The NEW Standard!

Jamerson & Bauwens
Electrical Contractors, Inc.

TEGG
An ABM Company

Presented by:

Joe Gierlach – Vice President Technical Training and Support

NFPA-70B 2023

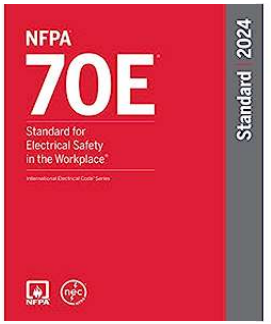
Standard for Electrical Equipment Maintenance

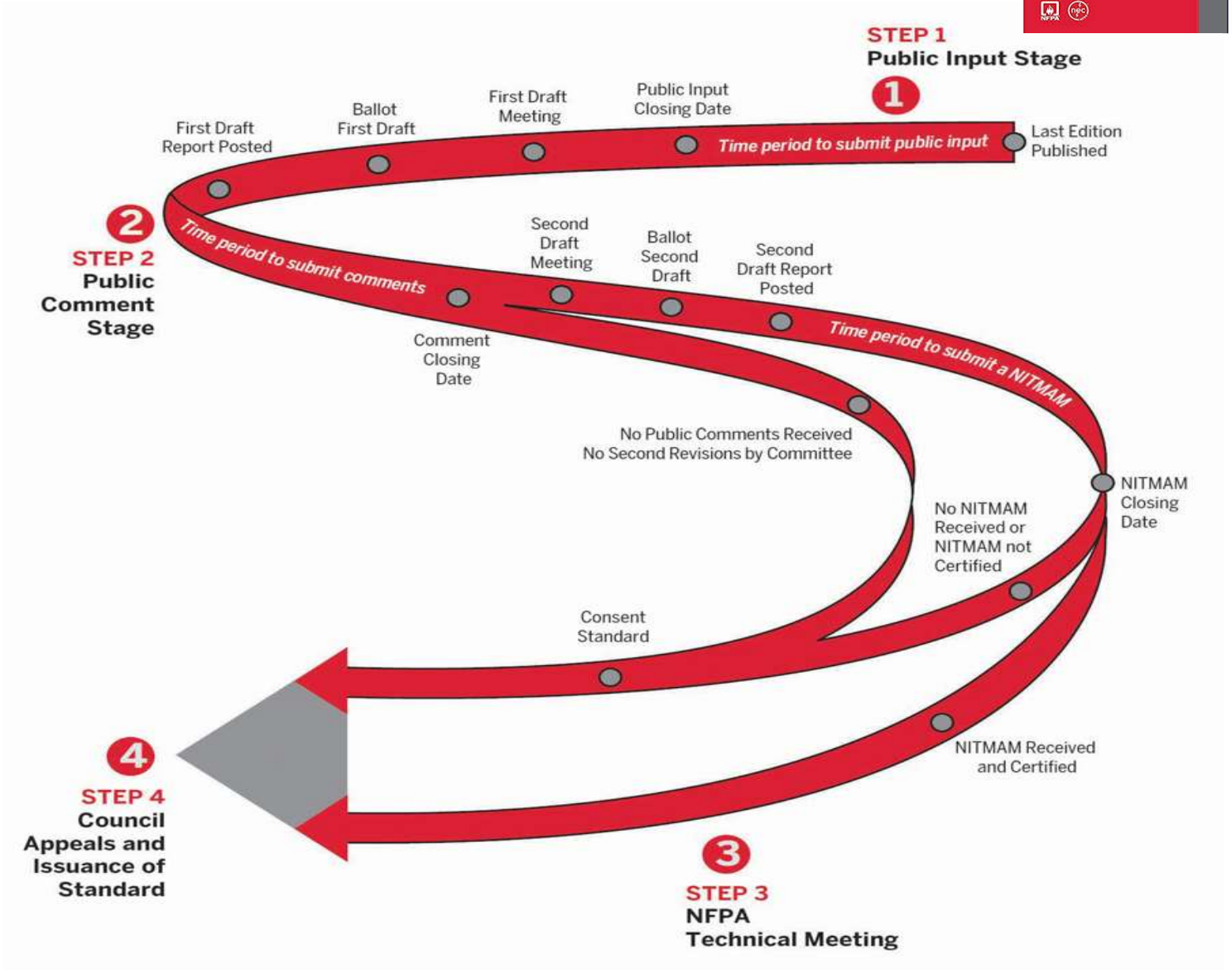
- NFPA® 70B, *Standard for Electrical Equipment Maintenance*, details preventive maintenance for electrical, electronic, and communication systems and equipment in industrial, institutional, commercial, and large residential buildings.

- Used in conjunction with NFPA 70E®, *Standard for Electrical Safety in the Workplace®*, the document provides requirements for helping to safeguard workers, avoid equipment downtime, and reduce the cost of repairs.

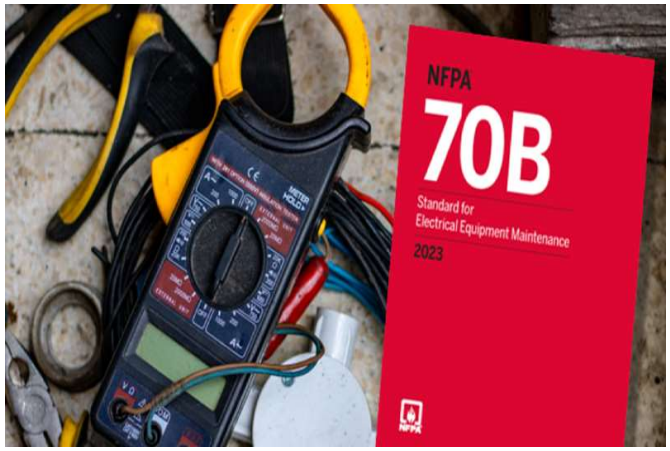
- The biggest change to the 2023 edition is that is has been **converted from a *recommended practice to a standard***. Changes were made throughout the document to update the provisions from recommendations to mandatory requirements.

