for fit, dents, corrosion, and missing hardware	1 or 2	Damage or deterioration, supports or restraints.
2	Inspect wiring, bus, and connections for damaged insulation, broken leads, tightness of connections, crimping, and overall general condition including corrosion	1 or 2	Excessive tension, signs of overheating, multiple sources, hazard, or other warning labels.
3	Inspect grounding/bonding	1 or 2	Damage, missing or loose terminations, clearance from energized parts, protection from physical damage.
4	Inspect cables	1 or 2	Damage, deterioration, supports, bending radius, excessive tension, cable ID, discoloration, cable jacket abrasion or wear when exposed, or evidence of overheating.
5	Inspect raceway/cable tray	1 or 2	Damage or deterioration, cable jacket abrasion or wear when exposed, continuity, tight joints, missing or loose bonding jumpers, corrosion.
6	Inspect barriers, guards, and assemblies	1 or 2	Damage or signs of deterioration, arcing, tracking, supports and mounting hardware.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

33.4 3 .1.2

The following inspections shall be performed annually:

(1) The cord and cord connector shall be inspected to verify that the strain relief is intact, stress is not placed on the cord terminations, and the pins are not damaged.

(2) The equipment mounting shall be inspected to ensure the integrity of the mounting means.

(3) The physical protection for the equipment shall be inspected to ensure its integrity.

33.4 3 .2 Cleaning. (Reserved)

33.4 3 .3 Mechanical Servicing. (Reserved)

33.4 3 .4 Electrical Testing. (Reserved)

Statement of Problem and Substantiation for Public Input

The documentation requirements of this chapter can be eliminated if PI23 is accepted in Chapter 4 to cover all equipment. At the very least, this section needs to be relocated to align with the standard organization of the specific equipment chapters.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2023 [New Section after 4.4]	Necessary for change

Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	Sister
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	Sister
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	Sister
Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	
Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]	

Submitter Information Verification

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Submittal Date: Sun Dec 10 11:20:07 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: No substantiation was provided to remove the listed items from this chapter.

Public Input No. 225-NFPA 70B-2024 [Section No. 33.4.1.2]

33.4.1.2

The following inspections shall be performed annually:

(1) The cord and cord connector shall be inspected to verify that the strain relief is intact, stress is not placed on the cord terminations, and the pins are not damaged.

(2) The equipment mounting shall be inspected to ensure the integrity of the mounting means.

(3) The physical protection for the equipment shall be inspected to ~~ensure~~ determine its integrity.

Statement of Problem and Substantiation for Public Input

The inspection does not "ensure" the integrity of the equipment. The inspection can help "determine" the integrity. This PI revises the requirement to use better language.

Submitter Information Verification

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Submittal Date: Mon Jan 01 20:00:26 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-114-NFPA 70B-2024
Statement: The language is updated as the inspection will determine the equipment integrity.

Public Input No. 223-NFPA 70B-2023 [Sections 33.4.3, 33.4.4]

Sections 33.4.3, 33.4.4

33.4.3 – **Lubrication. (Reserved)**

33.4.4 Mechanical Servicing. (Reserved)

33.4. ~~4~~ **5** Electrical Testing. (Reserved)

33.4.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

This PI adds in the missing requirements sections. They are added for consistency between chapters.

Submitter Information Verification

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Submittal Date: Mon Dec 25 19:01:16 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-156-NFPA 70B-2024
Statement: This revision aligns the table and chapter section titles for consistency.

Public Input No. 218-NFPA 70B-2023 [Sections 34.3.2, 34.3.3]

Sections 34.3.2, 34.3.3

34.3.2 Cleaning. (Reserved)

34.3.3 Lubrication. (Reserved)

34.3.4 Mechanical ~~Inspections~~ Servicing .

Public pools, fountains, and similar installations shall be mechanically ~~inspected~~ serviced in accordance with Table 34.3.~~2~~ 4 .

Table 34.3.~~2 Public~~ 4 Public Pools, Fountains, and Similar Installation Mechanical Inspections

No.	Task	Test Type*	Notes
1	Verify operation	1 or 2	Verify accessible means for shutting off the suction and discharge piping for electrically operated pumps.
2	Wet niche pool luminaires	2	Inspect for water intrusion, damaged attachment screws or sockets, insulating wedges or similar appliances, and visible cord damage and/or modification.
3	Operating pressures	1	Verify operating pressures after operating for minimum of 15 minutes.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

34.3.~~2~~ 4 .1

Luminaires with a discolored lens or evidencing water intrusion shall be replaced.

34.3.~~2~~ 4 .2*

Luminaires with cords exhibiting physical damage, repair, or splices or that are an inconsistent type for the luminaire shall be replaced.

34.3.~~2~~ 4 .3*

Luminaires or niches with incorrect, missing, or damaged attachment screws or sockets shall be repaired or replaced.

34.3.~~2~~ 4 .4

Insulating (nonconducting) wedges or similar appliances shall be replaced with conducting wedges or similar appliances.

34.3.~~3~~ 5 Electrical Testing.

Public pools, fountains, and similar installations shall be electrically tested in accordance with Table 34.3.~~3~~ 5 .

Table 34.3.~~3 Public~~ 5 Public Pools, Fountains, and Similar Installation Electrical Tests

No.	Task	GFCI Components Test Type*	Electric Motors and Valves Test Type*	System Grounding and Bonding Test Type*	Notes
1	Test electrically operated valves	NA	1	NA	Test for correct operation.
2	For individual components, refer to the appropriate chapter(s) of this standard.	NA	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

34.3.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

Adding three reserved sections for consistency between chapters. Changing mechanical inspections to mechanical servicing for consistency between chapters.

Submitter Information Verification

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Submittal Date: Mon Dec 25 18:45:34 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-156-NFPA 70B-2024
Statement: This revision aligns the table and chapter section titles for consistency.

Public Input No. 227-NFPA 70B-2024 [Section No. 34.3.3]

34.3.3 Electrical Testing.

Public pools, fountains, and similar installations shall be electrically tested in accordance with Table 34.3.3.

Table 34.3.3 Public Pools, Fountains, and Similar Installation Electrical Tests

No.	Task	GFCI Components Test Type*	Electric Motors and Valves Test Type*	System Grounding and Bonding Test Type*	Notes
1	Test electrically operated valves for correct operation.	NA	1	NA	~~Test for correct operation.~~
2	For individual components, refer to the appropriate chapter(s) of this standard.	NA	NA	NA	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 1 of the table had a note, but that note should be part of the requirement. The text is revised to simplify the item.

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Submittal Date: Mon Jan 01 20:07:14 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-115-NFPA 70B-2024
Statement: The note should be part of the requirement.

Public Input No. 229-NFPA 70B-2024 [Section No. 35.3.1]

35.3.1 Visual Inspections.

Protective relays shall be visually inspected in accordance with Table 35.3.1.

Table 35.3.1 Protective Relay Visual Inspections

No.	Task	Electromechanical Test Type*	Solid-State Test Type*	Microprocessor Test Type*	Notes
1	Inspect case and windows for cracks and proper seal	2	2	2	-
2	Inspect current transformer shorting blocks and voltage disconnects for proper operation	2	2	2	-
3	Check for proper operation of LEDs, targets, and visual displays	2	2	2	-
4	Inspect wiring and connections for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition including corrosion	2	2	2	-
5	Inspect clearances, mechanical freedom, and condition of contacts and control springs	2	NA	NA	-
6	Inspect contact bearing clearances and freedom of movement	2	NA	NA	-
7	Check that settings are in accordance with coordination study	2	2	2	-
8	Download or document events, oscillographs, and maintenance and statistical data	NA	NA	2A	-

NA: Not applicable.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

Statement of Problem and Substantiation for Public Input

Item 2 indicates to check items but has no language about what should be checked concerning those items. The proposed language adds "what" needs to be checked for these items.

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Submittal Date: Mon Jan 01 20:12:44 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-116-NFPA 70B-2024

Statement: Some tasks were updated to “1 or 2” reflecting that the task can be performed online or offline.

Task No. 2: The revised language clarifies “what” needs to be checked for the task.

Public Input No. 257-NFPA 70B-2024 [Chapter 36]

Chapter 36 – Stationary Standby Batteries

36.1 * – Scope.

This chapter identifies electrical maintenance requirements for all stationary installations of storage stationary standby batteries comprised of lead-acid or nickel-cadmium (NiCd) cells.

36.2 – Frequency of Maintenance.

The periodic maintenance procedures in Section 36.4 shall be performed in accordance with the frequencies in Chapter 9 , unless otherwise specified in Table 36.2 .

Table 36.2 Maintenance Intervals

- - Equipment Condition Assessment - Battery Technology Test to be Performed Condition 1 Condition 2 Condition 3 Notes Vented lead-acid Overall float voltage 3 months 3 months 1 month - - Visual inspections 12 months 12 months 1 month - - Electrolyte levels 3 months 3 months 1 month - - Ambient temperature 3 months 3 months 1 month - - Float current 3 months 3 months 1 month - - Individual cell/unit float voltages 12 months 12 months 1 month - - Representative cell temperatures 3 months 3 months 1 month - - Inspect electrical connection for high resistance 12 months 12 months 1 month - - Performance testing 60 months 60 months 12 months - Valve-regulated lead-acid Overall float voltage 1 month 1 month 1 month - Visual inspections 12 months 12 months 1 month - - Ambient temperature 3 months 3 months 1 month - - Float current 1 month 1 month 1 month - - Ohmic testing 3 months 3 months 1 month - - Individual cell/unit float voltages 3 months 3 months 1 month - - Representative cell temperatures 3 months 3 months 1 month - - Inspect electrical connection for high resistance 12 months 12 months 1 month - - Performance testing 24 months 24 months 12 months - Ni-Cad Overall float voltage 3 months 3 months 1 month - - Visual inspections 12 months 12 months 1 month - - Electrolyte levels 3 months 3 months 1 month - - Ambient temperature 3 months 3 months 1 month - - Float current 3 months 3 months 1 month - - Individual cell/unit float voltages 12 months 12 months 1 month - - Representative cell temperatures 3 months 3 months 1 month - - Inspect electrical connection for high resistance 12 months 12 months 1 month - - Performance testing 60 months 60 months 12 months -

36.3 – Documentation.

36.3.1 * –

Measurements shall be recorded for future reference along with log notations of the visual inspection and corrective action.

36.3.2 –

A stationary standby battery installation shall include supporting documentation to include the following:

(1) Electrical schematics and as-built drawings

(2) Signage, markings, and labels

(3) Commissioning manual, test plan, and test results

(4) Operations and maintenance manuals

(5) Materials list of expendable maintenance items, such as filters and fuses

36.4 * – Periodic Maintenance Procedures.

36.4.1 * – Visual Inspections.

Stationary standby batteries and their associated equipment shall be visually inspected in accordance with Table 36.4.1 :

Table 36.4.1 Stationary Standby Batteries Visual Inspections

No. Task Test Type* Notes 1 Inspect containers, covers, and vent caps for cracks and structural damage 1 - 2 Inspect plates and internal parts when visible 1 Document excessive positive plate growth, sulfate crystal formation, buckling, warping, scaling, swelling, cracking, hydration rings, excessive sedimentation, mossing, copper contamination, internal post seal cracks, and changes in color. 3 Inspect interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion, and discoloration 1 - 4 Inspect battery racks for corrosion, cleanliness, proper grounding, and structural integrity, seismic protection 1 - 5 Inspect electrolyte for containment, leaking, spills, and levels 1 - 6 Inspect ventilation equipment operation, dampers, filters, alarms, and other items that might restrict air movement 1 - 7 Inspect heating and air conditioning equipment including filters that control ambient room temperature for restricted air movement 1 - 8 Verify the functionality of lights, strobes, horns, and related alarm notifications 1 -

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

36.4.2 * – Cleaning.

Terminal connectors, battery posts, and cable ends shall be checked and be cleaned to remove all corrosion and dirt.

36.4.3 – Lubrication. (Reserved)

36.4.4 – Mechanical Servicing. (Reserved)

36.4.5 * – Electrical Testing.

Stationary standby batteries and their associated equipment shall be electrically tested in accordance with Table 36.4.5 :

Table 36.4.5 Stationary Standby Battery Electrical Tests

No. Task Test Type* Notes 1 Overall float voltage 1 Measured at the battery and verified annually to be in accordance with the battery manufacturer's instructions. 2 Measure cell temperature 1 - 3 Specific gravity 1A No less than 10% of the units in the string(s). 4 Ohmic testing 1A Resistance, impedance, or conductance. 5 Inspect electrical connection for high resistance 1 or 1A See Section 7.2. 6 Performance testing 1 - 7 Thermal imaging 1 Under full load of performance testing. 8 Float current 1 - 9 Individual cell/unit float voltage 1 Record voltage measurements on individual cells or units to two decimal places.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

36.5 – Special. (Reserved)

Statement of Problem and Substantiation for Public Input

There is a significant issue between the scopes of chapters 32 and 36. The original intent was for chapter 36 to be only for lead-acid and NiCd standby applications. Chapter 32 was to be for all other chemistries and applications. However, several exceptions were added to the scope of 32 that created a situation where neither chapter would apply to many situations. For usability, all battery related maintenance requirements should be consolidated into Chapter 32.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 254-NFPA 70B-2024 [Section No. 32.1.1]	
Public Input No. 259-NFPA 70B-2024 [Section No. 32.4.5]	

Submitter Information Verification

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Submittal Date: Tue Jan 02 20:59:59 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Insufficient substantiation was provided to determine if primary and standby battery systems would require the same maintenance and testing procedures.

Public Input No. 231-NFPA 70B-2024 [Sections 36.2, 36.3, 36.4, 36.5]

Sections 36.2, 36.3, 36.4, 36.5

36.2 Frequency of Maintenance.

The periodic maintenance procedures in Section 36.~~4 shall~~ 3 shall be performed in accordance with the frequencies in Chapter 9, unless otherwise specified in Table 36.2.

Table 36.2 Maintenance Intervals

				Equipment Condition Assessment	
Battery Technology	**Test to be Performed**	**Condition 1**	**Condition 2**	**Condition 3**	**Notes**
Vented lead-acid	Overall float voltage	3 months	3 months	1 month	
	Visual inspections	12 months	12 months	1 month	
	Electrolyte levels	3 months	3 months	1 month	
	Ambient temperature	3 months	3 months	1 month	
	Float current	3 months	3 months	1 month	
	Individual cell/unit float voltages	12 months	12 months	1 month	
	Representative cell temperatures	3 months	3 months	1 month	
	Inspect electrical connection for high resistance	12 months	12 months	1 month	
	Performance testing	60 months	60 months	12 months	
Valve-regulated lead-acid	Overall float voltage	1 month	1 month	1 month	
	Visual inspections	12 months	12 months	1 month	
	Ambient temperature	3 months	3 months	1 month	
	Float current	1 month	1 month	1 month	
	Ohmic testing	3 months	3 months	1 month	
	Individual cell/unit float voltages	3 months	3 months	1 month	
	Representative cell temperatures	3 months	3 months	1 month	
	Inspect electrical connection for high resistance	12 months	12 months	1 month	
	Performance testing	24 months	24 months	12 months	
Ni-Cad	Overall float voltage	3 months	3 months	1 month	
	Visual inspections	12 months	12 months	1 month	
	Electrolyte levels	3 months	3 months	1 month	
	Ambient temperature	3 months	3 months	1 month	
	Float current	3 months	3 months	1 month	
	Individual cell/unit float voltages	12 months	12 months	1 month	
	Representative cell temperatures	3 months	3 months	1 month	
	Inspect electrical connection for high	12 months	12 months	1 month	

		-	-	Equipment Condition Assessment		-
Battery Technology	Test to be Performed	Condition 1	Condition 2	Condition 3	Notes	
		resistance				
	-	Performance testing	60 months	60 months	12 months	-

36.3

– ~~Documentation. 36.3.1~~

***** –

~~Measurements shall be recorded for future reference along with log notations of the visual inspection and corrective action.~~

~~**36.3.2** –~~

~~A stationary standby battery installation shall include supporting documentation to include the following:~~

(1) ~~Electrical schematics and as-built drawings~~

(2) ~~Signage, markings, and labels~~

(3) ~~Commissioning manual, test plan, and test results~~

(4) ~~Operations and maintenance manuals~~

(5) ~~Materials list of expendable maintenance items, such as filters and fuses~~

~~36.4 *~~ –

Periodic Maintenance Procedures.

