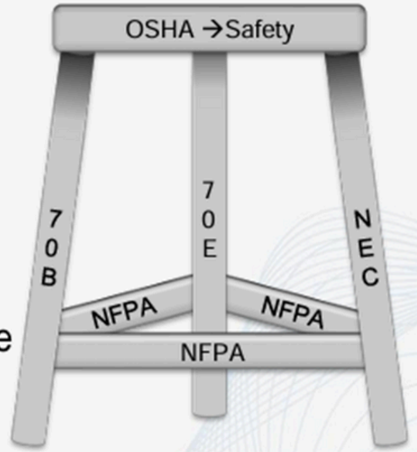
NFPA 70B - OSHA 70E - NEC 70

The National Fire Protection Association (NFPA), Occupational Safety and Health Administration (OSHA), and National Electrical Code (NEC) enforce electrical safety regulations in workplaces.

Understanding the recent changes to these codes, how they are intertwined, and how they affect electrical generation systems and liabilities of nonconformance is critical.

All 3 codes are interconnected

Safety requirements mandated by federal & state law are supported by adherence to the 3 NFPA electrical industry standards designed to support safety & facilitate OSHA compliance



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Past practices are not 100% code compliant.

- Cables run through buildings, dead fronts removed, permanent wiring disconnected, permanent lugs and portable wiring are not compatible, and cables run unsafely into switchgear
- Complete system exposed to elements
- All create dangerous situations and degrade the system

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Why the changes?

- Safety: Working in live electrical gear to test voltages is NOT safe and requires 100% full arc flash PPE.
- Degradation of generator system: The current practice of disconnecting existing wiring to tie-in portable gear, either a load bank or a portable generator, severely degrades the system by using existing breaker output lugs, which are not designed for repetitive use and are not listed for use with fine strand portable power cable.
- The manufacturers of the breakers and generators designed the units for non-repetitive connections via THHN wiring, torqued to specification, marked, and to be left alone, which is not happening.
- Engineers, manufacturers, and all three of the code setting/enforcing bodies have become more knowledgeable of the poor existing practices.
- Increased accidents and the associated liabilities
- Following and extending the success of NEC 700.3 (f) for critical facilities.

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NFPA 110 ties to NEC 70

How they all tie together to eliminate loopholes via explicit, direct references and instructions.

- NFPA 110 references specifically NEC 70. NFPA 110 covers the installation, operation, and maintenance of emergency and standby power systems to ensure reliability during emergencies.
- NEC 70, formally known as the National Electrical Code (NEC), provides guidelines for the safe installation of electrical wiring and equipment. NFPA 110 often references NEC 70 requirements to ensure that emergency power systems are safely integrated into the overall electrical system. This means that while NFPA 110 provides specific requirements for emergency and standby power systems, it relies on NEC 70 for general electrical safety and installation practices.

NFPA 70B - OSHA 70E - NEC 70

Why the changes?

- Complementary Goals: While NEC 70 provides the standards for how electrical systems should be safely installed and maintained, OSHA 70E focuses on protecting individuals who work on or near these systems. NEC 70 ensures that installations meet safety standards to prevent hazards, while OSHA 70E aims to protect workers from hazards associated with those installations.
- Safety Standards Integration: OSHA 70E often references NEC 70 standards because proper installation according to NEC 70 can help reduce electrical hazards.
- Electrical Hazard Identification: NEC 70's guidelines for safe installations can help in identifying and mitigating potential electrical hazards. OSHA 70E relies on this information to develop safe work practices and PPE requirements for workers.
- Training and Procedures: OSHA 70E mandates training for employees who work on or near electrical equipment. This training often includes understanding NEC 70 requirements to ensure that workers are aware of proper electrical system design and installation practices, which can affect safety.
- Compliance and Enforcement: While NEC 70 is adopted into local building codes and enforced through inspections and permits, OSHA 70E is enforced through workplace safety audits and inspections.

NFPA 70B - OSHA 70E - NEC 70

NFPA 70B ties to NEC 70 and OSHA 70E

NFPA 70B: Recommended Practice for Electrical Equipment Maintenance

- Maintenance Guidelines: NFPA 70B provides best practices for the maintenance of electrical equipment, including recommendations for following manufacturer's guidelines. It emphasizes the importance of adhering to these guidelines for safe and effective maintenance. While NFPA 70B doesn't specifically mandate that manufacturers state what is disallowed, it underscores and mandates the necessity of following manufacturer's instructions, which is currently undergoing the required updates.
- Documentation and Procedures: NFPA 70B mandates that proper documentation and procedures shall be in place for maintenance activities, which will include NEC 70, OSHA 70B, as well as understanding and following all manufacturer's provided information on safe servicing practices.