The Road to Revisions





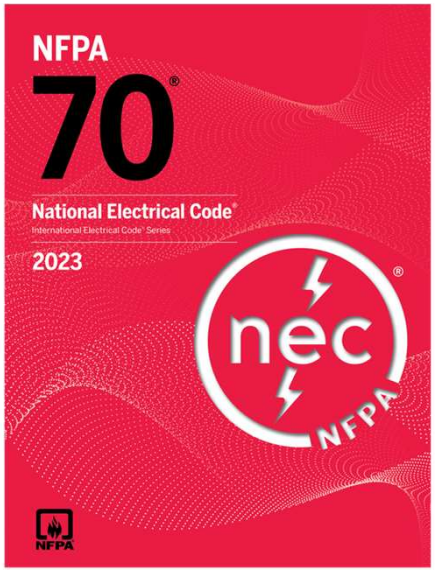
Source: https://netaworldjournal.org/nfpa-70e-2024-edition-second-draft-meeting/

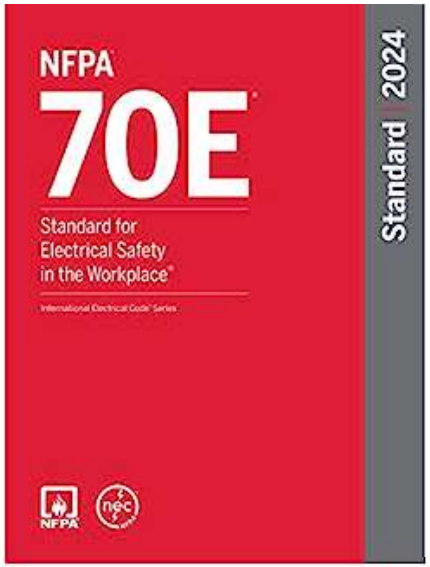


2.4 References for Extracts in Mandatory Sections.

NFPA 70®, *National Electrical Code®*, 2023 edition.
NFPA *70E®*, *Standard for Electrical Safety in the Workplace®*, 2021 edition (2024 is now out)

These are the most recent revision cycles





Article 100 - Definitions

NFPA-70E 2024

Working On (energized electrical conductors or circuit parts):

Informational Note: Examples of “working on” can include but are not limited to diagnostic testing (such as taking readings or measurements of electrical equipment, conductors, or circuit parts with approved test equipment that does not require making any physical change to the electrical equipment, conductors, or circuit parts) and repair or physical alteration of electrical equipment, conductors, or circuit parts (such as making or tightening connections, removing or replacing components, etc.).

Article 100 - Definitions

NFPA-70E 2024

Hazard, Electric Shock. (Electric Shock Hazard)

A source of possible injury or damage to health associated with current through the body caused by contact or approach to exposed energized electrical conductors or circuit parts.

Informational Note: Injury and damage to health resulting from electric shock is dependent on the magnitude of the electrical current, the power source frequency (e.g., 60 Hz, 50 Hz, dc), and the path and time duration of current through the body. The physiological reaction ranges from perception, muscular contractions, inability to let go, ventricular fibrillation, tissue burns, and death.

Article 100 - Definitions

NFPA-70E 2024

Hazard, Electrical. (Electrical Hazard)

A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or arc blast injury.

Informational Note: Class 2 power supplies, listed low voltage lighting systems, and similar sources are examples of circuits or systems that are not considered an electrical hazard.

Some Article Highlights

NFPA-70E 2024 110.2:

(A) Policy

An employer shall establish, document, and implement an electrically safe work condition policy that does both of the following:

(1) Requires hazard elimination to be the first priority in the implementation of safety-related work practices

(2) Complies with 110.2(B)

Informational Note No. 1: See Informative Annex F for examples of hazard elimination. Elimination is the risk control method listed first in the hierarchy of risk control identified in 110.3(H)(3).

Informational Note No. 2: The electrically safe work condition policy could be documented in the employer's electrical safety program or in the employer's management system or similar documentation.

Some Article Highlights

NFPA-70E 2024 110.2 (B):

Exception No. 1: Normal operation of electric equipment shall be permitted where a normal operating condition exists. A normal operating condition exists when all of the following conditions are satisfied:

(1) The equipment is properly installed.

(2) The equipment is properly maintained.

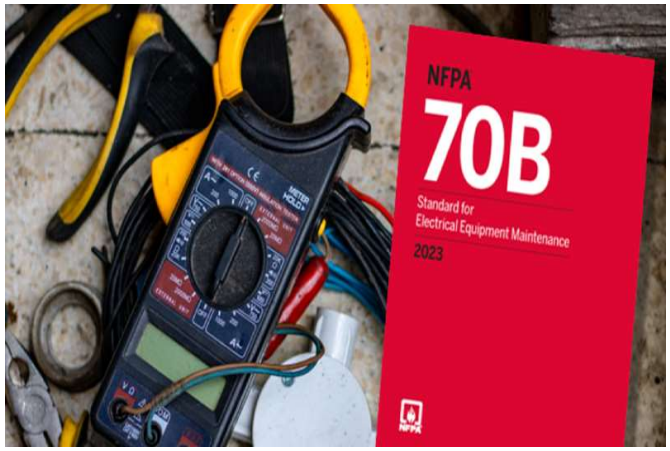
(3) The equipment is rated for the available fault current.

(4) The equipment is used in accordance with instructions included in the listing and labeling and in accordance with manufacturer's instructions.

(5) The equipment doors are closed and secured.

(6) All equipment covers are in place and secured.

(7) There is no evidence of impending failure.



4.2 Electrical Maintenance Program (EMP).

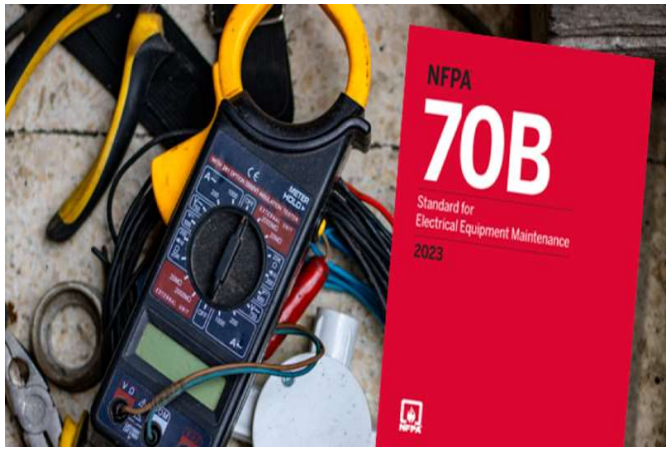
4.2.1 General.

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

4.2.2 Inspection.

4.2.2.1
The EMP shall include elements to verify that electrical equipment or systems have been inspected to comply with applicable installation codes and standards.

4.2.2.2
Equipment-specific maintenance tasks shall be developed utilizing the information gathered during the inspection.