36.

~~4~~

3 .1 * Visual Inspections.

Stationary standby batteries and their associated equipment shall be visually inspected in accordance with Table 36.

4

3 .1 .

Table 36.

4

3 .1 Stationary Standby Batteries Visual Inspections

No.	Task	Test Type*	Notes
1	Inspect containers, covers, and vent caps for cracks and structural damage	1	
2	Inspect plates and internal parts when visible	1	Document excessive positive plate growth, sulfate crystal formation, buckling, warping, scaling, swelling, cracking, hydration rings, excessive sedimentation, mossing, copper contamination, internal post seal cracks, and changes in color.
3	Inspect interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion, and discoloration	1	
4	Inspect battery racks for corrosion, cleanliness, proper grounding, and structural integrity, seismic protection		1
5	Inspect electrolyte for containment, leaking, spills, and levels		1
6	Inspect ventilation equipment operation, dampers, filters, alarms, and other items that might restrict air movement		1
7	Inspect heating and air conditioning equipment including filters that control ambient room temperature for restricted air movement		1
8	Verify the functionality of lights, strobes, horns, and related alarm notifications		1

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

36.

~~4~~

3.2* Cleaning.

Terminal connectors, battery posts, and cable ends shall be checked and be cleaned to remove all corrosion and dirt.

36.

~~4~~

3.3 Lubrication. (Reserved)

36.

~~4~~

3.4 Mechanical Servicing. (Reserved)

36.

~~4~~

3 .5 * Electrical Testing.

Stationary standby batteries and their associated equipment shall be electrically tested in accordance with Table 36.4.5 .

Table 36.4.5 Stationary Standby Battery Electrical Tests

No.	Task	Test Type*	Notes
1	Overall float voltage	1	Measured at the battery and verified annually to be in accordance with the battery manufacturer's instructions.
2	Measure cell temperature	1	
3	Specific gravity	1A	No less than 10% of the units in the string(s).
4	Ohmic testing	1A	Resistance, impedance, or conductance.
5	Inspect electrical connection for high resistance	1 or 1A	See Section 7.2.
6	Performance testing	1	
7	Thermal imaging	1	Under full load of performance testing.
8	Float current	1	
9	Individual cell/unit float voltage	1	Record voltage measurements on individual cells or units to two decimal places.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

36.

~~5~~

3.6 _ Special. (Reserved)

36.4. _ Documentation.

36.4.1 * _

Measurements shall be recorded for future reference along with log notations of the visual inspection and corrective action.

36.4.2 _

A stationary standby battery installation shall include supporting documentation to include the following:

(1) Electrical schematics and as-built drawings

(2) Signage, markings, and labels

(3) Commissioning manual, test plan, and test results

(4) Operations and maintenance manuals

(5) Materials list of expendable maintenance items, such as filters and fuse

Statement of Problem and Substantiation for Public Input

The chapter is updated to have the list of periodic maintenance procedures as arranged in other chapters. The documentation section is moved to the end of the chapter in a new section. This change better aligns the chapter with other chapters.

Submitter Information Verification

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Submittal Date: Mon Jan 01 20:22:23 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: The NFPA publishing system automatically adjusts section numbers for the addition or deletion of sections created by a first revision. A separate revision is renumbering sections of the equipment chapters.

Public Input No. 27-NFPA 70B-2023 [Sections 36.3, 36.4, 36.5]

Sections 36.3, 36.4, 36.5

36.~~3~~ 4 Documentation.

36.~~3~~ 4 .1*

Measurements shall be recorded for future reference along with log notations of the visual inspection and corrective action.

36.~~3~~ 4 .2

A stationary standby battery installation shall include supporting documentation to include the following:

(1) ~~Electrical schematics and as-built drawings~~

(2) Signage, markings, and labels

(3) ~~Commissioning manual, test plan, and test results~~

(4) ~~Operations and maintenance manuals~~

(5) ~~Materials list of expendable maintenance items, such as filters and fuses~~

36.~~4~~ 3 * Periodic Maintenance Procedures.

36.~~4~~ 3 .1* Visual Inspections.

Stationary standby batteries and their associated equipment shall be visually inspected in accordance with Table 36.~~4~~ 2 .1.

Table 36.~~4~~ 3 .1 Stationary Standby Batteries Visual Inspections

No.	Task	Test Type*	Notes
1	Inspect containers, covers, and vent caps for cracks and structural damage	1	-
2	Inspect plates and internal parts when visible	1	Document excessive positive plate growth, sulfate crystal formation, buckling, warping, scaling, swelling, cracking, hydration rings, excessive sedimentation, mossing, copper contamination, internal post seal cracks, and changes in color.
3	Inspect interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion, and discoloration	1	-
4	Inspect battery racks for corrosion, cleanliness, proper grounding, and structural integrity, seismic protection	1	-
5	Inspect electrolyte for containment, leaking, spills, and levels	1	-
6	Inspect ventilation equipment operation, dampers, filters, alarms, and other items that might restrict air movement	1	-
7	Inspect heating and air conditioning equipment including filters that control ambient room temperature for restricted air movement	1	-
8	Verify the functionality of lights, strobes, horns, and related alarm notifications	1	-

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

36.~~4~~ 3 .2* Cleaning.

Terminal connectors, battery posts, and cable ends shall be checked and be cleaned to remove all corrosion and dirt.

36.~~4~~ 3 .3 Lubrication. (Reserved)

36.~~4~~ 3 .4 Mechanical Servicing. (Reserved)

36.4 3 .5* Electrical Testing.

Stationary standby batteries and their associated equipment shall be electrically tested in accordance with Table 36.4.5.

Table 36.4 3 .5 Stationary Standby Battery Electrical Tests

No.	Task	Test Type*	Notes
1	Overall float voltage	1	Measured at the battery and verified annually to be in accordance with the battery manufacturer's instructions.
2	Measure cell temperature	1	-
3	Specific gravity	1A	No less than 10% of the units in the string(s).
4	Ohmic testing	1A	Resistance, impedance, or conductance.
5	Inspect electrical connection for high resistance	1 or 1A	See Section 7.2.
6	Performance testing	1	-
7	Thermal imaging	1	Under full load of performance testing.
8	Float current	1	-
9	Individual cell/unit float voltage	1	Record voltage measurements on individual cells or units to two decimal places.

*Types specified in accordance with Section 8.3, as follows: Type 1 = online standard test; Type 1A = online enhanced test; Type 2 = offline standard test; Type 2A = offline enhanced test.

36.5 3.6 Special. (Reserved)

Statement of Problem and Substantiation for Public Input

The documentation requirements of this chapter can be eliminated if PI23 is accepted in Chapter 4 to cover all equipment. At the very least, this section needs to be relocated to align with the standard organization of the specific equipment chapters.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2023 [New Section after 4.4]	Necessary for PI to not lose info
Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	Sister
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	Sister
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	Sister
Public Input No. 24-NFPA 70B-2023 [Sections 30.3, 30.4]	
Public Input No. 25-NFPA 70B-2023 [Sections 32.3, 32.4]	
Public Input No. 26-NFPA 70B-2023 [Sections 33.3, 33.4]	

Submitter Information Verification

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Submittal Date: Sun Dec 10 11:25:13 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: No substantiation was provided to remove the listed items from this chapter.

Public Input No. 230-NFPA 70B-2024 [Section No. 36.3.2]

~~36.3.2~~ –

~~A stationary standby battery installation shall include supporting documentation to include the following:~~

(1) ~~Electrical schematics and as-built drawings~~

(2) ~~Signage, markings, and labels~~

(3) ~~Commissioning manual, test plan, and test results~~

(4) ~~Operations and maintenance manuals~~

(5) ~~Materials list of expendable maintenance items, such as filters and fuses~~

Statement of Problem and Substantiation for Public Input

The documentation requirements in 36.3.2 are deleted. There are too many instances where this information is not available and would not be possible to get that information, especially as companies are bought and sold. Though the list of documentation would be nice to have and could be listed elsewhere (such as in annex material to Chapter 4), it should not be a requirement for this equipment. The same type of requirement does not exist for other equipment types. Requiring the information in the documentation section would make the remaining requirements in NFPA 70B for this section unnecessary so all other parts of this chapter should be deleted if the documentation information is kept in NFPA 70B.

Submitter Information Verification

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Submittal Date: Mon Jan 01 20:19:27 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: Battery systems are special systems that require all documentation in the list.

Public Input No. 260-NFPA 70B-2024 [New Section after 36.5]

New Chapter after Chapter 38

Chapter 39 Cybersecurity

39.1 Cybersecurity Provisions.

39.1.1

Where required by governing laws, codes, or standards, or other parts of this Code, ongoing cybersecurity evaluation shall be provided in accordance with Chapter 39 for equipment software, system support tools, , physical security of and access to equipment, data pathways, testing, and maintenance.

39.1.2

Minimum cybersecurity level shall be required for systems that meet any of the following conditions:

(1) Network connectable equipment

(2) Uploadable software configuration or firmware

(3) Locally configurable equipment via a software interface

39.2 Network Connectable Equipment Software Development and Production Environments.

Development and production environments used to develop and manufacture network connectable equipment shall employ cybersecurity safeguards that are consistent with one or more of the following:

(1) NIST's"Framework for Improving Critical Infrastucture Cybersecurity"

(2) ISO/IEC 27001,Information security management systems

(3) IASME Consortium Cyber Essentials

(4) Other equivalent standards acceptable to a qualified testing laboratory

(5) *Other applicable laws and regulations

39.3 Security Levels for Network Connectable Equipment.

All interfaces used to communicate with network connectable equipment shall be protected using the following minimum security levels:

(1) For non-internet-facing wired interfaces that do not employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 1 or CAN/UL 2900-2-3 Security Level 1 or a comparable level associated with Section 39.2(4)

(2) For all cellular, Bluetooth, wireless interfaces, and other accessible interfaces that do not employ internet protocol, IEC 62443-4-2/3-3 Security Level 2 or CAN/UL 2900-2-3 Security Level 2 or a comparable level associated with Section 39.2(4)

(3) For all non-internet-facing wired interfaces and those non-internet-facing wireless interfaces that employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 2 or CAN/UL 2900-2-3 Security Level 2 or a comparable level associated with Section 39.2(4)

(4) For all wired or wireless internet- facing interfaces or publicly accessible networks, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 3 or CAN/UL 2900-2-3 Security Level 3 or a comparable level associated with Section 39.2(4)

39.6 Unused Physical Data Ports.

All unused physical data ports shall be protected in at least one of the following ways:

(1) Physically protected from unauthorized access

(2) Administratively disabled

(3) Configured to require a token-based authentication, certificate-based authentication, password, or other method that is consistent with the security requirements of the system

39.7 Data Connections to External Networks.

When any data connection is made from the system to an external network, the connection shall be protected and monitored by a gateway, firewall, or similar security function that ensures that only trusted traffic is allowed.

39.8 Network Connectable Equipment Cybersecurity Software Updates.

39.8.1

The equipment manufacturer(s) shall do the following continuously as part of their business operations until the equipment is no longer supported by the manufacturer:

(1) Address vulnerabilities in their products

(2) Determine if a software update is required to maintain the cybersecurity level achieved in compliance with Section 39.2 and release it it a timely manner

39.8.2

The system installer shall provide the name and contact information of the system owner or their representative to the equipment manufacturer(s) at the time of installation.

39.8.3

The equipment manufacturer(s) shall notify the system owner or their representative of all required software security updates required to maintain the cybersecurity level achieved in compliance with Sections 39.2 and 39.3..

39.8.4

Software for devices shall be maintained by installing software security updates within 15 days of notification as required by the equipment manufacturer(s) to maintain the cybersecurity level achieved in compliance with Sections 39.2 and39.3.. High risk vulnerabilities, such as zero-day exploits, should be addressed as soon as possible.

39.8.7

Cybersecurity software changes to systems or system components shall be permitted to be made by remote access.

39.9 Notification of Termination of Cybersecurity Update Support.

The manufacturer shall notify the system owner or their representative of the termination of cybersecurity software update support required by Section 39.8 for any element of the system.

39.10 Cybersecurity for System Support Tools.

A system support tool and the support tool interfaces shall comply with the requirements of Sections 39.2 through 39.9.

39.11 Evidence of Compliance.

39.11.1

Evidence of cybersecurity compliance shall include one or more of the following:

(1) Certification of compliance by a qualified testing laboratory

(2) Manufacturer certification for the specific type and brand of system provided by the manufacturer

(3) An assessment or certification program acceptable to the authority having jurisdiction

39.11.2

The validity of cybersecurity certifications shall be verified annually.

39.11.3

The validity of the equipment manufacturer's contact information for the system owner shall be verified annually.

39.12 Documentation.

The standards used and security levels employed in complying with Chapter 39 shall be documented.

Additional Proposed Changes

File Name	Description	Approved
NFPA_70B_Cybersecurity_Chapter_Differences_from_NFPA_72_Second_Draft_-_2023-01-04_with_Substantiation.pdf	PDF Copy of redline showing changes from NFPA 72 Second Draft	
NFPA_70B_Cybersecurity_Chapter_Differences_from_NFPA_72_Second_Draft_-_2023-01-04_with_Substantiation.docx	Word DOCX Copy of redline showing changes from NFPA 72 Second Draft	

Statement of Problem and Substantiation for Public Input

Significant attention to Cybersecurity arose during the 2023 NEC cycle and continues into the 2026 NEC cycle. While some requirements were added to the 2023 NEC, it was observed during the code cycle that cybersecurity is characterized by cybersecurity experts as primarily a maintenance concern. Relatively little can be done at the time of installation to establish proper cybersecurity, and the critical tasks associated with cybersecurity must be carried out on a continuous, ongoing basis to be effective. The Standards Council declined to charter a dedicated cybersecurity document (NPFA 70C was proposed). In response, I am submitting this public input to provide cybersecurity guidance for electrical equipment in NFPA 70B.

NEC 72 is in its Second Draft and has had significant consensus arise around a set of cybersecurity requirements appropriate for Fire Alarm systems. This is much simpler to accomplish in NFPA 72 as it is a combined installation and maintenance standard. Chapter 11 of that document serves as the basis of this Public Input but is modified to remove installation requirements as well as other requirements that are not appropriate for Electrical Equipment covered by NFPA 70B.

The submission includes a red-line document showing the changes from the NFPA 72 Second Draft. Cisco is a leader in the cybersecurity field and the changes suggested reflect multiple perspectives on how to best adapt NFPA 72's consensus requirements to NFPA 70B.

The majority of deletions are due to requirements being related to installation practice, or being specific to fire alarm systems and thus not applicable. Other concerns were raised more generally, which I will summarize briefly:

- Cybersecurity is not a tangible thing that can be provided, it is a series of best practices and regular evaluations that knowledgeable personnel must execute on an ongoing basis.
- Proper cybersecurity practice extends beyond networked devices to software configurable equipment that relies on a user interface, and simply being disconnected from a network is not adequate to protect against malicious actors.
- It is essential to monitor systems for cybersecurity concerns, not simply deploy firewalls and then ignore their status reports.
- Gateways and firewalls are increasingly built into equipment as a function and not a stand-alone

device.