NFPA 70B - OSHA 70E - NEC 70

Specific items to comply with new mandates

- Evaluating, developing, and implementing a Maintenance Schedule to NFPA 70B specifications
- Training personnel on all three codes and how they tie together
- Procuring appropriate PPE, testing equipment and tools
- Not altering existing system to perform testing
- Verifying absence of power and disallowing power while accessible to electrical connections
- Using thermal imaging or collecting thermal readings via thermal connection points and a collection/monitoring/storage device

NFPA 70B - OSHA 70E - NEC 70

Evaluating, developing, and implementing maintenance schedules to NFPA 70B specifications

1. **Maintenance intervals are now a primary focus**
   - Chapter 9 of NFPA 70B now provides mandatory scopes of work and maintenance intervals broken out by product type and based on an equipment condition assessment. These requirements can be referenced in Table 99.2.2, which is in alphabetical order and provides the corresponding reference chapter for maintenance procedures specifics.
   - It's important to note these maintenance intervals to not supersede manufacturer's guidelines; they provide guidance only in the absence of information from the manufacturer.

2. **Equipment condition assessment is key**
   - NFPA 70B Chapter 9 prescribes maintenance intervals based on equipment condition assessment, which depends on the following conditions:
     - Equipment physical condition
     - Criticality
     - Operating environment
   - The equipment condition assessment (ECA) is driven by the highest value of these three conditions. For example, if equipment is designated "Condition 1" for electrical equipment and criticality, but a "Condition 3" for operating environment, then the equipment would use "Condition 3" durations for the ECA maintenance intervals.

NFPA 70B - OSHA 70E - NEC 70

Electrical maintenance programs are now defined, mandated, and shall be implemented.

- NFPA 70B 4.2 provides clearly defined requirements for what elements the electrical maintenance program shall include:
- An electrical safety program that addresses the conditions of maintenance
- Identification of personnel responsible for implementing each element of the program
- Survey and analysis of electrical equipment and systems to determine maintenance requirements and priorities
- Developed and documented maintenance procedures for equipment
- A plan of inspections, equipment, and personnel documentation and records-retention policy
- A maintenance, equipment, and personnel documentation and records-retention policy
- A process to prescribe, implement, and document corrective measures based on collected date
- A process for incorporating design for maintainability in electrical installations
- A program review and revision process that considers failures and findings for continuous improvement

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Example of mandated maintenance requirements for NFPA 70B.

Frequency of maintenance for common electrical equipment

		Equipment condition assessment		
Product	**Scope of Work**	**Condition 1**	**Condition 2**	**Condition 3**
All Equipment	Infrared thermography	12 months	12 months	6 months
Uninterruptible power supplies	Visual inspection	6 months	3 months	1 months
	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

Generators are referred to as “Rotating Electrical Equipment.”

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Prohibiting the altering of existing systems to perform testing

- All connections in a system are designed for permanent use and with specific specifications for permanent wiring.
- Disconnecting these permanent connections for temporary and repetitive testing is not allowed for both safety and system degradation concerns and this applies to initial NEC 70 installation, OSHA 70E safety requirements, and NFPA 70B testing/maintenance procedures.
- The use of specifically designed repetitive use devices/lugs are allowable for testing.

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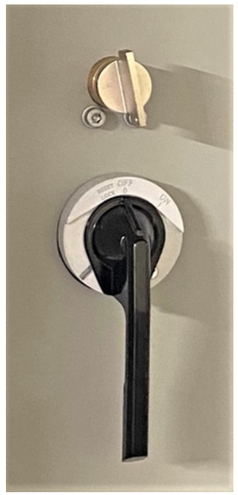
Voltage Test Port

- Verifies absence of power before accessing an enclosure prior to making connections for load testing, portable generator connections, or servicing a piece of equipment.
- NEMA 4 UL’d device does not alter existing UL of enclosure it’s being added to.

NFPA 70B - OSHA 70E - NEC 70

Verifying absence of power and disallowing power while accessible to electrical connections



Pictured: Trapped Key Interlocks

NFPA 70B - OSHA 70E - NEC 70

Prohibiting the altering of existing systems to perform testing

Using infrared imaging window and camera or collecting thermal readings via thermal connection points and a collection/monitoring/storage device.

NEMA 4 UL'd devices that do not alter existing UL of enclosure it's being added to.

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Conclusion

- Learn how the revised codes apply to your products and services.
- Read between the often fuzzy lines and figure out how to best implement these strict changes.
- Don’t be lackadaisical about taking this seriously or being afraid of upsetting a customer because of added cost. You’re helping them and protecting you both.
- Watch for red flags on project specs and help get it fixed. It’s an opportunity to help specify and also protect everyone.
- Protect your customers and suppliers from making mistakes, as you are considered to be a Subject Matter Expert (SME).
- View these new mandates as an opportunity to help protect your customers, company, and employees from expensive liabilities.

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