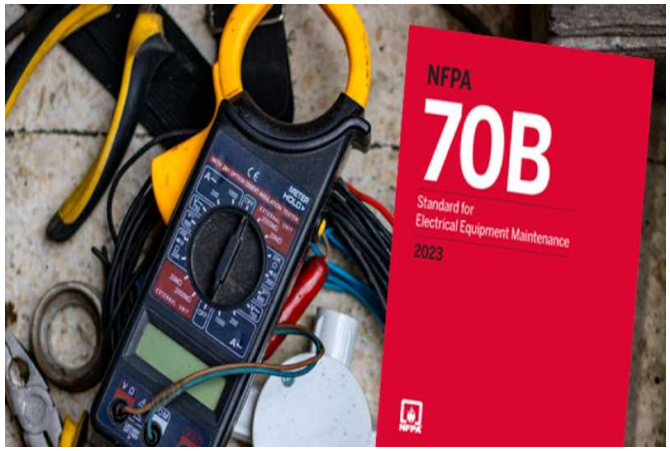


4.2.3 Condition of Maintenance.

The EMP shall include elements that consider current condition of maintenance of electrical equipment and systems as well as the potential safety and operational risks to maintenance and operational personnel. (New Annex S in NFPA-70E)

What EXACTLY does it mean to consider the condition of maintenance?

- Follow the manufacturer's instructions and recommendations
- NFPA-70B is now the maintenance standard providing a road map when manufacture instructions are absent or incomplete
- Do not miss maintenance cycles (adverse affects on safety and longevity)
- NFPA-70E & 70B requires an ongoing, documented electrical maintenance program with concise record keeping
- NFPA-70B requires the following elements of this maintenance program

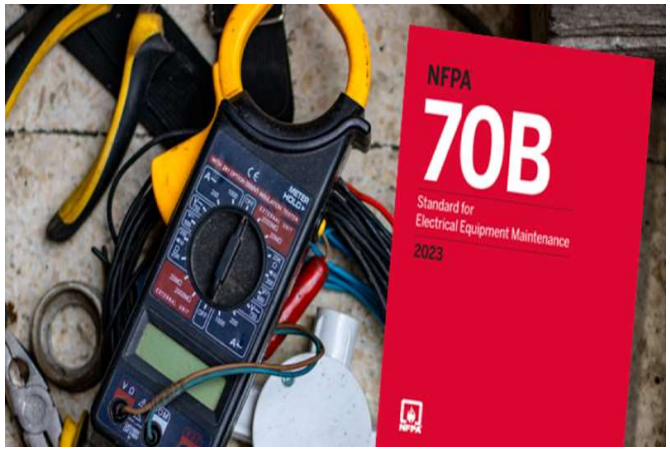


4.2.3 Condition of Maintenance.

The EMP shall include elements that consider current condition of maintenance of electrical equipment and systems as well as the potential safety and operational risks to maintenance and operational personnel. (New Annex S in NFPA-70E)

What EXACTLY does it mean to consider the condition of maintenance?

S.2 Assess the Risk (Eliminate is Priority)
S.3 Visual Inspection (Licensed Technicians)
S.4 Periodic Testing and Inspection (Basic, Premium, Prime)
S.5 Permanently Installed Monitoring (Exitherm)
S.6 Predictive Techniques (Current Technologies)
S.7 Maintenance History (TEGGPro)
S.8 Standard for Electrical Equipment Maintenance (NFPA-70B)



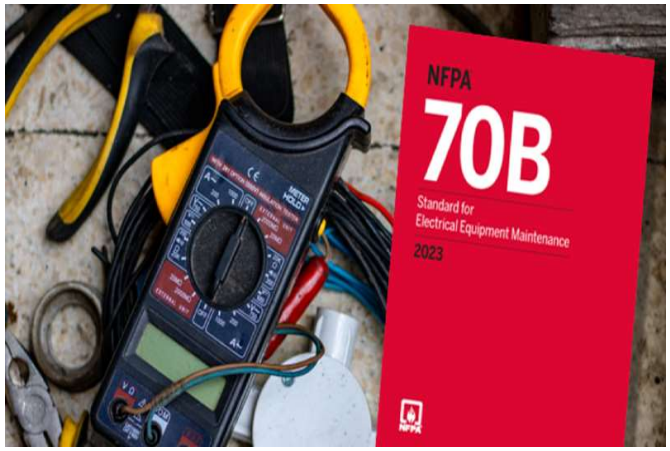
Risk Assessments and Condition of Maintenance.

- 2024 NFPA-70E ***requires*** our risk assessment take into consideration the condition of maintenance.
- Are we doing all that is required for compliance?
- Particularly with overcurrent devices as it pertains to arc flash energies
- Which devices and what tests should we be considering?

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



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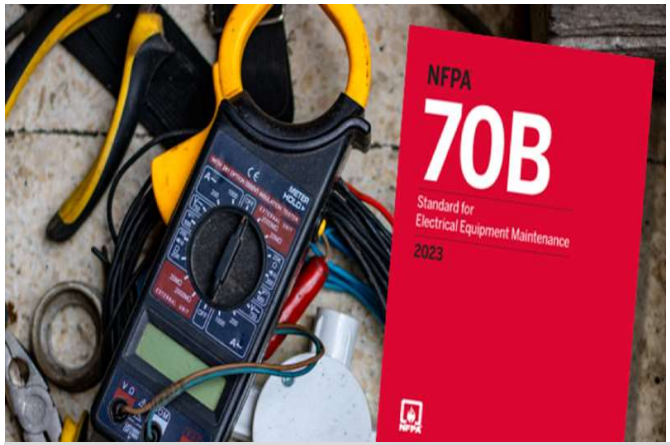
Pin Header

Table 9.2.2 Maintenance Intervals

X

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

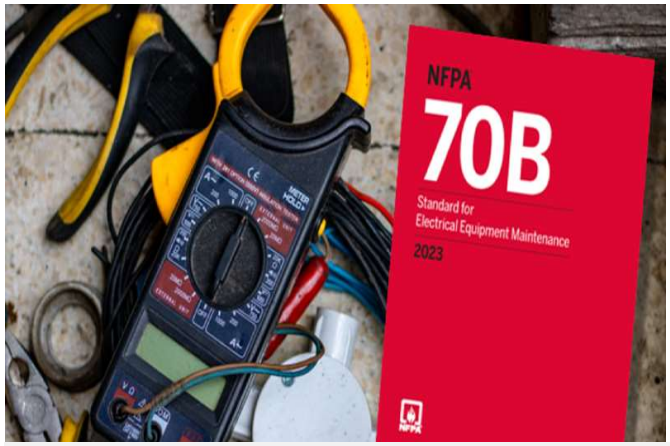


Some excerpts for overcurrent devices

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*
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