- Cybersecurity threats cannot be scheduled, so any language suggesting action at regular intervals is not effective. Instead, product vendors must remain continuously vigilant in responding to vulnerabilities that are discovered in their systems and provide updates to mitigate them in a timely manner.
- Consumers of these products must respond to notifications of vulnerabilities and suggested mitigations within well-defined timeframes to maintain a secure system.

Submitter Information Verification

Submitter Full Name: Jason Potterf
Organization: Cisco
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Street Address:
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Submittal Date: Thu Jan 04 13:36:09 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: The proposed requirements are overly broad, and some are more appropriate for installation requirements. Not all equipment needs to consider cybersecurity.

NFPA 70B Chapter 39 Cybersecurity Public Input

Substantiation:

Significant attention to Cybersecurity arose during the 2023 NEC cycle and continues into the 2026 NEC cycle. While some requirements were added to the 2023 NEC, it was observed during the code cycle that cybersecurity is characterized by cybersecurity experts as primarily a maintenance concern. Relatively little can be done at the time of installation to establish proper cybersecurity, and the critical tasks associated with cybersecurity must be carried out on a continuous, ongoing basis to be effective. The Standards Council declined to charter a dedicated cybersecurity document (NPFA 70C was proposed). In response, I am submitting this public input to provide cybersecurity guidance for electrical equipment in NFPA 70B.

NEC 72 is in its Second Draft and has had significant consensus arise around a set of cybersecurity requirements appropriate for Fire Alarm systems. This is much simpler to accomplish in NFPA 72 as it is a combined installation and maintenance standard. Chapter 11 of that document serves as the basis of this Public Input but is modified to remove installation requirements as well as other requirements that are not appropriate for Electrical Equipment covered by NFPA 70B.

The submission includes a red-line document showing the changes from the NFPA 72 Second Draft. Cisco is a leader in the cybersecurity field and the changes suggested reflect multiple perspectives on how to best adapt NFPA 72's consensus requirements to NFPA 70B.

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- Cybersecurity is not a tangible thing that can be provided, it is a series of best practices and regular evaluations that knowledgeable personnel must execute on an ongoing basis.
- Proper cybersecurity practice extends beyond networked devices to software configurable equipment that relies on a user interface, and simply being disconnected from a network is not adequate to protect against malicious actors.
- It is essential to monitor systems for cybersecurity concerns, not simply deploy firewalls and then ignore their status reports.
- Gateways and firewalls are increasingly built into equipment as a function and not a stand-alone device.
- Cybersecurity threats cannot be scheduled, so any language suggesting action at regular intervals is not effective. Instead, product vendors must remain continuously vigilant in responding to vulnerabilities that are discovered in their systems and provide updates to mitigate them in a timely manner.
- Consumers of these products must respond to notifications of vulnerabilities and suggested mitigations within well-defined timeframes to maintain a secure system.

Chapter 39~~11~~ Cybersecurity

~~11.~~39.1 Cybersecurity Provisions.

~~11.~~39.1.1*

Where required by governing laws, codes, or standards, or other parts of this Code, ongoing cybersecurity evaluation shall be provided in accordance with Chapter ~~11~~ 39 for equipment software, system support tools, ~~installation methods~~, physical security of and access to equipment, data pathways, testing, and maintenance.

~~11.~~39.1.2*

~~No m~~Minimum cybersecurity level shall be required for systems that meet ~~both~~ any of the following conditions:

1. No network Network connectable equipment

2.

2. No uUploadable software configuration or firmware
3. Locally configurable equipment via a software interface

SR-5079Show Deleted

11.39.2* Network Connectable Equipment Software Development and Production Environments.

Development and production environments used to develop and manufacture network connectable equipment shall employ cybersecurity safeguards that are consistent with one or more of the following:

1. NIST's"Framework for Improving Critical Infrastucture Cybersecurity"
2. ISO/IEC 27001,*Information security management systems*
3. IASME Consortium Cyber Essentials
4. Other equivalent standards acceptable to a nationally recognizedqualified testing laboratory
5. *Other applicable laws and regulations

SR-5081Show Deleted

11.39.3* Security Levels for Network Connectable Equipment.

All interfaces used to communicate with network connectable equipment shall be protected using the following minimum security levels:

1. For non-internet-facing wired interfaces that do not employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 1 or CAN/UL 2900-2-3 Security Level 1 or a comparable level associated with Section 11.39.2(4)
2. For all cellular, Bluetooth, wireless interfaces, and other accessible interfaces that do not employ internet protocol, IEC 62443-4-2/3-3 Security Level 2 or CAN/UL 2900-2-3 Security Level 2 or a comparable level associated with Section 11.39.2(4)
3. For all non-internet-facing wired interfaces and those non-internet-facing wireless interfaces that employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 2 or CAN/UL 2900-2-3 Security Level 2 or a comparable level associated with Section 11.39.2(4)
4. For all wired or wireless internet- facing interfaces or publicly accessible networks, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 3 or CAN/UL 2900-2-3 Security Level 3 or a comparable level associated with Section 11.39.2(4)

11.4* Interconnecting Conductors, Cables, or Other Physical Pathways.

Interconnecting conductors, cables, or other physical pathways for use in Security Level 2 or higher applications in locations accessible to the public shall be protected by metal raceways or metal armored cables.

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11.5 Network Connectable Equipment Using Shared Pathways.

11.5.1

Network connectable equipment using the security levels required by Section 11.3(2) through Section 11.3(4) shall comply with 23.6.3.3 through 23.6.3.5 and 7.6.7.

11.5.2

~~Network connectable equipment using Shared Pathway Level 0, Shared Pathway Level 1, or Shared Pathway Level 2 shall comply with 23.6.3.3 through 23.6.3.5 and 7.6.7.~~

~~SR-5154Show Deleted~~

~~11.~~39.6 Unused Physical Data Ports.

All unused physical data ports shall be protected in at least one of the following ways:

1. Physically protected from unauthorized access
2. Administratively disabled
3. Configured to require a token-based authentication, certificate-based authentication, password, or other method that is consistent with the security requirements of the system

~~11.~~39.7* Data Connections to External Networks.

When any data connection is made from the system to an external network, the connection shall be protected and monitored by a gateway~~, or~~ firewall, or similar security function that ensures that only trusted traffic is allowed~~ to pass~~.

~~Detail SR-5095~~

~~11.~~39.8 Network Connectable Equipment Cybersecurity Software Updates.

~~11.~~39.8.1

~~At least quarterly, t~~The equipment manufacturer(s) shall do the following continuously as part of their business operations until the equipment is no longer supported by the manufacturer:

1. Address vulnerabilities in their products~~Evaluate all relevant cybersecurity threats~~
2. Determine if a software update is required to maintain the cybersecurity level achieved in compliance with Section ~~11.~~39.2 and release it it a timely manner

~~11.~~39.8.2

The system installer shall provide the name and contact information of the system owner or their representative to the equipment manufacturer(s) at the time of ~~system acceptance testing~~installation.

~~11.~~39.8.3*

The equipment manufacturer(s) shall notify the system owner or their representative of all required software security updates required to maintain the cybersecurity level achieved in compliance with Sections ~~11.~~39.2 and ~~, 11.~~39.3~~., and 11.4~~.

~~11.~~39.8.4

Software for ~~network connectable~~ devices shall be maintained by installing software security updates within 15 days of notification as required by the equipment manufacturer(s) to maintain the cybersecurity level achieved in compliance with Sections ~~11.~~39.2 and~~, 11.~~39.3~~., and 11.4~~. High risk vulnerabilities, such as zero-day exploits, should be addressed as soon as possible.

~~**11.8.5**~~

~~Software security updates that are deemed necessary by the equipment manufacturer(s) for compliance with Section 11.3 shall be installed at least annually.~~

~~SR-5086Show Deleted~~

~~**11.8.6**~~

~~Cybersecurity software updates applied to gateways or firewalls that do not affect the system site-specific or system executive software shall not be required to comply with 14.4.2.~~

~~SR-5087Show Deleted~~

~~11.~~39.8.7

Cybersecurity software changes to systems or system components shall be permitted to be made by remote access ~~in accordance with 23.8.2.11.3~~.

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~~11.~~39.9 Notification of Termination of Cybersecurity Update Support.

The manufacturer shall notify the system owner or their representative of the termination of cybersecurity software update support required by Section ~~11.~~39.8 for any element of the system.

~~11.~~39.10 Cybersecurity for System Support Tools.

A system support tool and the support tool interfaces shall comply with the requirements of Sections ~~11.~~39.2 through ~~11.~~39.9.

39~~11~~.11 Evidence of Compliance.

39~~11~~.11~~11.~~.1

Evidence of cybersecurity compliance shall include one or more of the following:

1. Certification of compliance by a qualified~~nationally recognized~~ testing laboratory
2. Manufacturer certification for the specific type and brand of system provided by the manufacturer
3. An assessment or certification program acceptable to the authority having jurisdiction

39~~11~~.11~~11~~.2

The validity of cybersecurity certificationes shall be verified annually ~~by the person testing the system~~.

~~SR-5089Show Deleted~~

39~~11~~.11~~11~~.3

The validity of the equipment manufacturer's contact information for the system owner shall be verified annually ~~by the person testing the system~~.

~~11.~~39.12 Documentation.

The standards used and security levels employed in complying with Chapter 39~~11~~ shall be ~~identified in the system~~ documented~~ation required by Chapter 7~~.

NFPA 70B Chapter 39 Cybersecurity Public Input

Substantiation:

Significant attention to Cybersecurity arose during the 2023 NEC cycle and continues into the 2026 NEC cycle. While some requirements were added to the 2023 NEC, it was observed during the code cycle that cybersecurity is characterized by cybersecurity experts as primarily a maintenance concern. Relatively little can be done at the time of installation to establish proper cybersecurity, and the critical tasks associated with cybersecurity must be carried out on a continuous, ongoing basis to be effective. The Standards Council declined to charter a dedicated cybersecurity document (NPFA 70C was proposed). In response, I am submitting this public input to provide cybersecurity guidance for electrical equipment in NFPA 70B.

NEC 72 is in its Second Draft and has had significant consensus arise around a set of cybersecurity requirements appropriate for Fire Alarm systems. This is much simpler to accomplish in NFPA 72 as it is a combined installation and maintenance standard. Chapter 11 of that document serves as the basis of this Public Input but is modified to remove installation requirements as well as other requirements that are not appropriate for Electrical Equipment covered by NFPA 70B.

The submission includes a red-line document showing the changes from the NFPA 72 Second Draft. Cisco is a leader in the cybersecurity field and the changes suggested reflect multiple perspectives on how to best adapt NFPA 72's consensus requirements to NFPA 70B.

The majority of deletions are due to requirements being related to installation practice, or being specific to fire alarm systems and thus not applicable. Other concerns were raised more generally, which I will summarize briefly:

- Cybersecurity is not a tangible thing that can be provided, it is a series of best practices and regular evaluations that knowledgeable personnel must execute on an ongoing basis.
- Proper cybersecurity practice extends beyond networked devices to software configurable equipment that relies on a user interface, and simply being disconnected from a network is not adequate to protect against malicious actors.
- It is essential to monitor systems for cybersecurity concerns, not simply deploy firewalls and then ignore their status reports.
- Gateways and firewalls are increasingly built into equipment as a function and not a stand-alone device.
- Cybersecurity threats cannot be scheduled, so any language suggesting action at regular intervals is not effective. Instead, product vendors must remain continuously vigilant in responding to vulnerabilities that are discovered in their systems and provide updates to mitigate them in a timely manner.
- Consumers of these products must respond to notifications of vulnerabilities and suggested mitigations within well-defined timeframes to maintain a secure system.

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Chapter 39~~11~~ Cybersecurity

~~11.~~39.1 Cybersecurity Provisions.

~~11.~~39.1.1*

Where required by governing laws, codes, or standards, or other parts of this Code, ongoing cybersecurity evaluation shall be provided in accordance with Chapter ~~11~~ 39 for equipment software, system support tools, ~~installation methods~~, physical security of and access to equipment, data pathways, testing, and maintenance.

~~11.~~39.1.2*

~~No m~~Minimum cybersecurity level shall be required for systems that meet ~~both~~ any of the following conditions:

1. ~~No network~~ Network connectable equipment

~~2.~~

2. ~~No u~~Uploadable software configuration or firmware
3. Locally configurable equipment via a software interface

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~~11.~~39.2* Network Connectable Equipment Software Development and Production Environments.

Development and production environments used to develop and manufacture network connectable equipment shall employ cybersecurity safeguards that are consistent with one or more of the following:

1. NIST's"Framework for Improving Critical Infrastucture Cybersecurity"
2. ISO/IEC 27001,*Information security management systems*
3. IASME Consortium Cyber Essentials
4. Other equivalent standards acceptable to a ~~nationally recognized~~qualified testing laboratory
5. *Other applicable laws and regulations

~~SR-5081Show Deleted~~

~~11.~~39.3* Security Levels for Network Connectable Equipment.

All interfaces used to communicate with network connectable equipment shall be protected using the following minimum security levels:

1. For non-internet-facing wired interfaces that do not employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 1 or CAN/UL 2900-2-3 Security Level 1 or a comparable level associated with Section ~~11.~~39.2(4)
2. For all cellular, Bluetooth, wireless interfaces, and other accessible interfaces that do not employ internet protocol, IEC 62443-4-2/3-3 Security Level 2 or CAN/UL 2900-2-3 Security Level 2 or a comparable level associated with Section ~~11.~~39.2(4)
3. For all non-internet-facing wired interfaces and those non-internet-facing wireless interfaces that employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 2 or CAN/UL 2900-2-3 Security Level 2 or a comparable level associated with Section ~~11.~~39.2(4)
4. For all wired or wireless internet- facing interfaces or publicly accessible networks, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 3 or CAN/UL 2900-2-3 Security Level 3 or a comparable level associated with Section ~~11.~~39.2(4)

~~**11.4* Interconnecting Conductors, Cables, or Other Physical Pathways.**~~

~~Interconnecting conductors, cables, or other physical pathways for use in Security Level 2 or higher applications in locations accessible to the public shall be protected by metal raceways or metal armored cables.~~

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~~**11.5 Network Connectable Equipment Using Shared Pathways.**~~

~~**11.5.1**~~

~~Network connectable equipment using the security levels required by Section 11.3(2) through Section 11.3(4) shall comply with 23.6.3.3 through 23.6.3.5 and 7.6.7.~~

~~**11.5.2**~~

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~~Network connectable equipment using Shared Pathway Level 0, Shared Pathway Level 1, or Shared Pathway Level 2 shall comply with 23.6.3.3 through 23.6.3.5 and 7.6.7.~~

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~~11.~~39.6 Unused Physical Data Ports.

All unused physical data ports shall be protected in at least one of the following ways:

1. Physically protected from unauthorized access
2. Administratively disabled
3. Configured to require a token-based authentication, certificate-based authentication, password, or other method that is consistent with the security requirements of the system

~~11.~~39.7* Data Connections to External Networks.

When any data connection is made from the system to an external network, the connection shall be protected and monitored by a gateway, ~~or~~ firewall, or similar security function that ensures that only trusted traffic is allowed ~~to pass~~.

~~Detail SR-5095~~

~~11.~~39.8 Network Connectable Equipment Cybersecurity Software Updates.