Some excerpts for overcurrent devices

15.3.1 Visual Inspections.
A visual inspection shall be conducted in accordance with Table 15.3.1.

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.**

8.3* Testing Category Types

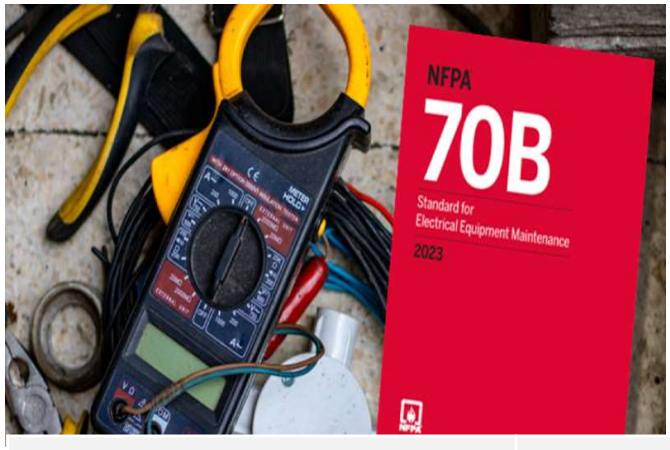


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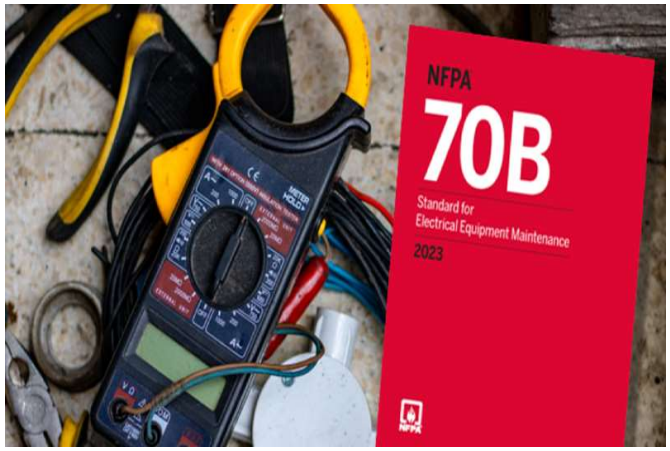
Table 9.2.2 Maintenance Intervals

		Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3
Equipment	**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
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

Table 9.2.2 Maintenance Intervals				
	Equipment Condition Assessment			
		Condition 1	Condition 2	Condition 3
Equipment	**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
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**
	Visual inspection	60 months	36 months	12 months
Power cables	Cleaning	60 months	36 months	12 months
	Mechanical servicing	Reserved	Reserved	
	Electrical testing	60 months	36 months	12 months
Power cables	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
Protective relays, solid state and microprocessor	**Electrical testing**	**36 months**	**24 months**	**12 months**
	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



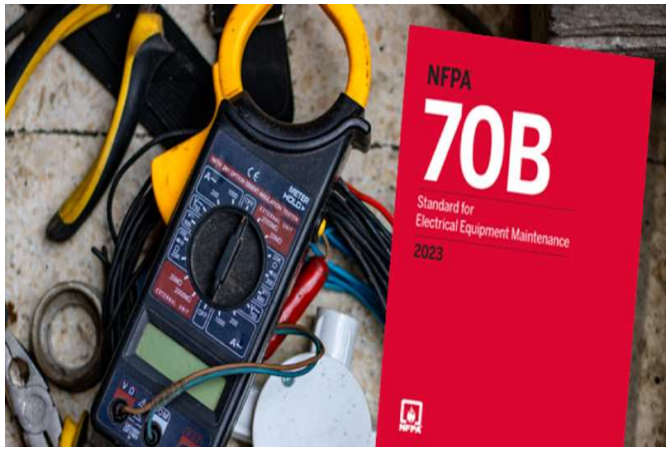
Some excerpts for overcurrent devices

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**.

15.3.3 Lubrication.
Moving and sliding surfaces shall be lubricated in accordance with **Table 15.3.3**.



Some excerpts for overcurrent devices

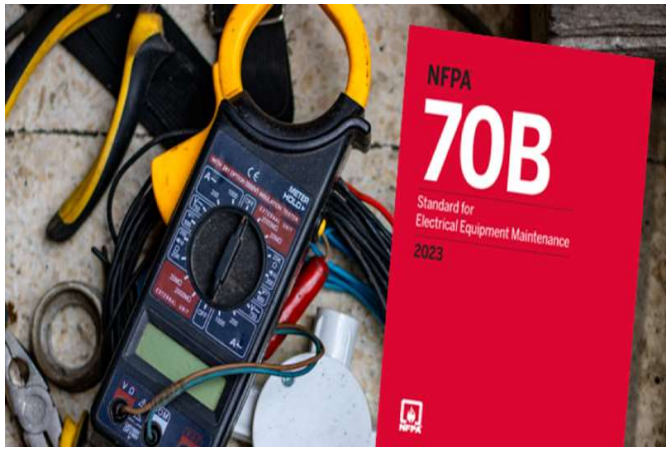
15.3.4 Mechanical Servicing.

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.**



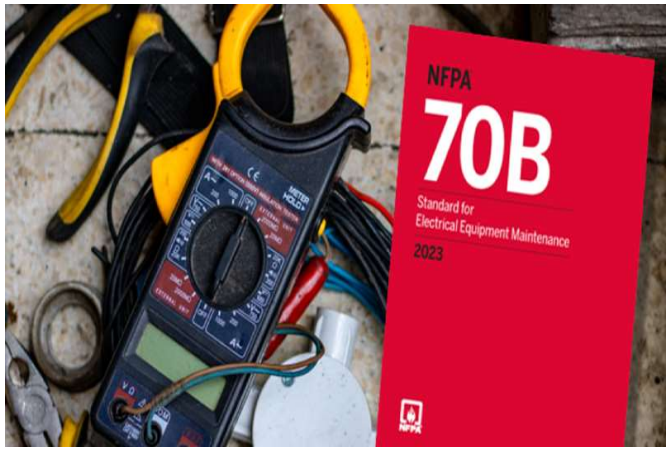
Some excerpts for overcurrent devices

15.3.5* Electrical Testing.- (THE BIG ONE TO ME)

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*	
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	



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Some excerpts for overcurrent devices

15.3.5* Electrical Testing.- (THE BIG ONE TO ME)

Circuit breakers shall be electrically tested in accordance with Table 15.3.5.

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	
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.

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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.)