~~11.~~39.8.1

~~At least quarterly, t~~The equipment manufacturer(s) shall do the following continuously as part of their business operations until the equipment is no longer supported by the manufacturer:

1. Address vulnerabilities in their products~~Evaluate all relevant cybersecurity threats~~
2. Determine if a software update is required to maintain the cybersecurity level achieved in compliance with Section ~~11.~~39.2 and release it it a timely manner

~~11.~~39.8.2

The system installer shall provide the name and contact information of the system owner or their representative to the equipment manufacturer(s) at the time of ~~system acceptance testing~~installation.

~~11.~~39.8.3*

The equipment manufacturer(s) shall notify the system owner or their representative of all required software security updates required to maintain the cybersecurity level achieved in compliance with Sections ~~11.~~39.2 and ~~, 11.~~39.3~~, and 11.4~~.

~~11.~~39.8.4

Software for ~~network connectable~~ devices shall be maintained by installing software security updates within 15 days of notification as required by the equipment manufacturer(s) to maintain the cybersecurity level achieved in compliance with Sections ~~11.~~39.2 and~~, 11.~~39.3~~, and 11.4~~. High risk vulnerabilities, such as zero-day exploits, should be addressed as soon as possible.

~~11.8.5~~

~~Software security updates that are deemed necessary by the equipment manufacturer(s) for compliance with Section 11.3 shall be installed at least annually.~~

~~SR-5086Show Deleted~~

~~11.8.6~~

~~Cybersecurity software updates applied to gateways or firewalls that do not affect the system site-specific or system executive software shall not be required to comply with 14.4.2.~~

~~SR-5087Show Deleted~~

~~11.~~39.8.7

Cybersecurity software changes to systems or system components shall be permitted to be made by remote access ~~in accordance with 23.8.2.11.3~~.

~~SR-5096Show Deleted~~

~~11.~~39.9 **Notification of Termination of Cybersecurity Update Support.**

The manufacturer shall notify the system owner or their representative of the termination of cybersecurity software update support required by Section ~~11.~~39.8 for any element of the system.

~~11.~~39.10 **Cybersecurity for System Support Tools.**

A system support tool and the support tool interfaces shall comply with the requirements of Sections ~~11.~~39.2 through ~~11.~~39.9.

39~~11~~.11 **Evidence of Compliance.**

39~~11~~.11~~11~~..1

Evidence of cybersecurity compliance shall include one or more of the following:

1. Certification of compliance by a ~~qualifiednationally recognized~~ testing laboratory
2. Manufacturer certification for the specific type and brand of system provided by the manufacturer
3. An assessment or certification program acceptable to the authority having jurisdiction

39~~11~~.11~~11~~..2

The validity of cybersecurity certificationes shall be verified annually ~~by the person testing the system~~.

~~SR-5089Show Deleted~~

39~~11~~.11~~11~~..3

The validity of the equipment manufacturer's contact information for the system owner shall be verified annually ~~by the person testing the system~~.

~~11.~~39.12 **Documentation.**

The standards used and security levels employed in complying with Chapter 39~~11~~ shall be ~~identified in the system~~ documentedation ~~required by Chapter 7~~.

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Public Input No. 46-NFPA 70B-2023 [Section No. A.3.3.9]

A.3.3.9 Circuit Breaker.

One example of a listing standard for circuit breakers is UL 489, *Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures*.

Molded-Case Circuit Breaker (MCCB). MCCBs are most often available in one-, two-, three-, or four-pole versions and are available in 120 V to 1000 V ratings. All MCCBs, including ICCBs, will include some sort of instantaneous protection, which might be adjustable but cannot be ~~completely~~ disabled.

Insulated-Case Circuit Breaker (ICCB). There is no specific definition or mention of ICCB within the MCCB standard. However, their stated ratings will be those of MCCBs but they can operate like LVPCBs. ICCBs can either include a two-step stored energy operating mechanism that will require manual charging of closing and opening springs when the circuit breaker is manually operated or include internal charging motors for closing and opening springs. ICCBs are normally housed in a case of dielectric materials providing a layer of insulation between its exterior and internal mechanisms. The characteristics of ICCBs vary widely between models and manufacturers.

Low-Voltage Power Circuit Breaker (LVPCB). LVPCBs are mechanical switching devices consisting of a frame that contains some number of field replaceable component parts or subassemblies capable of making, carrying, interrupting, and breaking currents. Modern LVPCBs are rated 1000 V ac or less, or 1500 V dc or less, and do not include MCCBs. They are typically larger circuit breakers with frames rated at 600 A or more that have a significant degree of maintainability, such as the ability to replace contact structures, arc chutes, and other parts subject to wear. Modern versions are listed to UL 1066, *Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures*, and are commonly installed in switchgear as draw-out devices. More rarely, they might be installed as fixed mounted devices in older equipment. LVPCBs manufactured prior to 2000 generally had metal frames; those manufactured after 2000 tend to use frames made from nonconductive materials. LVPCBs are sometimes also referred to as metal frame or air frame breakers.

Statement of Problem and Substantiation for Public Input

The text is modified in this PI to add a missing space and to delete the unnecessary word "completely". The word "completely" is not needed since the term "disabled" already includes the concept of a final state and not a partial state.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Wed Dec 20 09:29:07 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-118-NFPA 70B-2024

Statement: This revision adds a missing space before MCCB's and removes unnecessary wording for clarity.

Public Input No. 52-NFPA 70B-2023 [Section No. A.3.3.26]

A.3.3.26 Ground-Fault Circuit Interrupter (GFCI).

See UL 943, *Standard for Ground-Fault Circuit Interrupters,* for further information. Class A ground-fault circuit interrupters trip when the ground-fault current is 6 mA or higher and do not trip when the ground-fault current is less than 4 mA. [**70,** 2023]

A GFCI does not eliminate the electric shock sensation since normal perception level is approximately 0.5 mA~~; nor does it protect~~ . A GFCI does not protect from electric shock hazard from line-to-line or line-to-neutral contact.

Statement of Problem and Substantiation for Public Input

The sentence is updated to also state the a GFCI does not protect against line-to-neutral contact. Listing just "line-to-line" in the existing statement can be misleading since most GFCIs are applied in a "line-to-neutral" circuit (typical 120 V circuit).

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Submittal Date: Wed Dec 20 09:46:08 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-119-NFPA 70B-2024
Statement: This annex material is being modified to align with informational note in NFPA 70 and remove extraneous information.

Public Input No. 72-NFPA 70B-2023 [Sections A.4.7.1, A.4.7.2]

Sections A.4.7.1, A.4.7.2

A.4.7.1

Rework, remanufacturing, or retrofitting of equipment typically involves replacement or refurbishing of major components of equipment or systems. Repairs or modifications not authorized by the original equipment manufacturer might void the equipment warranties and third-party certifications. Equipment can be reconditioned under rebuild programs provided the reconditioning follows established guidelines. The AHJ can assess the acceptability of reconditioned equipment to determine if a re-evaluation of the modified product by the organization that listed the equipment is necessary.

~~**A.4.7.2**~~ —

See also NFPA 791 and OSHA Safety & Health Information Bulletin (SHIB), “Certification of Workplace Products by Nationally Recognized Testing Laboratories.”

Statement of Problem and Substantiation for Public Input

A separate PI deletes the requirement 4.7.1. The Annex material for 4.7.1 is still good material and is moved with this PI to existing section 4.7.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 71-NFPA 70B-2023 [Section No. 4.7.1]	
Public Input No. 71-NFPA 70B-2023 [Section No. 4.7.1]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Zip:

Submittal Date: Wed Dec 20 11:52:33 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-66-NFPA 70B-2024

Statement: This subsection has been deleted because it is already covered by 4.7.2. The annex material in A.4.7.1 has been retained and combined with A.4.7.2.

Public Input No. 3-NFPA 70B-2023 [Sections A.5.1.2, A.6.1.1]

Sections A.5.1.2, A.6.1.1

A.5.1.2

~~In addition to~~ ~~*NFPA 70E*~~ ~~, IEEE C2,~~ ~~*National Electrical Safety Code*~~ ~~;~~ Examples of applicable legal requirements ~~(e.g.,~~ include 29 CFR 1926, “Occupational Safety and Health Standards,” and 29 CFR 1910, “Safety and Health Regulations for Construction” ~~); and~~ ~~*NFPA 70*~~ ~~are among the references that should be~~ which are law are to be utilized for the development of programs and procedures associated with electrical maintenance activities and are necessary to be used in conjunction with this document.

Equipment should be placed in an electrically safe work condition for inspections, tests, repairs, and other servicing. Where electrical maintenance tasks must be performed when the equipment is energized, provisions are to be made to allow electrical maintenance to be performed safely. See NFPA 70E, Standard for Electrical Safety in the Workplace, for information related to establishing an electrically safe work condition and both OSHA and NFPA 70E for rules addressing justification for energized work.

A.6.1.1

Engineering studies generally cover the following areas:

(1) Short-circuit studies

(2) Coordination studies

(3) Load-flow studies

(4) Reliability studies

(5) Incident energy analysis (arc-flash hazard calculations)

(6) Maintenance-related design studies

In order to conduct short-circuit, coordination, and arc flash studies, specific data should be collected. Data that should be included on a single-line diagram are utility company points of contact and data records for equipment such as transformers, cables, overhead lines, fuses, medium-voltage breakers, reclosers, capacitor banks, low-voltage breakers, disconnects, generators, and motors. This information should be developed for each type of operating condition. Examples of data collection forms are included in Annex E.

Utility information should at least include the minimum and maximum short circuit megavolt-amperes (MVA) and the X/R ratio at the service point; point of contact name, address, and telephone number; and facility point of contact, address, and telephone number.

Transformer data records should include location, rated kilovolt-amperes (kVA), maximum kVA, primary voltage, secondary voltage, impedance in percent, type of primary and secondary connection, ground impedance, and, if appropriate, the voltage tap.

Cable data should include “to” and “from,” rated volts, nominal volts, single-conductor or three-conductor cable, the number of conductors per phase, the neutral size, copper or aluminum, and length in feet.

Raceway material (i.e., magnetic or nonmagnetic) should be noted.

Overhead line information should include “to” and “from,” connection configuration, nominal volts, number of lines, lines per phase, ground size, type of cable (material), and length in feet.

Medium-voltage breaker information should include location, manufacturer, type, rated volts, interrupting current, interrupting time (cycles), close/latch amps and for the associated relays the manufacturer/type, time delay range and existing tap, time dial, instantaneous range and existing tap, and CT ratio.

Recloser information should include location, CT ratio, nominal volts, manufacturer, type, BIL, continuous current rating, interrupting rating, minimum trip, operational sequence, reclosing times (if available), and tripping curves (if available).

Low-voltage information for the breaker should include location, manufacturer, type, rated volts, frame rating, and interrupting rating and for the trip device should include manufacturer, type, long time delay range and bands available, short time delay range and bands available, instantaneous range, and ground range and bands available.

Generator information should include location, type, kVA rating, generated volts, rated current, rpm, wiring connection (e.g., delta or wye), system ground, subtransient impedance, ground impedance, and power factor.

Motor information should include location, type, horsepower, rated volts, full load amps, rpm, code letter, locked rotor amps, power factor, and starter type.

Capacitor bank information should include location, kVAR rating, rated volts, and wiring connection (e.g., delta or wye).

Fuse information should include location, voltage rating, interruption rating, fuse type or class, manufacturer, and manufacturer’s part number.

Statement of Problem and Substantiation for Public Input

NFPA 70E and the NESC are not examples of applicable state, federal, or local codes and standards, to identify the hazards and reduce the associated risks. The OSHA standards referenced here are. This recommendation reflects that and adjusts this annex information accordingly. Further, a companion Public Input adds NFPA 70E to 5.1 and 5.2 as it does correctly address how to establish an electrically safe work condition and, along with OSHA 29 CFR Part 1910, address justification for energized work.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1-NFPA 70B-2023 [Section No. 5.1.2]	Related concept.
Public Input No. 1-NFPA 70B-2023 [Section No. 5.1.2]	

Submitter Information Verification

Submitter Full Name: Palmer Hickman
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Submittal Date: Thu Mar 02 15:36:48 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-120-NFPA 70B-2024
Statement: This revision is being made in recognition that NFPA 70E, IEEE C2 and NESC are not necessarily examples of applicable legal requirements.

Public Input No. 35-NFPA 70B-2023 [Section No. A.6.1.1]

A.6.1.1

Engineering studies generally cover the following areas:

(1) Short-circuit studies

(2) Coordination studies

(3) Load-flow studies

(4) Reliability studies

(5) Incident energy analysis (arc-flash hazard calculations)

(6) Maintenance-related design studies

In order to conduct ~~short-circuit, coordination, and arc flash studies,~~ engineering studies, specific data should be collected. Data that should be included on a single-line diagram are utility company points of contact and data records for equipment such as transformers, cables, overhead lines, fuses, medium-voltage breakers, reclosers, capacitor banks, low-voltage breakers, disconnects, generators, and motors. This information should be developed for each type of operating condition. Examples of data collection forms are included in Annex E.

Utility information should at least include the minimum and maximum short circuit megavolt-amperes (MVA) and the X/R ratio at the service point; point of contact name, address, and telephone number; and facility point of contact, address, and telephone number.

Transformer data records should include location, rated kilovolt-amperes (kVA), maximum kVA, primary voltage, secondary voltage, impedance in percent, type of primary and secondary connection, ground impedance, and, if appropriate, the voltage tap.

Cable data should include “to” and “from,” rated volts, nominal volts, single-conductor or three-conductor cable, the number of conductors per phase, the neutral size, copper or aluminum, and length in feet.

Raceway material (i.e., magnetic or nonmagnetic) should be noted.

Overhead line information should include “to” and “from,” connection configuration, nominal volts, number of lines, lines per phase, ground size, type of cable (material), and length in feet.

Medium-voltage breaker information should include location, manufacturer, type, rated volts, interrupting current, interrupting time (cycles), close/latch amps and for the associated relays the manufacturer/type, time delay range and existing tap, time dial, instantaneous range and existing tap, and CT ratio.

Recloser information should include location, CT ratio, nominal volts, manufacturer, type, BIL, continuous current rating, interrupting rating, minimum trip, operational sequence, reclosing times (if available), and tripping curves (if available).

Low-voltage information for the breaker should include location, manufacturer, type, rated volts, frame rating, and interrupting rating and for the trip device should include manufacturer, type, long time delay range and bands available, short time delay range and bands available, instantaneous range, and ground range and bands available.

Generator information should include location, type, kVA rating, generated volts, rated current, rpm, wiring connection (e.g., delta or wye), system ground, subtransient impedance, ground impedance, and power factor.

Motor information should include location, type, horsepower, rated volts, full load amps, rpm, code letter, locked rotor amps, power factor, and starter type.

Capacitor bank information should include location, kVAR rating, rated volts, and wiring connection (e.g., delta or wye).

Fuse information should include location, voltage rating, interruption rating, fuse type or class, manufacturer, and manufacturer’s part number.

Statement of Problem and Substantiation for Public Input

The existing sentence lists only three of the six types of engineering studies. That may cause the reader to believe specific data is not required for the other three types of engineering studies. The proposed changes refer to "engineering studies" which were defined just above this paragraph. This change clearly indicates to the reader that data is required for all the types of studies.

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Submittal Date: Wed Dec 20 07:34:46 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-121-NFPA 70B-2024

Statement: This revision is being made to better align with other standards and for consistency with the remainder of the section.

Public Input No. 36-NFPA 70B-2023 [Section No. A.6.1.1]

A.6.1.1

Engineering studies generally cover the following areas:

(1) Short-circuit studies

(2) Coordination studies

(3) Load-flow studies

(4) Reliability studies

(5) Incident energy analysis (arc-flash hazard calculations)

(6) Maintenance-related design studies

In order to conduct short-circuit, coordination, and arc flash studies, specific data should be collected. Data that should be included on a single-line diagram are utility company points of contact and data records for equipment such as transformers, cables, overhead lines, fuses, medium-voltage breakers, reclosers, capacitor banks, low-voltage breakers, disconnects, generators, and motors. This information should be developed for each type of operating condition. Examples of data collection forms are included in Annex E.

Utility information should at least include the minimum and maximum short circuit megavolt-amperes (MVA) and the X/R ratio at the service point; point of contact name, address, and telephone number; and facility point of contact, address, and telephone number.

Transformer data records should include location, rated kilovolt-amperes (kVA), maximum kVA, primary voltage, secondary voltage, impedance in percent, type of primary and secondary connection, ground impedance, and, if appropriate, the voltage tap.

Cable data should include “to” and “from,” rated ~~volts~~ voltage , nominal ~~volts~~ voltage , single-conductor or three-conductor cable, the number of conductors per phase, the neutral size, copper or aluminum, and length in feet.

Raceway material (i.e., magnetic or nonmagnetic) should be noted.

Overhead line information should include “to” and “from,” connection configuration, nominal ~~volts~~ voltage , number of lines, lines per phase, ground size, type of cable (material), and length in feet.

Medium-voltage breaker information should include location, manufacturer, type, rated ~~volts~~ voltage , interrupting current, interrupting time (cycles), close/latch amps and for the associated relays the manufacturer/type, time delay range and existing tap, time dial, instantaneous range and existing tap, and CT ratio.

Recloser information should include location, CT ratio, nominal ~~volts~~ voltage , manufacturer, type, BIL, continuous current rating, interrupting rating, minimum trip, operational sequence, reclosing times (if available), and tripping curves (if available).

Low-voltage information for the breaker should include location, manufacturer, type, rated ~~volts~~ voltage , frame rating, and interrupting rating and for the trip device should include manufacturer, type, long time delay range and bands available, short time delay range and bands available, instantaneous range, and ground range and bands available.

Generator information should include location, type, kVA rating, ~~generated volts~~ rated voltage , rated current, rpm, wiring connection (e.g., delta or wye), system ground, subtransient impedance, ground impedance, and power factor.

Motor information should include location, type, horsepower, rated ~~volts~~ voltage , full load amps, rpm, code letter, locked rotor amps, power factor, and starter type.

Capacitor bank information should include location, kVAR rating, rated ~~volts~~ voltage , and wiring connection (e.g., delta or wye).

Fuse information should include location, rated voltage ~~rating~~ , interruption rating, fuse type or class, manufacturer, and manufacturer’s part number.

Statement of Problem and Substantiation for Public Input

The existing language refers to "rated volts". IEEE equipment standards have requirements for "rated voltage", not "rated volts". The proposed revisions better align the NFPA 70B language with IEEE standards. Minor changes to the generator and fuse voltage ratings language allows for consistency for the voltage ratings language within this section.

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Submittal Date: Wed Dec 20 07:39:47 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-121-NFPA 70B-2024
Statement: This revision is being made to better align with other standards and for consistency with the remainder of the section.

Public Input No. 37-NFPA 70B-2023 [Section No. A.6.1.1]

A.6.1.1

Engineering studies generally cover the following areas:

(1) Short-circuit studies

(2) Coordination studies

(3) Load-flow studies

(4) Reliability studies

(5) Incident energy analysis (arc-flash hazard calculations)

(6) Maintenance-related design studies

In order to conduct short-circuit, coordination, and arc flash studies, specific data should be collected. Data that should be included on a single-line diagram are utility company points of contact and data records for equipment such as transformers, cables, overhead lines, fuses, medium-voltage breakers, reclosers, capacitor banks, low-voltage breakers, disconnects, generators, and motors. This information should be developed for each type of operating condition. Examples of data collection forms are included in Annex E.

Utility information should at least include the minimum and maximum short circuit megavolt-amperes (MVA) and the X/R ratio at the service point; point of contact name, address, and telephone number; and facility point of contact, address, and telephone number.

Transformer data records should include location, rated kilovolt-amperes (kVA), maximum kVA, primary voltage, secondary voltage, impedance in percent, type of primary and secondary connection, ground impedance, and, if appropriate, the voltage tap.

Cable data should include “to” and “from,” rated volts, nominal volts, ~~single-conductor or three-conductor cable~~ number of conductors , the number of conductors per phase, the neutral size, copper or aluminum, and length in feet.

Raceway material (i.e., magnetic or nonmagnetic) should be noted.

Overhead line information should include “to” and “from,” connection configuration, nominal volts, number of lines, lines per phase, ground size, type of cable (material), and length in feet.

Medium-voltage breaker information should include location, manufacturer, type, rated volts, interrupting current, interrupting time (cycles), close/latch amps and for the associated relays the manufacturer/type, time delay range and existing tap, time dial, instantaneous range and existing tap, and CT ratio.

Recloser information should include location, CT ratio, nominal volts, manufacturer, type, BIL, continuous current rating, interrupting rating, minimum trip, operational sequence, reclosing times (if available), and tripping curves (if available).

Low-voltage information for the breaker should include location, manufacturer, type, rated volts, frame rating, and interrupting rating and for the trip device should include manufacturer, type, long time delay range and bands available, short time delay range and bands available, instantaneous range, and ground range and bands available.

Generator information should include location, type, kVA rating, generated volts, rated current, rpm, wiring connection (e.g., delta or wye), system ground, subtransient impedance, ground impedance, and power factor.

Motor information should include location, type, horsepower, rated volts, full load amps, rpm, code letter, locked rotor amps, power factor, and starter type.

Capacitor bank information should include location, kVAR rating, rated volts, and wiring connection (e.g., delta or wye).

Fuse information should include location, voltage rating, interruption rating, fuse type or class, manufacturer, and manufacturer’s part number.

Statement of Problem and Substantiation for Public Input

The existing language allows for recording whether a cable is a single-conductor or a three-conductor cable. A cable can have a number of conductors different than one or three, such as a five conductor cable that may include three conductors for use as the phase conductors, one conductor for use as a neutral conductor, and a conductor to use as an equipment grounding conductor. The revised language just the number of conductors to be recorded and no restrict it to the single- and three-conductor choice currently listed.

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Submittal Date: Wed Dec 20 07:54:19 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-121-NFPA 70B-2024
Statement: This revision is being made to better align with other standards and for consistency with the remainder of the section.

Public Input No. 38-NFPA 70B-2023 [Section No. A.6.1.1]

A.6.1.1

Engineering studies generally cover the following areas:

(1) Short-circuit current studies

(2) Coordination studies

(3) Load-flow studies

(4) Reliability studies

(5) Incident energy analysis (arc-flash hazard calculations)

(6) Maintenance-related design studies

In order to conduct short-circuit, coordination, and arc flash studies, specific data should be collected. Data that should be included on a single-line diagram are utility company points of contact and data records for equipment such as transformers, cables, overhead lines, fuses, medium-voltage breakers, reclosers, capacitor banks, low-voltage breakers, disconnects, generators, and motors. This information should be developed for each type of operating condition. Examples of data collection forms are included in Annex E.

Utility information should at least include the minimum and maximum short circuit megavolt-amperes (MVA) and the X/R ratio at the service point; point of contact name, address, and telephone number; and facility point of contact, address, and telephone number.

Transformer data records should include location, rated kilovolt-amperes (kVA), maximum kVA, primary voltage, secondary voltage, impedance in percent, type of primary and secondary connection, ground impedance, and, if appropriate, the voltage tap.

Cable data should include “to” and “from,” rated volts, nominal volts, single-conductor or three-conductor cable, the number of conductors per phase, the neutral size, copper or aluminum, and length in feet.

Raceway material (i.e., magnetic or nonmagnetic) should be noted.

Overhead line information should include “to” and “from,” connection configuration, nominal volts, number of lines, lines per phase, ground size, type of cable (material), and length in feet.

Medium-voltage breaker information should include location, manufacturer, type, rated volts, interrupting current, interrupting time (cycles), close/latch amps and for the associated relays the manufacturer/type, time delay range and existing tap, time dial, instantaneous range and existing tap, and CT ratio.

Recloser information should include location, CT ratio, nominal volts, manufacturer, type, BIL, continuous current rating, interrupting rating, minimum trip, operational sequence, reclosing times (if available), and tripping curves (if available).

Low-voltage information for the breaker should include location, manufacturer, type, rated volts, frame rating, and interrupting rating and for the trip device should include manufacturer, type, long time delay range and bands available, short time delay range and bands available, instantaneous range, and ground range and bands available.

Generator information should include location, type, kVA rating, generated volts, rated current, rpm, wiring connection (e.g., delta or wye), system ground, subtransient impedance, ground impedance, and power factor.

Motor information should include location, type, horsepower, rated volts, full load amps, rpm, code letter, locked rotor amps, power factor, and starter type.

Capacitor bank information should include location, kVAR rating, rated volts, and wiring connection (e.g., delta or wye).

Fuse information should include location, voltage rating, interruption rating, fuse type or class, manufacturer, and manufacturer’s part number.

Statement of Problem and Substantiation for Public Input

The existing language refers to "short-circuit" study, but a more appropriate term is "short-circuit current" study. The language is revised to add "current". This PI is associated with another PI to change the language in section 6 to make a similar change in the name of the study.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 39-NFPA 70B-2023 [Section No. 6.3]	
Public Input No. 39-NFPA 70B-2023 [Section No. 6.3]	

Submitter Information Verification

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Submittal Date: Wed Dec 20 07:57:43 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The phrase “short-circuit study” is used in IEEE 3002.3-2018. Therefore, it is appropriate here.

Public Input No. 41-NFPA 70B-2023 [Section No. A.6.7]

~~A.6.7~~ —

~~Performing an incident energy analysis (arc-flash study) is an important aspect to risk assessment. A risk assessment is conducted on facility electrical systems to determine the following for each designated piece of electrical equipment:~~

(1) ~~Incident energy exposure at working distance~~

(2) ~~Arc-flash boundary~~

~~A risk assessment is an important consideration for electrical safe work practices. Refer to NFPA *70E* and IEEE 3007.3, *Recommended Practice for Electrical Safety in Industrial and Commercial Power Systems* , for guidance on risk assessment and selection of PPE.~~

~~The available short-circuit current and the total clearing time at each designated piece of electrical equipment is needed to perform a risk assessment. NFPA *70E* and OSHA provide the requirements. IEEE 1584, *Guide for Performing Arc-Flash Hazards Calculations* , provides suggested calculation methods.~~

~~Where the result of the incident energy analysis at a designated piece of equipment is greater than what is appropriate for the available PPE, a means to reduce the hazard level should be implemented.~~

~~The risk assessment results are field marked by a label on the equipment. The documentation for the assessment should be retained for reference and use as needed.~~

~~The assessment should be repeated if there are changes that occur that affect the arc-flash hazard, such as changes in the available short-circuit current or in the overcurrent protective devices.~~

~~The benefit of a risk assessment is being able to provide the necessary information to a qualified electrical worker so that proper safe work practices can be followed if the worker has to work on or near electrical equipment not in an electrically safe work condition.~~

Statement of Problem and Substantiation for Public Input

A separate PI is submitted to delete the requirement to perform an incident energy analysis study. This PI is to delete the associated Annex material.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 40-NFPA 70B-2023 [Section No. 6.7]	
Public Input No. 40-NFPA 70B-2023 [Section No. 6.7]	

Submitter Information Verification

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Submittal Date: Wed Dec 20 09:10:17 EST 2023

Committee: EEM-AAA

Committee Statement

Resolution: An arc-flash study is integral to the maintenance of electrical equipment and interacting with said equipment is directly related to the review of data obtained in the incident energy analysis.

Public Input No. 103-NFPA 70B-2023 [Sections A.9.2.1, A.9.2.2, A.9.3.2, A.9.3.2.1]

Sections A.9.2.1, A.9.2.2, A.9.3.2, A.9.3.2.1

~~A.9.2.1~~ —

~~Manufacturer's service manuals and industry standards should have a recommended frequency of inspection. The frequency given is based on standard or usual operating conditions and environments.~~

~~A.9.~~ 2.2

~~For more information on risk management, see ISO 31000, *Risk Management — Principles and Guidelines* , and Annex F of NFPA *70E* .~~

A

~~.9.3.2 —~~

~~A criticality assessment team should be comprised of personnel who are familiar with the electrical equipment, safety requirements, operational capabilities, potential impact of downtime, required maintenance activities, and business priorities. The team can include external expertise when needed. Some examples of the type of personnel to include in a criticality assessment include the following:~~

(1) ~~The electrical foreman or superintendent~~

(2) ~~Production personnel thoroughly familiar with the operation capabilities of the equipment and the effect its loss will have on quality and productivity~~

(3) ~~The senior maintenance individual who is generally familiar with the maintenance and repair history of the equipment or process~~

(4) ~~A technical individual knowledgeable in the theoretical fundamentals of the process and its hazards (e.g., in a chemical plant, a chemist; in a mine, a geologist)~~

(5) ~~A safety engineer or the individual responsible for the overall security of the plant and its personnel against fire and accidents of all kinds~~

~~The team should review the entire plant or each of its operating segments in detail, considering each unit of equipment as related to the entire operation and the effect of its loss on safety and production. The purpose of the review is to identify failure modes and their cause and effect.~~

~~There should be objective criteria consistently used to evaluate all equipment to make a clear determination in establishing whether a system is critical and in having the proper amount of emphasis placed on its maintenance. The determination of critical parts should be the responsibility of the electrical foreman or superintendent on the team.~~

~~The entire team should consider each alarm in the system with the same thoroughness with which they have considered the shutdown circuits. A critical alarm should be characterized by its separate sensing device, a separate readout device, and separate circuitry and power source. The maintenance department should thoroughly understand the critical level of each alarm. The critical alarms and their significance should be distinctly marked on drawings, in records, and on the operating unit. For an alarm to be critical does not necessarily mean that it is complex or related to complex action. A simple valve position indicator can be one of the most critical alarms in an operating unit.~~

A.9.3~~.~~2 .2.1

The owner can also choose to assign criticality based on the threat to operational continuity. The criticality assessment should consider personnel exposure to electrical hazards. Electrical system criticality should be evaluated with consideration of the possible widespread effect of a fault in electrical equipment.

A.9.3.1

Manufacturer's service manuals and industry standards should have a recommended frequency of inspection. The frequency given is based on standard or usual operating conditions and environments.

A.9.3.2

For more information on risk management, see ISO 31000, *Risk Management — Principles and Guidelines* , and Annex F of NFPA *70E* .

Statement of Problem and Substantiation for Public Input

This PI renumbers the sections based on proposed reordering of material in Chapter 9.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 101-NFPA 70B-2023 [Section No. 9.3]	
Public Input No. 102-NFPA 70B-2023 [Section No. 9.2]	
Public Input No. 101-NFPA 70B-2023 [Section No. 9.3]	
Public Input No. 102-NFPA 70B-2023 [Section No. 9.2]	

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Submittal Date: Wed Dec 20 13:56:38 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The NFPA publishing system automatically adjusts section numbers for the addition or deletion of sections created by a first revision.

Public Input No. 108-NFPA 70B-2023 [Section No. A.10.2.2]

A.10.2.2

~~Ignition sources can include high~~ Examples of ignition sources are high surface temperatures, stored electrical energy, and the buildup of static charges.