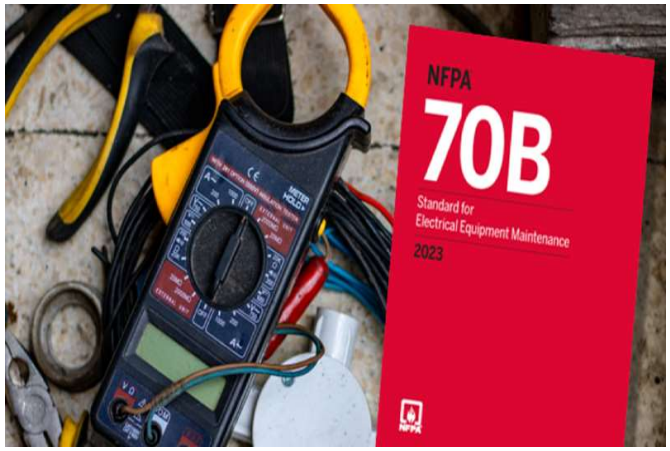
NFPA-70B

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

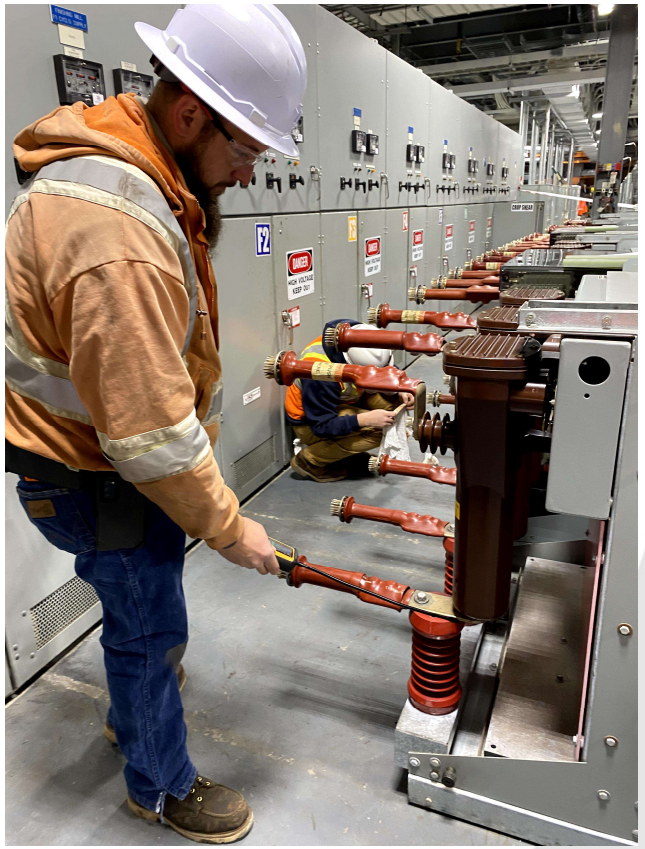
Offline enhanced tests shall include certain testing procedures performed while the electrical equipment or device is disconnected from the source of supply or is connected to an external test voltage source of supply and that are not typically performed in normal electrical maintenance activities and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



Some excerpts for overcurrent devices

15.3.5* Electrical Testing.- (THE BIG ONE TO ME)

Circuit breakers shall be electrically tested in accordance with **Table 15.3.5**.



Images Courtesy of Turner Electrical Services

What does this mean for us?

Reviewing the basics:

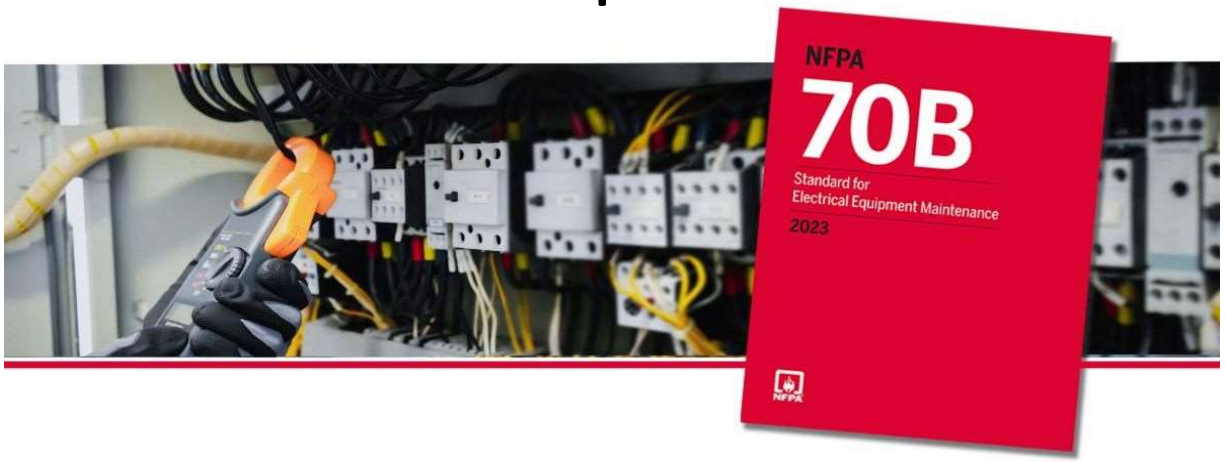
- **Guides** – Informational from advisors with “pointers” on how to’s
- **Recommended Practice** – Explanatory information with best practice suggestions (where we were pre-2023)
- **Standards –** Mandated, enforcable procedures necessary to meet codes (where we are NOW moving forward)
- **Codes** – Industry based “laws” enacted by authoirities

What *TEGG* has always preached?

Reviewing the basics:

- Develop a comprehensive maintenance plan
- Maintain an up-to-date single line diagram
- Reduce risks and downtime
- Improve employee safety and exposure to hazards
- Train, qualify and equip personnel exposed to hazards
- Compliance with standards and codes
- Increase reliability and reduce costs

Areas of Emphasis



The roadmap to reliability and reduced costs

- Electrical equipment maintenance requirements and procedures
- Documented, ongoing maintenance program
- Concise records containing tests, results, repairs, and replacements and verifications
- Training and continuing education of personnel responsible for maintenance tasks
- Safety considerations to reduce and eliminate electrical hazards
- Continuous improvement

NICET Certification

Perfectly suited pathway to this end

TEGG CTT NICET Certification					
Description of Skills	Level I(1)	Level II(2)	Level II(3-5)	Level III(6-7)	Level IV(10)
TEGG Parallel Training	X				
IR Level I	X				
CPR	X	X		X	X
Basic Power Quality	X				
NFPA 70E Training	X	X		X	X
NICET Level I Certification	X				
UE Level I		X			
Partial Discharge Level I		X			
LV Breaker Maintenance		X			
OverVoltage (DC Hi-Potential)		X			
VLF		X			
DGOA		X			
NICET Level II Certification		X	X		
AFHA Field Modeling			X		
MV Breaker Maintenance			X		
Protective Relay Testing			X		
Advanced Transformer Testing			X		
Advanced Power Quality			X		
Electromechanical Relays			X		
Power Factor Testing			X		
Substation Maintenance			X		
Leadership / Supervisory Training			X		
Partial Discharge Level II				X	
Specialty Testing of Transformers				X	
Solid State & Multifunction Relays				X	
Advanced Component Training				X	
NICET Level III Certification				X	
SF-6 Testing					X
Transmission Class Equipment					X
NICET Level IV Certification					X