Statement of Problem and Substantiation for Public Input

The existing wording could imply the list is exhaustive when I feel the list is providing some examples. The revised text clearly indicates the list is just a list of example and not an exhaustive list of all ignition sources.

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Submittal Date: Wed Dec 20 14:21:01 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-122-NFPA 70B-2024
Statement: This revision is being made to clarify that the list is just an example and is not exhaustive of all potential ignition sources.

Public Input No. 129-NFPA 70B-2023 [New Section after A.11.3.5]

A11.2

Periodic testing of the insulating fluid in liquid filled transformers is a reliable method to gain valuable insight on the health of a transformer. Test results can provide indication of problems such as internal arcing, high moisture content, degradation of transformer construction materials, and poor oil quality. For more information on insulating fluid testing, refer to IEEE C57.104, *IEEE Guide for the Interpretation of Gases generated in Mineral Oil-Immersed Transformers* and IEEE C57.106, *IEEE Guide for Acceptance and Maintenance of Insulating Minteral Oil in Electrical Equipment* .

Statement of Problem and Substantiation for Public Input

It would be beneficial to the reader to provide some Annex material concerning transformer insulating fluid testing and the benefits of that testing. The references to IEEE standards direct the reader to sources for more information.

Submitter Information Verification

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Submittal Date: Thu Dec 21 07:53:14 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-87-NFPA 70B-2024
Statement: This annex material is added to provide additional information and references related to insulating fluid testing.

Public Input No. 138-NFPA 70B-2023 [Section No. A.13.1.1]

A.13.1.1

Panelboards or switchboards are either fuse~~- or~~ /switch or circuit breaker type of construction .

Where critical circuits are involved, those circuits, panelboards or switchboards ~~should~~ could be ~~appropriately~~ identified by tags, labels, or color coding ~~.Seldom are panelboards or switchboards de-energized, and then only for circuit changes; it is for those times that electrical maintenance can be scheduled. There is always the possibility of an error or accidental tripping of a main circuit breaker causing an unscheduled shutdown.~~ to make the locations of those circuits more prominent.

During operating periods, the panels can be checked only for hot spots or excessive heat. This electrical maintenance should be done at reasonable intervals in accordance with the importance of the circuit. A record should be made of areas that have given trouble; memory should not be relied on.

Statement of Problem and Substantiation for Public Input

The first sentence is modified to add "switch" with the fuse since the construction is fused switch, not just a fuse.

The second sentence about circuit identification has been modified to add a reason for doing identification and to add identification of the circuit (not just the panelboard or switchboard) as an option. the word "should" was changed to "could" as there is not an actual need to do do the identification but it could be a good idea if someone wants to do that.

The information about panelboard and switchboards being shutdown infrequently was removed as that type of statement applies to all type of power system equipment.

The information about the possibility of tripping the main breaker had no context and no real reason to be included in the Annex material.

Submitter Information Verification

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Submittal Date: Thu Dec 21 08:47:58 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-123-NFPA 70B-2024
Statement: Annex material is being deleted as it does not provide clarity to the application of the related requirements.

Public Input No. 159-NFPA 70B-2023 [Section No. A.16.3.5]

A.16.3.5

Fuses can be tested with a continuity tester to verify that the fuse is not open. Resistance readings ~~can~~ should be taken using a sensitive 4-wire instrument such as a Kelvin bridge or micro-ohmmeter. Fuse resistance values should be compared against values recommended by the manufacturer. Where the manufacturer's data is not readily available, resistance deviations of more than 15 percent for identical fuses in the same circuit should be investigated.

Statement of Problem and Substantiation for Public Input

The existing Annex material indicates that resistance reading "can" be taken with the 4-wire instrument. It seems like stating the resistance reading "should" be taken with the 4-wire instrument is the recommended method to get more accurate test results.

Submitter Information Verification

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Submittal Date: Fri Dec 22 11:55:42 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-124-NFPA 70B-2024
Statement: This revision is made to clarify that this is a recommendation rather than an option.

Public Input No. 166-NFPA 70B-2023 [Section No. A.18.1]

~~A.18.1~~ —

~~Electrical maintenance is the one of best ways to ensure continued reliable service from electrical cable installations. Visual inspection and electrical testing of the cable insulation are the major maintenance procedures. However, it should be stressed that no amount of maintenance can correct improper application or physical damage done during installation.~~

Statement of Problem and Substantiation for Public Input

The content in this annex material applies to all equipment types covered by NFPA 70B. No amount of maintenance can correct improper application of or damage done during construction. It is recommended to delete this annex material. There is not need to specifically make this statement for cables. Therefore this PI deletes this annex material. A separate, unlinked, PI has been created to add similar content in the annex material to Chapter 1. The two PIs are not linked as one does not have to be done in order for the other one to be done and accepting just one does not create a problem if the other one remains.

Submitter Information Verification

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Submittal Date: Fri Dec 22 12:26:33 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-125-NFPA 70B-2024
Statement: This revision removes A.18.1 as the information is not necessary to apply the related requirements of Section 18.1 addressing electrical maintenance requirements for power cables and conductors covered by Chapter 18, per Section 18.1.

Public Input No. 167-NFPA 70B-2023 [Section No. A.18.3.1]

A.18.3.1

Cable identification tags or markings should be checked.

If, in addition to the visual inspection, cables are to be touched or moved, they should be in an electrically safe work condition.

Readily Accessible . Readily accessible locations are locations that provide visual access to the cable or conductor without having the open conduit fittings, remove cable ties, or remove interior equipment panels to access the cables.

Vault Installations. Cables in vaults should be inspected for sharp bends, physical damage, excessive tension, oil leaks, pits, cable movement, insulation swelling, soft spots, cracked jackets in nonlead cables, damaged fireproofing, poor ground connections, deterioration of metallic sheath bonding, as well as corroded and weakened cable supports and the continuity of any main grounding system. Terminations and splices of nonlead cables should be inspected for tracking or signs of corona. The ground braid should be inspected for corrosion and tight connections. The bottom surface of the cable should be inspected for wear or scraping, due to movement, at the point of entrance into the vault and where it rests on the cable supports.

The vault should be inspected for deterioration of the concrete, both internal and above ground. In some instances, the vault can be equipped with drains that might require cleaning. In some instances, it might be necessary to pump water from the vault prior to entrance. A vault should not be entered unless a test for dangerous gas has been made and adequate ventilation is provided. The inspection crew should always consist of two or more persons with at least one remaining outside the vault, and the rules and regulations for confined space entry should be followed. [See OSHA requirements in 29 CFR 1910.146, “Permit-Required Confined Spaces,” for practices and procedures to protect employees from the hazards of entry into permit-required confined spaces, and 29 CFR 1910.269(e), “Electric Power Generation, Transmission, and Distribution, Enclosed Spaces,” for enclosed space entry.]

Cable Potheads . Potheads , a type of insulator with a bell or pot-like shape typically used to connect underground electrical cables to overhead lines, should be inspected for oil or compound leaks and cracked or chipped porcelain. The porcelain surfaces should be cleaned, and if the connections are exposed, their tightness should be checked.

~~Cable identification tags or markings should be checked.~~

Aerial Installations. Aerial cable installations should be inspected for mechanical damage due to vibration, deteriorating supports, or suspension systems. Special attention should be given to the dead-end supports to ensure that the cable insulation is not abraded, pinched, or bent too sharply. Aerial cable installations should be inspected for animal and bird infestation. Terminations should be inspected as covered in Chapter 7.

Raceway Installations. Because the raceway is the primary mechanical support for the cable, it should be inspected for signs of deterioration or mechanical damage or if the cable jacket is being abraded or mechanically damaged. In many installations, the raceway serves as a part of the ground-fault current circuit. Joints should be inspected for signs of looseness or corrosion that could result in a high resistance. Splices and terminations should be verified as covered in Chapter 7.

Statement of Problem and Substantiation for Public Input

The section is edited to provide "subtitled" for the "cable vaults" and "pothead" paragraphs like done for aerial and raceway installations. The recommendation to check cable identification marking or tags was not modified and was only moved to the beginning of the annex material as it is not included in the newly defined "pothead" section. These changes improve readability.

Information about what is considered "readily accessible" is added to provide clearer guidance to the reader about what should be considered readily accessible.

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Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
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Submittal Date: Fri Dec 22 12:31:38 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-126-NFPA 70B-2024 The definition of readily accessible is not necessary here since it's a definition and not a recommendation.

Statement: The sentence "cable identification tags or markings should be checked" is relocated as a first sentence so that it is more likely to be noticed by the user of this recommendation. Headings are added to portions of this annex information so that the content contained is more readily apparent.

Public Input No. 168-NFPA 70B-2023 [Section No. A.18.3.5]

A.18.3.5

A preferred testing method should be selected only after all circuit parameters have been analyzed.

~~*Electrical Testing* .~~ When performing electrical testing of cables, there are many factors that need to be considered before applying a specific test methodology. The two most commonly used tests for cable insulation are insulation resistance testing and dc over-potential testing. Other tests are listed in ANSI/IEEE 400, *Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above*. In many instances it can be desired to achieve a more comprehensive analysis of cable condition, doing so with techniques and methods other than insulation resistance.

~~*Inspection and Testing Records* . Because inspection intervals normally are 1 year or more, comprehensive records are an important part of any maintenance program. Comprehensive records should be arranged to facilitate comparison from year to year.~~

Statement of Problem and Substantiation for Public Input

The content in this annex material about test record applies to all equipment types covered by NFPA 70B. This is already addressed in Chapter 4 with the requirements of the EMP. Therefore this annex material can be deleted. With the last paragraph deleted, there is no need for the subtitle for the remaining larger paragraph in this annex material.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
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Submittal Date: Fri Dec 22 12:35:43 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-127-NFPA 70B-2024
Statement: This first revision deletes unnecessary and redundant information.

Public Input No. 179-NFPA 70B-2023 [Section No. A.22.3.3]

A.22.3.3 ~~—~~ 6.1 ___

OSHA 29 CFR 1926.56, “Illumination,” and *The Lighting Library* (Illuminating Engineering Society of North America) provide guidance on acceptable illumination levels.

Statement of Problem and Substantiation for Public Input

This annex material is renumbered to match proposed changes in Chapter 22.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 178-NFPA 70B-2023 [Sections 22.3.3, 22.3.4]	
Public Input No. 178-NFPA 70B-2023 [Sections 22.3.3, 22.3.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
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Submittal Date: Fri Dec 22 13:55:40 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-75-NFPA 70B-2024

Statement: The maintenance program information was added to clarify the requirements for lighting maintenance.

The order of the section was changed to match standard headings in other Chapters.

Public Input No. 188-NFPA 70B-2023 [Section No. A.25.1.1]

A.25.1.1

There are two basic types of UPS systems: static and rotary. Some systems are hybrid versions that incorporate some features of both.

A static unit rectifies incoming ac power to dc and then inverts the dc into ac of the proper voltage and frequency as input power to the load. A battery bank connected between the rectifier and inverter sections ensures an uninterrupted supply of dc power to the inverter section based on the designed ride through time based on system load and battery bank sizing .

A basic rotary system is essentially a motor-generator set that provides isolation between the incoming power supply and the load and stabilizes power supply aberrations by flywheel mechanical inertia effect.

In the UPS industry, the term *module* refers to a single self-contained enclosure containing the power and control elements needed to achieve uninterrupted operation. These components include transformers, rectifier, inverter, and protective devices.

UPS systems can comprise one or more UPS modules connected in parallel either to increase the capacity of the system power rating or to provide redundancy in the event of a module malfunction or failure. Figure A.25.1.1(a) illustrates a typical single-module static 3-phase UPS configuration. Note that in this configuration the solid-state switch (SSS) is internal to the UPS module.

Figure A.25.1.1(a) Typical Single-Module Static 3-Phase UPS Configuration.

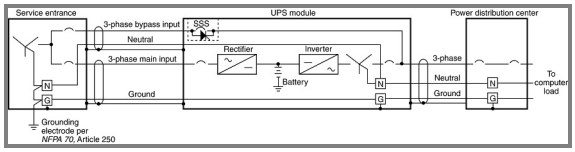
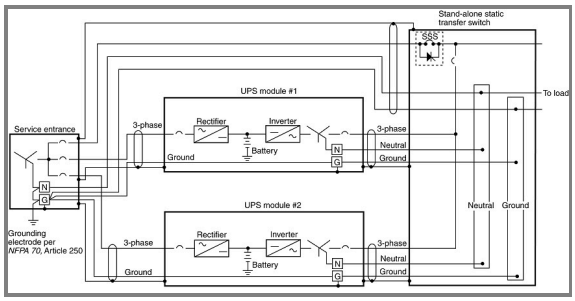


Figure A.25.1.1(b) illustrates a typical multimodule static 3-phase UPS configuration. Note that in this configuration the SSS is in the stand-alone static transfer switch (STC) control cabinet.

Figure A.25.1.1(b) Typical Multimodule Static 3-Phase UPS Configuration.



Almost all UPS systems comprise these common elements: disconnecting means, bypass and transfer switches, protective devices and power switchgear, molded-case circuit breakers, and fuses. Depending on the type of UPS (static, rotary, or hybrid), the system might also include transformers, batteries, a battery charger, a rectifier/inverter unit (static system), and a motor-generator set (rotary system). The system might also be supported by a standby generating unit to permit operations to continue during sustained power outages.

Statement of Problem and Substantiation for Public Input

The annex material is updated to help more clearly indicate that the UPS system has a defined ride through time and will not supply power indefinitely.

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Submittal Date: Fri Dec 22 14:19:35 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-128-NFPA 70B-2024
Statement: This first revision provides the additional clarity that a UPS system has a defined ride through time and will not necessarily supply power indefinitely.

Public Input No. 203-NFPA 70B-2023 [Section No. A.27.3.2]

A.27.3.2

Where rotating equipment is exposed to dirt, regular inspections should detect when cleaning is needed. The external surface of motors should be kept clean because a pileup of dirt restricts heat dissipation.

Machines that have been clogged with mud from dust storms, floods, or other unusual conditions should be given a thorough water washing, usually with a hose with pressure not exceeding 1.72 kPa (25 psi). Initial cleaning should be made with hot nonsaline water plus detergent, followed by a rinse with hot nonsaline water (no detergent). The machine should be completely dismantled, terminal boxes opened, and all corroded parts identified for repair or replacement. All components that are to be reused should be washed in a tank of hot, fresh, nonsaline water for at least four hours. The winding insulation resistance should be measured with a megohmmeter every 2 hours until the insulation resistance has stabilized. Allow the insulation to cool in a dry environment to avoid moisture absorption. Sleeve bearings and housings should be cleaned and rolling element bearings should be replaced with the same type as originally supplied with the machine.

~~*Drying Methods.*~~ The commonly used drying methods are external heat or internal heat. External heat is preferred because it is the safer application. Forced hot air can be heated electrically, by steam, or by a controlled gas burner. Electric space heaters or infrared lamps can also be used. They should be distributed so as not to overheat any machine components.

Coil insulation can be dried by circulating current through the winding. There is some hazard involved with this method because the heat generated in the inner parts is not readily dissipated. This method should be followed only under competent supervision.

Statement of Problem and Substantiation for Public Input

The subheading is not required and is removed by this PI. The first sentence is modified to be more specific.

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Submittal Date: Mon Dec 25 17:08:21 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: The recommendation in this public input does not improve the usability of the guidance in A.27.3.2.

Public Input No. 213-NFPA 70B-2023 [Sections A.30.2.1, A.30.2.2]

~~Sections A~~ Section A .30.2.1~~, A.30.2.2~~

A.30.2.1

A maintenance program helps to ensure the greatest level of safety to the maintenance worker and that the highest level of efficiency and reliability can be obtained from the operation of the system. The system owner or maintenance personnel should consider performing maintenance during the nighttime, during periods of low moonlight and with minimal artificial light illuminating the array. This helps to reduce electrical hazards and lost production.