Empower Training Offerings

- Courses based on 2024 NFPA-70E and 2023 NFPA-70B to suit your employee needs
  - Customized classes for specific industries available including LOTO versions and NFPA 99 (Healthcare)
- NFPA-70E – Electrical Safe Work Practices (Chapter 1, Day 1)
- NFPA-70E & NFPA 70B – Safety Related Maintenance Practices (Chapter 2, Day 2) and NEW 2023 Standard for Maintenance
- OSHA 10- & 30-Hour General Industry Courses

Risk Elimination is the KEY

Hierarchy of Risk Control Methods - 110.3(H)(3)

- Elimination
- Substitution
- Engineering Controls
- Awareness
- Administration Controls
- PPE

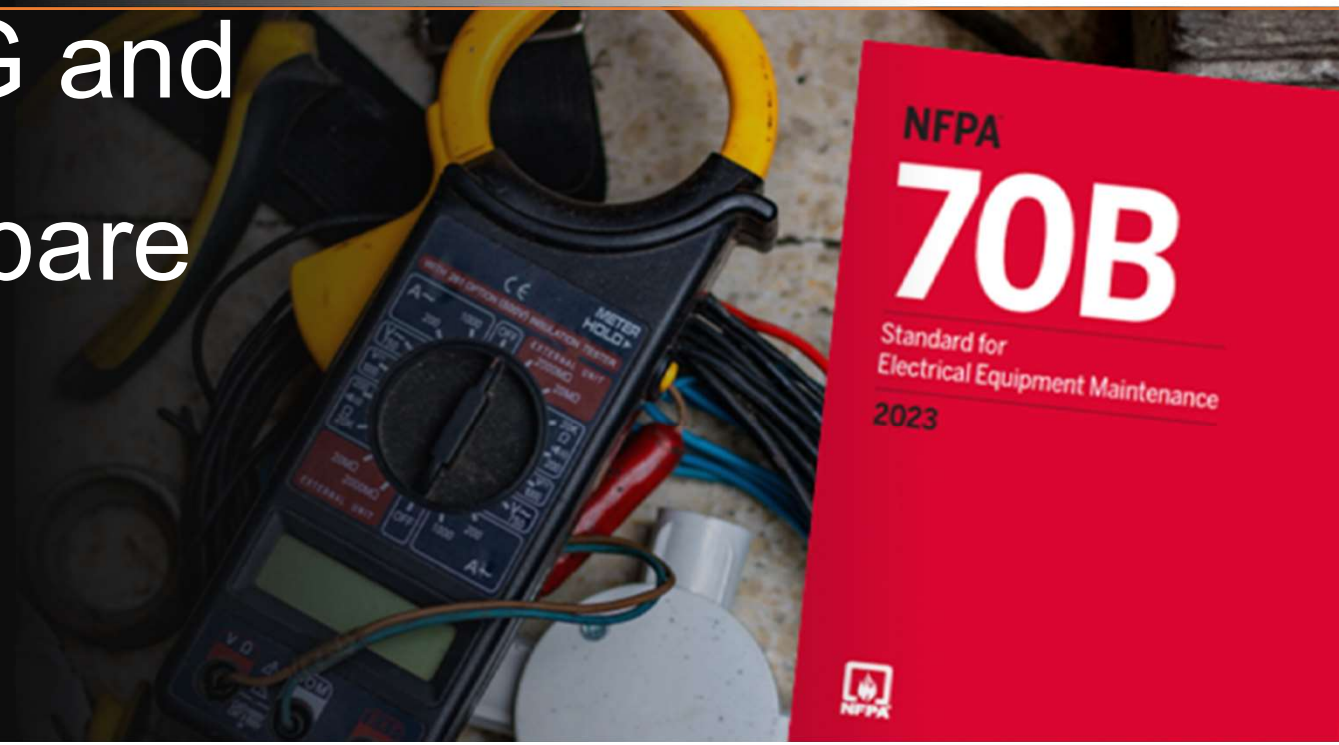
One Approach from Schneider Electric

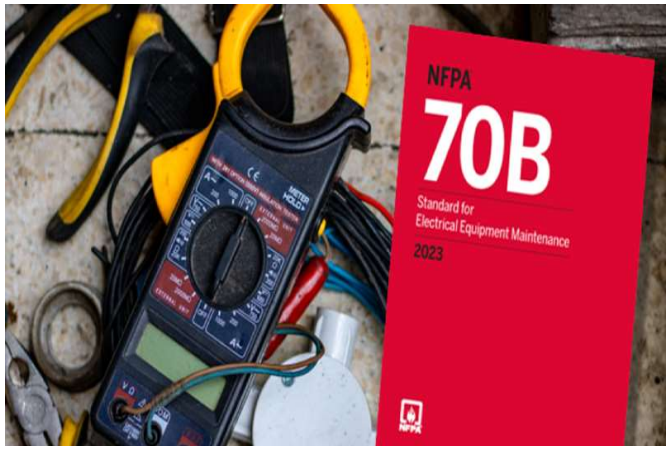
Maintenance checklist

A safe, reliable electrical infrastructure requires a well-planned electrical maintenance program:

1. Conduct an assessment
2. Identify priorities
3. Determine maintenance tasks
4. Create a schedule
5. Establish procedures
6. Assign responsibility
7. Establish a tracking system

And how TEGG and Jamerson and Bauwens Compare

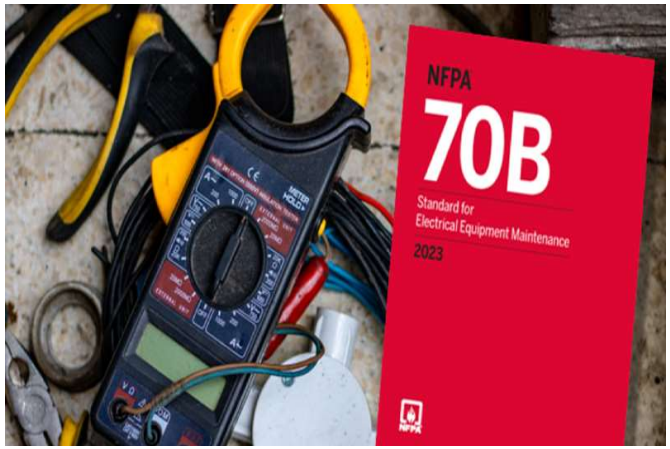




Maintenance checklist

A safe, reliable electrical infrastructure requires a well-planned electrical maintenance program:

1. Conduct an assessment — **PSE / Options Development**
2. Identify priorities — **Test/Inspect/Repair/Replace**
3. Determine maintenance tasks — **Basic, Premium Prime**
4. Create a schedule — **Dispatching**



Maintenance checklist

A safe, reliable electrical infrastructure requires a well-planned electrical maintenance program:

1. Conduct an assessment
2. Identify priorities
3. Determine maintenance tasks
4. Create a schedule
5. Establish procedures
6. Assign responsibility
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OEM/70E/70B/NETA

Technicians /DES

TEGGPro/CARE

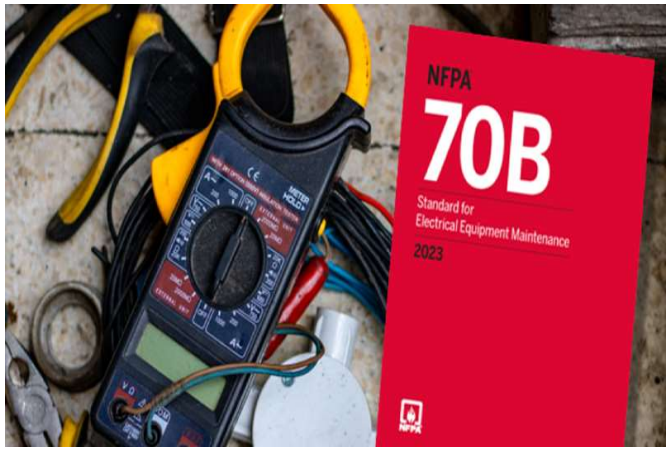
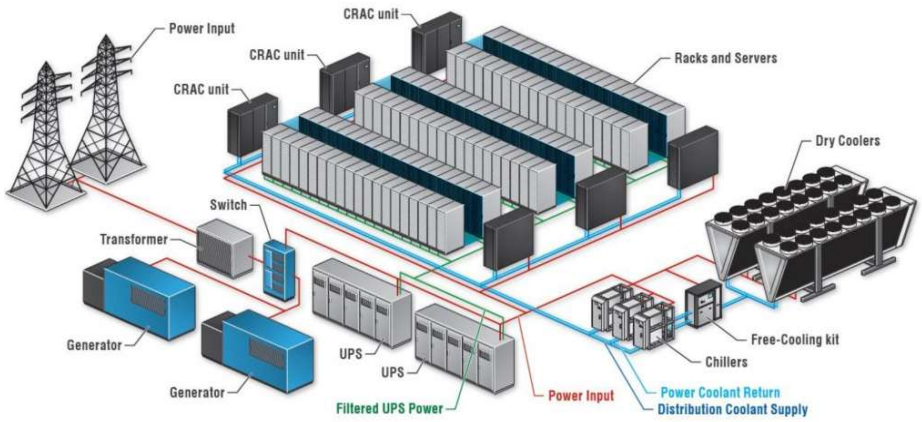


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

There are 3 Considerations for Condition Assignments:

- Equipment Physical Condition
- Criticality Condition of the Equipment
- Operating Environment Condition of Equipment



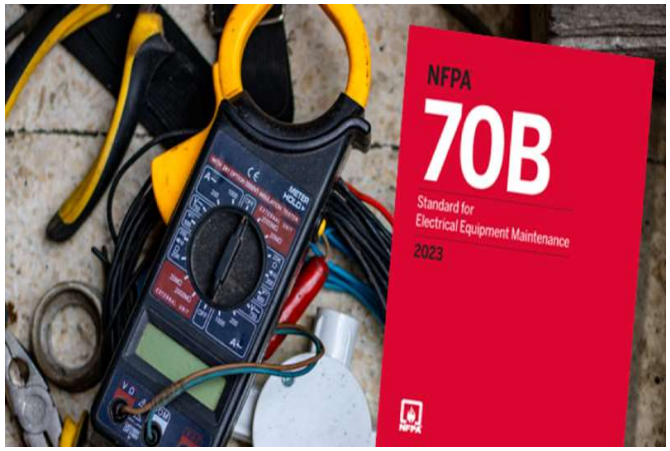


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

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 (Electrical Maintenance Program).

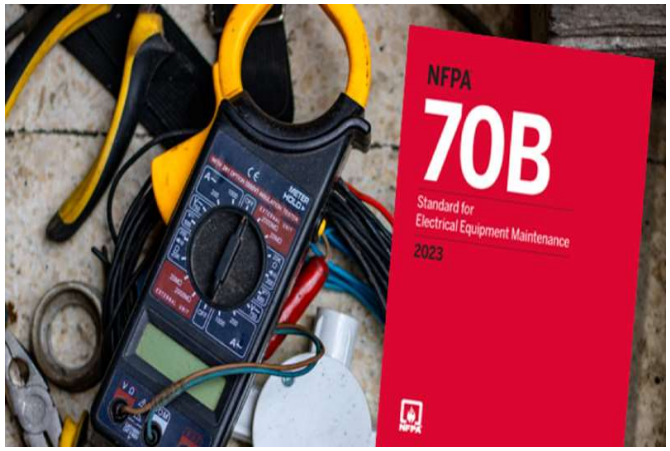


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	**Condition 2**	Condition 3

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.

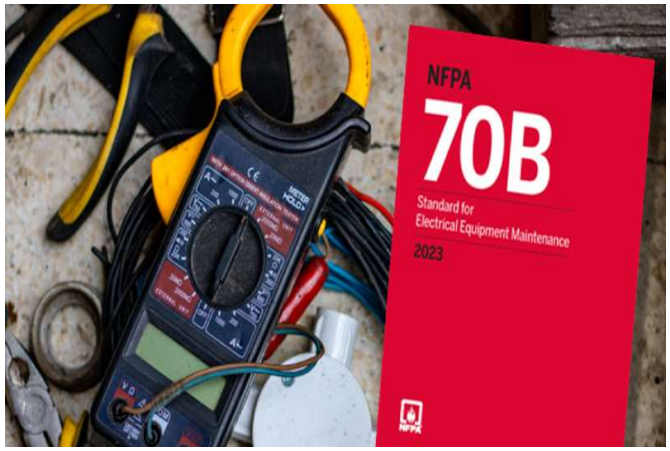


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

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.

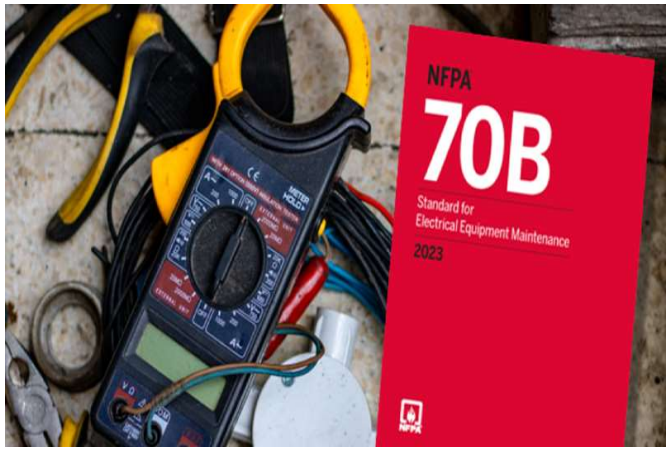


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

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.

A.9.3.2.1

- *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.*

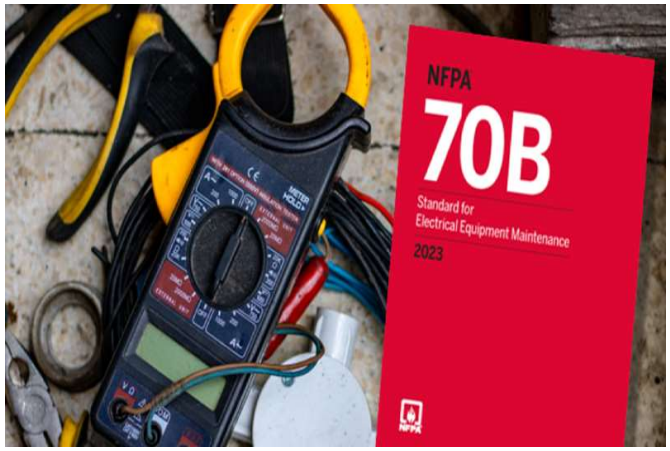


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

9.3.2* Criticality Condition of Equipment. (New Note)

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:

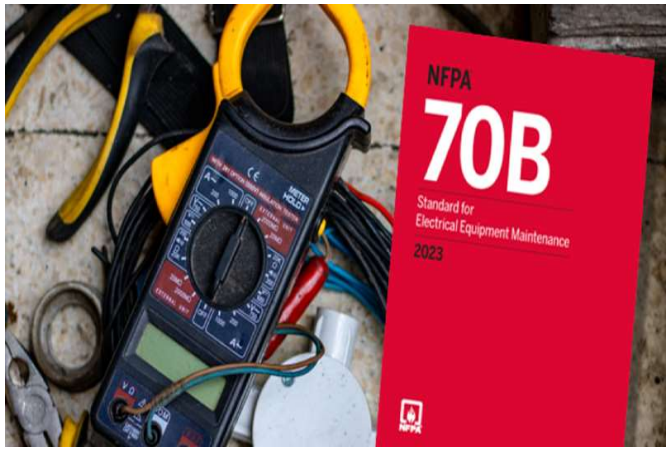


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

9.3.2* Criticality Condition of Equipment. (New Note con't)

(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

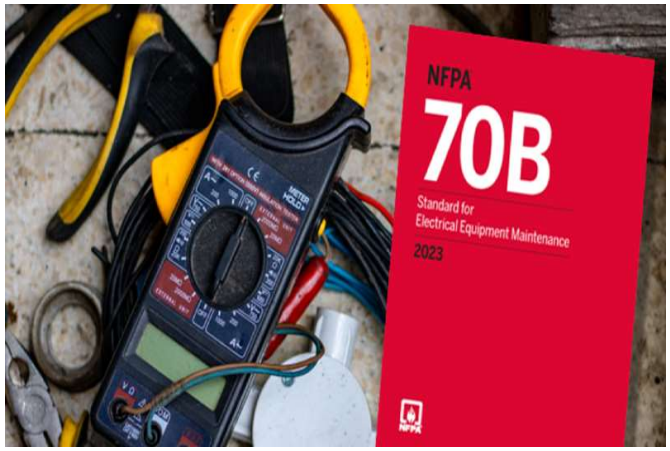


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

9.3.2* Criticality Condition of Equipment.

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Criticality Condition 3 shall be assigned where the failure of the equipment or system will endanger personnel.

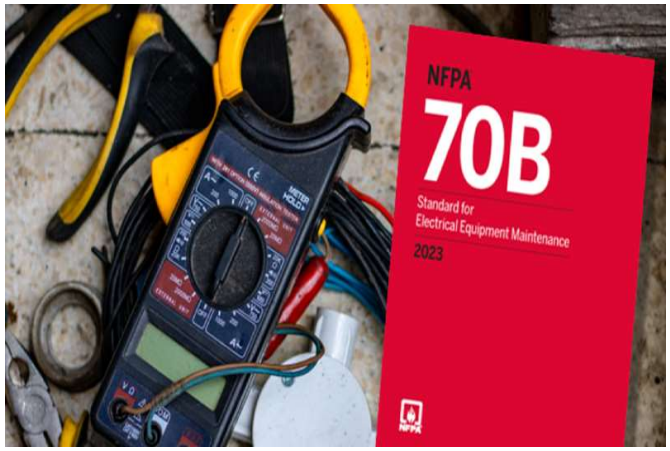
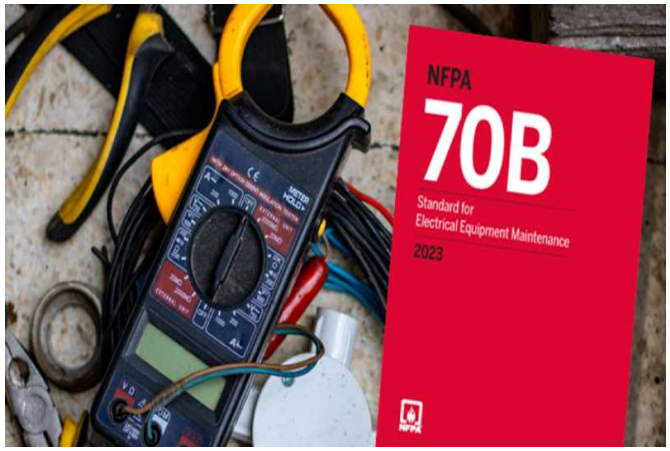


Table 9.2.2 Maintenance Intervals		
Equipment Condition Assessment		
Condition 1	Condition 2	Condition 3

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..



Jamerson & Bauwens
Electrical Contractors, Inc.

TEGG
An ABM Company

SUMMARY:

- Now a mandatory, compulsory standard, no longer optional (National Standard)
- Enforcement will come (OSHA)
- Always needed attention (Not a one and done)
- Requires advanced skill sets
- Improve employee exposure to hazards
- Reduce downtime and unplanned outages
- QUESTIONS??