~~**A.30.2.2** —~~

Significant weather, such as hail, heavy snow, high winds, driving rain, or lightning, can adversely impact PV systems and their associated equipment. The priority is to render the site physically and electrically safe by tying down loose items and disconnecting exposed circuits and ground faults.

Statement of Problem and Substantiation for Public Input

Requirement 30.2.2 is being deleted in a related PI. The annex material for 30.2.2 is good and is being moved to A30.2.1.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 212-NFPA 70B-2023 [Section No. 30.2.2]	
Public Input No. 212-NFPA 70B-2023 [Section No. 30.2.2]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
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Submittal Date: Mon Dec 25 18:17:25 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-82-NFPA 70B-2024
Statement: This subdivision has been deleted because the requirements are already covered by Section 4.2. Annex A.30.2.2 information is amended to A.30.2.1.

Public Input No. 215-NFPA 70B-2023 [Sections A.30.3.1, A.30.3.2, A.30.4.1, A.30.4.2, A.30.4.5]

Sections A.30.3.1, A.30.3.~~2, A.30.4.~~ 1, A.30.~~4~~ 3 .2, A.30.~~4~~ 3 .5

A.30.3.1

Proper signage should be installed to identify the location of rooftop panels on the building prior to completion of installation. Marking on conduits and enclosures is needed to provide guidance for maintenance and emergency personnel to isolate the PV electrical system. This can facilitate identifying energized electrical lines that connect the solar modules to the inverter, which can be energized even when the inverter is offline. See also *NFPA 70*, Article 690.

~~**A.30.3.2** —~~

See

~~*NFPA 70* , Article 690.~~

~~**A.30.4.1** —~~

~~See~~

IEC 62446-2, *Photovoltaic (PV) systems — Requirements for testing, documentation and maintenance — Part 2: grid connected systems — Maintenance of PV systems* .

A.30.~~4~~ 3 .2

PV systems and their associated equipment can be damaged when cleaned improperly. The following precautions should be considered:

(1) Cold water should never be applied to a hot PV array as thermal shock can damage the modules.

(2) Cleaning robots and systems should be validated with the system owner and designer as acceptable for the climate, environment, and module types.

(3) Water or cleaning solutions should not be applied to damaged or cracked modules.

A.30.~~4~~ 3 .5

Infrared thermography (IR): This noncontact electrical test can be performed on photovoltaic modules, strings, systems, and/or associated wiring connections. The modules or systems must have current flowing to acquire useful data. These images can identify potential issues, including failed modules, high-resistance connections, cell hot spots, and interconnection issues.

IV curve trace — current and voltage (IV) tracing: This electrical testing is used to determine output and electrical parameters of photovoltaic modules, strings, and systems. Tests are conducted on electrically isolated photovoltaic devices. Electrical parameters are evaluated, including open circuit voltage, short-circuit current, maximum power, maximum power voltage, and maximum power current. This test can give an accurate snapshot of the health of the module, string, or system.

Electroluminescence imaging (EL): This noncontact electrical test is a useful tool to find and identify cracked cells in deployed crystalline or wafer-based photovoltaic modules. Depending on the equipment used, the modules or strings might need to be isolated to acquire useful images. Cracks in cells can contribute to power loss.

Statement of Problem and Substantiation for Public Input

Another PI makes a recommendation to delete 30.3, 30.3.1, and 30.3.2 and renumber the section to allow Periodic Maintenance Procedures to start at 30.3 to make the equipment chapter consistent with other chapters. Renumbering take place of the annex material in this PI to move the annex material.

Existing annex material A30.3.2 is not needed as it is already part of A30.3.1.

Existing annex material A30.3.1 is retained and kept in the renumbered 30.4.1 which becomes new 30.3.1.

Existing annex material A30.4.1 is retained and kept in the renumbered 30.4.1 which becomes new 30.3.1.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 214-NFPA 70B-2023 [Sections 30.3, 30.4]	
Public Input No. 214-NFPA 70B-2023 [Sections 30.3, 30.4]	

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Mon Dec 25 18:33:20 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: PV systems are special systems that require all documentation in the list. The associated annex is not modified since the requirement is unchanged. The label required by 30.3.2 needs to be affixed if it is missing. Renumbering is addressed by a global revision.

Public Input No. 226-NFPA 70B-2024 [Section No. A.34.3.1]

A.34.3.1

Any components found to be excessively corroded should be repaired or replaced. Leaks should be mitigated, or ventilation should be added or corrected as needed. Missing motor nameplates should be replaced. Electrically operated pool pumps should be listed and labeled. Overhead conductor clearances should be in accordance with 680.9(A) of *NFPA 70*. ~~Any components found to be excessively corroded should be repaired or replaced. Leaks should be mitigated, or ventilation shall be added or corrected as needed. Missing motor nameplates should be replaced. Electrically operated pool pumps should be listed and labeled. Overhead conductor clearances should be in accordance with 680.9(A) of *NFPA 70* .~~

Statement of Problem and Substantiation for Public Input

The four sentences of text in this annex material were repeated. This PI deletes the redundant text.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
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Submittal Date: Mon Jan 01 20:04:43 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-129-NFPA 70B-2024
Statement: This first revision removes redundant text.

Public Input No. 228-NFPA 70B-2024 [Section No. A.34.3.2.3]

A.34.3.2.3

The ~~maximum~~ resistance value ~~permitted~~ between the luminaire and niche ~~is 0~~ should be less than 0 .0003 ohms.

Statement of Problem and Substantiation for Public Input

The existing annex material is written as a requirement: maximum value is 0.0003 ohms. The language is changed to make it clear the ohm value is a value that should not be exceeded and not an allowed maximum.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
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Submittal Date: Mon Jan 01 20:09:10 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-130-NFPA 70B-2024
Statement: This revision provides guidance to support the application of its related requirement in 34.3.2.3.

Public Input No. 233-NFPA 70B-2024 [Sections B.1.3, B.1.4]

Sections B.1.3, B.1.4

B.1.3 Extension Cords.

~~Are extension~~ Extension cords should not be used in place of permanent wiring, ~~and are they of excessive length and of proper type? They should~~ should not be of excessive length, and should be the proper type. The cords should not pass through walls, partitions, or doors.

B.1.4 Multiple Current Taps.

~~Are multiple~~ Multiple current taps from extension cords should not be used because of too few receptacles ~~? In particular, are they used in areas such as canteens, lunchrooms, and offices?~~ in an area.

Statement of Problem and Substantiation for Public Input

The language is changed to be statements instead of questions to be more consistent with most other content in this section. Other PIs make similar changes to other "questions" in this section.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
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Submittal Date: Mon Jan 01 20:33:49 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-131-NFPA 70B-2024
Statement: This revision revises the questions posed into statements and removes vague wording.

Public Input No. 234-NFPA 70B-2024 [Section No. B.1.7]

B.1.7 Receptacle Outlets.

Grounding-type receptacles are generally required. ~~Are special~~ Any special receptacle configurations used for those supplying unusual voltages, ~~frequencies, and so on? Are they well~~ or frequencies should be well marked or identified? In particular, missing faceplates, receptacles showing signs of severe arcing, loose mounting, and so on should be noted.

Statement of Problem and Substantiation for Public Input

The language is changed to be statements instead of questions to be more consistent with most other content in this section. Other PIs make similar changes to other "questions" in this section.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
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Zip:

Submittal Date: Mon Jan 01 20:37:14 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-132-NFPA 70B-2024
Statement: This revision revises the questions posed into statements and removes vague wording.

Public Input No. 235-NFPA 70B-2024 [Sections B.1.12, B.1.13, B.1.14]

Sections B.1.12, B.1.13, B.1.14

B.1.12 Services.

The condition of weatherheads and weatherhoods should be visually checked to determine that they remain in good condition. Nests, such as rodent, insect, and bird nests, should be documented. At the same time, the apparent condition of lightning arresters, surge capacitors, grounding conductors, and grounds should be determined. ~~Are switches~~ Switches should be able to be safely and readily accessible~~?~~ .

B.1.13 Electrical Equipment Rooms and Motor Control Centers.

Electrical equipment rooms and motor control centers should be clean, used for no other purpose, and free of storage of any kind, especially combustible material. Ventilation equipment should be in working condition and unobstructed. Any unusual noises or odors should be noticed and reported promptly. Metering equipment should be checked for high or low voltage and current and any indication of accidental grounding (ungrounded systems). ~~Are switches~~ Switches , disconnects, and motor controllers should be properly identified as to function~~? Are fire extinguishers~~ . Fire extinguishers shoudl be in place, of suitable type, and charged~~?~~ .

B.1.14 Grouped Electrical Control Equipment (Such as Might Be Mounted on Walls).

~~Is grouped~~ Grouped electrical control equipment should be protected from physical damage and be readily accessible~~? Are any equipment enclosures damaged, or do any~~ . Equipment enclosures should not be damaged or have missing or open covers~~? Are any live parts exposed? Any~~ . Live parts should not be exposed. Any condition that prevents quick or ready access should be reported.

Statement of Problem and Substantiation for Public Input

The language is changed to be statements instead of questions to be more consistent with most other content in this section. Other PIs make similar changes to other "questions" in this section.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Mon Jan 01 20:38:43 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-133-NFPA 70B-2024
Statement: This revision revises the questions posed into statements and removes vague wording.

Public Input No. 236-NFPA 70B-2024 [Section No. B.1.17.3]

B.1.17.3

Emergency power supplies, such as batteries and engine-driven generators, normally receive scheduled tests. Records of periodic tests should be checked. ~~Are fuel~~ Fuel and cooling supplies for engine drives ~~adequate? Are fire extinguishers~~ shoudl be verified as adequate. Fire extinguishers shoudl be in place, of proper type, and charged~~?~~ .

Statement of Problem and Substantiation for Public Input

The language is changed to be statements instead of questions to be more consistent with most other content in this section. Other PIs make similar changes to other "questions" in this section.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
City:
State:
Zip:

Submittal Date: Mon Jan 01 20:41:03 EST 2024
Committee: EEM-AAA

Committee Statement

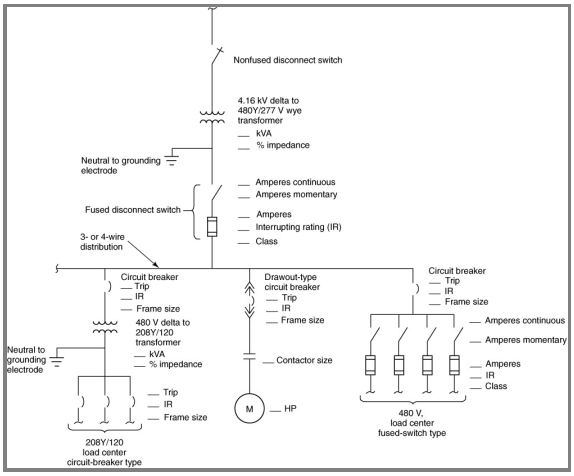
Resolution: FR-134-NFPA 70B-2024
Statement: This revision revises the questions posed into statements and removes vague wording.

Public Input No. 237-NFPA 70B-2024 [Section No. D.1]

D.1

~~Note that Annex D is presented to show use of symbols and should not be construed to indicate recommendations.~~ Figure D.1 shows the use of some typical symbols in a single-line power distribution program.

Figure D.1 Typical Use of Symbols in a Single-Line Power Distribution Program.



Statement of Problem and Substantiation for Public Input

The deleted text is not needed as part of D.1. The note seems unnecessary for Annex D. If the note is needed, it should be moved to it's own section in Annex D as it would apply to all of Annex D, not just D.1.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
Organization: DuPont
Street Address:
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Submittal Date: Mon Jan 01 20:42:46 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-135-NFPA 70B-2024
Statement: The deleted text is not necessary for the application and understanding of Figure D.1.

Public Input No. 241-NFPA 70B-2024 [Section No. H.1]

H.1 ~~Introduction~~ General Requirements .

Preferably, all types of electrical equipment should be stored in a clean, heated building affording good physical protection and providing controlled access to prevent unauthorized tampering with the equipment. However, equipment can be stored in other inside and outside environments with proper provisions to satisfy the general recommendations of this section and the recommendations specified in the particular equipment sections. The manufacturer's instructions for the specific equipment and environment should be followed.

H.1.1

Before storage, when equipment is received, it should be inspected for shipping damage, and reports should be made as recommended to recover repair or replacement costs from the carrier in the event damage was sustained. In some cases, visual inspection might indicate a need to test for concealed damage before the equipment is removed from the carrier vehicle.

H.1.2

Covers are recommended unless storage conditions specified in Section H.1 exist. Canvas tarpaulins or the equivalent are preferred over other coverings because they provide better humidity control and enclosure scuff protection.

H.1.3

The manufacturer's shipping skids should be left on the equipment to provide structural support until the equipment is set in its final resting place.

H.1.4

Insulation tests should be conducted and test values recorded when the equipment is received. Periodic tests are recommended in the following sections for particular types of equipment. In all cases, insulation should be retested prior to start-up, with sufficient time provided for any necessary dry-out or repair prior to energizing.

H.1.5

Regular inspections should be made to check the general effectiveness of equipment storage provisions, and improvements should be made as indicated.

Statement of Problem and Substantiation for Public Input

H.1 is titled Introduction but it is not an introduction as it has recommendations for storage and does not just introduce the topic. The section title is changed with this PI to be more descriptive of the section contents.

Submitter Information Verification

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Submittal Date: Mon Jan 01 20:55:20 EST 2024

Committee: EEM-AAA

Committee Statement

Resolution: FR-136-NFPA 70B-2024

Statement: This first revision recognizes that there are environmental conditions other than heat that should be considered and clarifies that “requirements”, not recommendations, are specified in the particular equipment sections.

Public Input No. 239-NFPA 70B-2024 [Section No. H.1 [Excluding any Sub-Sections]]

Preferably, all types of electrical equipment should be stored in a clean, conditioned air (heated/cooled) building affording good physical protection and providing controlled access to prevent unauthorized tampering with the equipment. However, equipment can be stored in other inside and outside environments with proper provisions to satisfy the general recommendations of this section and the recommendations specified in the particular equipment sections. The manufacturer's instructions for the specific equipment and environment should be followed.

Statement of Problem and Substantiation for Public Input

The language is changed to refer to "conditioned air". For some storage conditions, having equipment in a humidity controlled environment is important so the storage may need air conditioning, not just a heated facility.

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Submittal Date: Mon Jan 01 20:51:01 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-136-NFPA 70B-2024
Statement: This first revision recognizes that there are environmental conditions other than heat that should be considered and clarifies that "requirements", not recommendations, are specified in the particular equipment sections.

Public Input No. 240-NFPA 70B-2024 [Section No. H.1.2]

H.1.2

Covers are recommended ~~unless storage conditions specified in Section~~ ~~H.1~~ ~~exist.~~ for the equipment. Canvas tarpaulins or the equivalent are preferred over other coverings because they provide better humidity control and enclosure scuff protection.

Statement of Problem and Substantiation for Public Input

The existing language refers to H.1. The current language does not make any sense as this item is part of H1. The wording is changed to remove this conflict.

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Submitter Full Name: Paul Sullivan
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Submittal Date: Mon Jan 01 20:53:06 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-137-NFPA 70B-2024
Statement: Covers, canvases, tarps do not provide enough protection for the equipment.

Public Input No. 242-NFPA 70B-2024 [Section No. H.2 [Excluding any Sub-Sections]]

~~Where storage conditions specified in Section~~ ~~H.1~~ ~~are not available, indoor or outdoor storage~~ Equipment storage should comply with the following paragraphs that provide equipment specific recommendations .

Statement of Problem and Substantiation for Public Input

The existing reference to when equipment does not meet H.1 does not make sense. H.1 is a list of general recommendations. The language is revised to be more of an introduction of the recommendations in H.2.

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Submittal Date: Mon Jan 01 20:56:59 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-138-NFPA 70B-2024
Statement: This first revision removes unnecessary text while retaining informative recommendations.

Public Input No. 243-NFPA 70B-2024 [Section No. H.2.1.3]

H.2.1.3

~~Temporary heaters~~ When the equipment is not furnished with space heaters, temporary heaters or lamp banks should be used ~~where space heaters are not furnished~~ to maintain temperature at a level approximately 12°C (22°F) above ambient.

Statement of Problem and Substantiation for Public Input

The existing reference to "space heaters" can lead to confusion as the reference does not specifically refer to the equipment space heaters. The proposed changes improves readability of the sentence.

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Submittal Date: Mon Jan 01 20:59:23 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-139-NFPA 70B-2024
Statement: This first revision clarifies the information provided in the recommendation in this section in recognition for electrical equipment to include electronics.

Public Input No. 245-NFPA 70B-2024 [Section No. M.1.2.1]

M.1.2.1 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D923, *Standard Practices for Sampling Electrical Insulating Liquids*, 2015.

ASTM D924, *Standard Test Method for Dissipation Factor (or Power Factor) and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids*, ~~2015~~ 2023 .

ASTM D971, *Standard Test Method for Interfacial Tension of Insulating Liquids Against Water by the Ring Method*, 2020.

ASTM D974, *Standard Test Method for Acid and Base Number by Color-Indicator Titration*, ~~2014e2~~ 2022 .

ASTM D1298, *Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method*, 2012b, reapproved 2017.

ASTM D1500, *Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)*, 2012, reapproved 2017.

ASTM D1524, *Standard Test Method for Visual Examination of Used Electrical Insulating Liquids in the Field*, 2015, reapproved 2022 .

ASTM D1533, *Standard Test Method for Water in Insulating Liquids by Coulometric Karl Fischer Titration*, 2020.

ASTM D1816, *Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using VDE Electrodes*, 2012, reapproved 2019.

ASTM D1933, *Standard Specification for Nitrogen Gas as an Electrical Insulating Material,* 2003, reapproved 2017.

ASTM D5837, *Standard Test Method for Furanic Compounds in Electrical Insulating Liquids by High-Performance Liquid Chromatography (HPLC)*, 2015.

Statement of Problem and Substantiation for Public Input

Updating revision information for ASTM standards to be the latest version.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Mon Jan 01 21:07:54 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-140-NFPA 70B-2024

Statement: This first revision updates the revision dates of the referenced ASTM standards.

Public Input No. 246-NFPA 70B-2024 [Section No. M.1.2.2]

M.1.2.2 EASA Publications.

Electrical Apparatus Service Association, Inc., 1331 Baur Blvd, St. Louis, MO 63132.

ANSI/EASA AR100, *Recommended Practice for the Repair of Rotating Electrical Apparatus*, ~~2015~~ 2020 .

Statement of Problem and Substantiation for Public Input

Updating the reference standard year to the most recent version.

Submitter Information Verification

Submitter Full Name: Paul Sullivan
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Submittal Date: Mon Jan 01 21:12:10 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-141-NFPA 70B-2024
Statement: This first revision updates the revision date of the referenced standard.

Public Input No. 247-NFPA 70B-2024 [Section No. M.1.2.5]

M.1.2.5 IEEE Publications.

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

IEEE C2, *National Electrical Safety Code® (NESC®)*, ~~2017~~ 2023 .

ANSI/IEEE C37.20.7, *Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults*, 2017.

IEEE C37.23, *Standard for Metal-Enclosed Bus*, 2015.

ANSI/IEEE 43, *Recommended Practice for Testing Insulation Resistance of ~~Rotating~~ Electric Machinery,* 2013.

IEEE C57.12.91, *Standard Test Code for Dry-Type Distribution and Power Transformers*, 2020.

IEEE C57.104, *Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers*, 2019.

ANSI/IEEE C57.110, *Recommended Practice for Establishing Liquid Immersed and Dry-Type Power and Distribution Transformer Capability when Supplying Nonsinusoidal Load Currents*, 2018.

ANSI/IEEE C62.41, *Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits*, 1991.

IEEE 80, *Guide for Safety in AC Substation Grounding*, 2013.

IEEE 100, *Authoritative Dictionary of IEEE Standards Terms*, 2000 (withdrawn).

ANSI/IEEE 141, *Recommended Practice for Electric Power Distribution for Industrial Plants (IEEE Red Book)*, 1993.

ANSI/IEEE 142, *Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book)*, 2007.

ANSI/IEEE 241, *Recommended Practice for Electric Power Systems in Commercial Buildings (IEEE Gray Book)*, 1990.

ANSI/IEEE 242, *Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (IEEE Buff Book)*, 2001.

IEEE 315, *Graphic Symbols for Electrical and Electronics Diagrams,* 1975 (1993).

ANSI/IEEE 399, *Recommended Practice for Industrial and Commercial Power Systems Analysis (IEEE Brown Book)*, 1997.

ANSI/IEEE 400, *Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above*, ~~2012~~ 2023 .

IEEE 450, *Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications*, ~~2010~~ 2020 .

ANSI/IEEE 493, *Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems (IEEE Gold Book)*, 2007.

ANSI/IEEE 519, ~~*Recommended Practice and Requirements*~~ *Standard for Harmonic Control in Electrical Power Systems*, ~~2014~~ 2022 .

ANSI/IEEE 1100, *Recommended Practice for Powering and Grounding Electronic Equipment (IEEE Emerald Book),* 2005.

IEEE 1106, *Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*, 2015.

IEEE 1159, *Recommended Practice for Monitoring Electric Power Quality*, 2019.

IEEE 1188, *Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*, 2005 (2010 with 2014 amendment).

IEEE 1584™, *Guide for Performing Arc-Flash Hazards Calculations*, 2018.

IEEE 1578, *Recommended Practice for Stationary Battery Electrolyte Spill Containment and Management*, 2018.

IEEE 1657, *Recommended Practice for Personnel Qualifications for Installation and Maintenance of Stationary Batteries*, 2018.

IEEE 3000 Standards: *Fundamentals.*

IEEE 3001 Standards: *Power Systems Design.*

IEEE 3002 Standards: *Power Systems Analysis.*

IEEE 3002.8, *Recommended Practice for Conducting Harmonic Studies and Analysis of Industrial and Commercial Power Systems*, 2018.

IEEE 3003 Standards: *Power Systems Grounding.*

IEEE 3004 Standards: *Protection & Coordination.*

IEEE 3005 Standards: *Energy & Standby Power Systems.*

IEEE 3006 Standards: *Power Systems Reliability.*

IEEE 3007 Standards: *Maintenance, Operations & Safety.*

IEEE 3007.1, *Recommended Practice for the Operation and Management of Industrial and Commercial Power Systems*, 2010.

IEEE 3007.2, *Recommended Practice for the Maintenance of Industrial and Commercial Power Systems*, 2010.

IEEE 3007.3, *Recommended Practice for Electrical Safety in Industrial and Commercial Power Systems*, 2012.

Statement of Problem and Substantiation for Public Input

Updating document publication dates and titles to match most recent versions.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-142-NFPA 70B-2024
Statement: This first revision updates the revision dates/titles of the referenced IEEE standards.

Public Input No. 248-NFPA 70B-2024 [Section No. M.1.2.6]

M.1.2.6 NEMA Publications.

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

NEMA AB-4, *Guidelines for Inspection and Preventive Maintenance of Molded-Case Circuit Breakers Used in Commercial and Industrial Applications*, ~~2017~~ 2023 .

NEMA BU1.1, *General Instructions for Handling, Installation, Operation, and Maintenance of Busway Rated 600 Volts or Less*, 2010.

ANSI/NEMA C84.1, *American National Standard for Electric Power Systems and Equipment — Voltage Ratings (60 Hz)*, 2020.

NEMA GD 1, *Evaluating Water-Damaged Electrical Equipment,* 2019.

NEMA GD 2, *Evaluating Fire- and Heat-Damaged Electrical Equipment*, 2016.

NEMA KS - 3, *Guidelines for Inspection and Preventive Maintenance of Switches Used in Commercial and Industrial Applications*, ~~2010~~ 2023 .

ANSI/NEMA WD 6, *Wiring Devices — Dimensional Specifications*, ~~2016~~ 2021 .

Statement of Problem and Substantiation for Public Input

Updating documents dates and titles to the most recent versions.

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Committee: EEM-AAA

Committee Statement

Resolution: FR-143-NFPA 70B-2024
Statement: This first revision updates the revision dates of the referenced NEMA standards.

Public Input No. 249-NFPA 70B-2024 [Section No. M.1.2.7]

M.1.2.7 NETA Publications.

InterNational Electrical Testing Association, 3050 Old Centre Ave., Suite 101, Portage, MI 49024.

ANSI/NETA ATS, *Standard for Acceptance Testing Specifications for Electrical Power ~~Distribution~~ Equipment and Systems*, 2021.

ANSI/NETA MTS, *Standard for Maintenance Testing Specifications for Electrical Power ~~Distribution~~ Equipment and Systems,* ~~2019~~ 2023 .

Statement of Problem and Substantiation for Public Input

Updating document titles and publication dates to the most recent versions.

Submitter Information Verification

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Submittal Date: Mon Jan 01 21:33:34 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-144-NFPA 70B-2024
Statement: This first revision updates the revision dates and titles of the referenced NETA standards.

Public Input No. 224-NFPA 70B-2023 [Section No. M.1.2.8]

M.1.2.8 UL Publications.

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

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

UL 857, *Busways*, 2009, revised 2021 .

UL 943, *Ground-Fault Circuit-Interrupters*, 2016, revised 2023 .

UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit-Interrupters*, 2012.

UL 1053, *Ground-Fault Sensing and Relaying Equipment*, 2015, revised 2020 .

UL 1066, *Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures*, ~~2017~~ 2022 .

Statement of Problem and Substantiation for Public Input

Update the standards to the most current publication dates.

Submitter Information Verification

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Submittal Date: Fri Dec 29 12:10:55 EST 2023
Committee: EEM-AAA

Committee Statement

Resolution: FR-145-NFPA 70B-2024
Statement: This revision updates the UL publications to the most current revision dates.

Public Input No. 250-NFPA 70B-2024 [Section No. M.1.2.8]

M.1.2.8 UL Publications.

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

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

UL 857, *Busways*, ~~2009~~ 2021 .

UL 943, *Ground-Fault Circuit-Interrupters*, ~~2016~~ 2023 .

UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit-Interrupters*, 2012.

UL 1053, *Ground-Fault Sensing and Relaying Equipment*, ~~2015~~ 2020 .

UL 1066, ~~Low-Voltage AC and DC Power Circuit Breakers~~ *Power Circuit B reakers up to 1000 V C and 1500 V DC Used in Enclosures*, ~~2017~~ 2022 .

Statement of Problem and Substantiation for Public Input

Revising document titles and latest revision dates. Note - Some date changes are the most recent "revision dates" shown on the UL website. They show a different "publication date". Need NFPA staff's assistance to determine what date needs to be shown in NFPA 7B.

Submitter Information Verification

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Submittal Date: Mon Jan 01 21:35:13 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-145-NFPA 70B-2024
Statement: This revision updates the UL publications to the most current revision dates.

Public Input No. 251-NFPA 70B-2024 [Section No. M.2.4]

M.2.4 IEEE Publications.

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

ANSI/IEEE 67, *Guide for Operation and Maintenance of Turbine Generators,* 2005.

ANSI/IEEE 315 (ANSI Y32.2-75), *Graphic Symbols for Electrical and Electronics Diagrams,* 1975, reaffirmed 1993.

ANSI/IEEE 432, *Guide for Insulation Maintenance for Rotating ~~Electrical Machinery~~ Electric Machinery (5 HP to less than 10,000 HP),* 1992 (withdrawn).

IEEE 1250, ~~*IEEE*~~ *Guide for Identifying and Improving Voltage Quality in Power Systems,* ~~2011~~ 2018 .

IEEE 1409, *Guide for Application of Power Electronics for Power Quality Improvement on Distribution Systems Rated 1 kV Through 38 kV,* 2012.

IEEE 1453, ~~*IEEE Recommended Practice — Adoption of IEC 61000-4-15:2010, Electromagnetic compatibility (EMC) — Testing and measurement techniques — Flickermeter — Functional and design specifications,* 2015~~ *Standard for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems* , 2022 .

IEEE 1458, *Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded Case Circuit Breakers for Industrial Applications,* 2017.

IEEE 1564, *Guide for Voltage Sag Indices,* 2014.

IEEE C37.41, *Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories,* 2016.

ANSI/IEEE C37.95, *Guide for Protective Relaying of Utility-Consumer Interconnections,* 2014.

IEEE C37.96, *Guide for AC Motor Protection,* 2012.

IEEE C57.94, *Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers,* 2015.

ANSI/IEEE C57.106, *Guide for Acceptance and Maintenance of Insulating Oil in Equipment,* 2006.

IEEE C57.111, *Guide for Acceptance and Maintenance of Silicone Insulating Fluid and Its Maintenance in Transformers,* 2009.

ANSI/IEEE C57.121, *Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers,* 1998, reaffirmed 2009.

Statement of Problem and Substantiation for Public Input

Updating document titles and publication dates to be the most recent versions.

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Submittal Date: Mon Jan 01 21:44:56 EST 2024

Committee: EEM-AAA

Committee Statement

Resolution: FR-146-NFPA 70B-2024

Statement: This first revision updates the dates and titles of the referenced standards. ANSI/IEEE C57.106 is now referenced in the annex and has been move to Section M.1.

Public Input No. 252-NFPA 70B-2024 [Section No. M.2.7]

M.2.7 NEMA Publications.

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

NEMA 280, *Application Guide for Ground-Fault Circuit Interrupters* (see Section 7, Field Test Devices, and Section 8, Field Troubleshooting), 1990.

NEMA AB 3, *Molded Case Circuit Breakers and Their Application*, 2013.

NEMA ~~GD 1, *Evaluating Water-Damaged Electrical Equipment,* 2016.~~NEMA ICS 1.3, *Preventive Maintenance of Industrial Control and Systems Equipment*, 1986, reaffirmed 2015.

NEMA ICS 2.3, *Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated Not More Than 600 Volts,* ~~1995, reaffirmed 2008~~ 2019 .

NEMA ICS 7, ~~*Adjustable — Speed*~~ *Adjustable Speed Drives,* ~~2014~~ 2020 .

ANSI/NEMA MG ~~2~~ 10012 , *Safety Standard ~~for Construction~~ and Guide for Selection, Installation, and Use of Electric Motors and Generators* ~~(see Section 8.3, Maintenance), 2014~~ , 2023 .

NEMA PB 1.1, *General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated ~~600 V~~ 1000 V or Less,* ~~2013~~ 2023 .

Statement of Problem and Substantiation for Public Input

Removing NEMA GD 1 as it is listed in the previous reference section. Updated publication titles and latest publication dates. MG 2 was superseded by MG 10012.

Submitter Information Verification

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Submittal Date: Mon Jan 01 21:53:18 EST 2024
Committee: EEM-AAA

Committee Statement

Resolution: FR-147-NFPA 70B-2024
Statement: This revision is being made to update to the most current revision dates and deleting duplicate reference to NEMA GD-1 that appears in previous section M.1.2.6