



**Uniform Fire Prevention and Building Code**

***TECHNICAL BULLETIN***

**Electrical Systems and Equipment in Flood-damaged Structures**

**Question:** Do electrical systems and equipment submerged through flooding have to be replaced?

**Answer:** Floodwaters are not just water; the water may also be contaminated with chemicals, sewage, oil and other debris. When the floodwater is salt water, its corrosive effects are particularly damaging. Any or all of those can affect the integrity and performance of electrical systems and equipment, either immediately or eventually.

Some of the larger types of electrical equipment, such as panelboards, switchboards, certain types of busways, some types of motor control equipment, circuit breakers, protective relays, meters and current transformers exposed to floodwaters may be reconditioned. To recondition any electrical equipment requires that the work be done by qualified personnel and that the original manufacturer be contacted for specific recommendations. In many cases, it is ultimately safer, less expensive and less time-consuming to replace the equipment.

Electrical equipment such as outlet and junction boxes, arc fault circuit interrupters (AFCI), ground fault circuit interrupters (GFCI), surge protective devices, switches, receptacles, dimmers, and lighting fixtures exposed to floodwaters must be replaced.

Wiring or cable exposed to floodwaters may or may not be required to be replaced, depending on the type of wire or cable. Wire or cable listed for dry locations (such as NM-B) exposed to water must be replaced. Wire or cable that is listed for use in wet locations may remain - provided the ends of the wire or cable have not been exposed to water, and the wire or cable is not damaged. But, even with wire or cable listed for use in wet locations, when the wire or cable has been exposed to the contaminants found in floodwaters, the manufacturer should be consulted before any decision is made to continue using it. Again, in most cases, it is safer, less expensive

and less time-consuming to replace the wiring or cable.

For more information, the publication *Evaluating Water-Damaged Electrical Equipment* by the National Electrical Manufacturers Association (NEMA) contains practical guidelines and understandable explanations about the salvageability of electrical equipment, wiring, and cable.

**Question: When evaluating submerged electrical systems and equipment, who is qualified to determine what is damaged and must be removed, and what is not damaged and may remain?**

**Answer** The municipality determines who is qualified to evaluate submerged electrical systems and equipment for damage. Electrical contractors, licensed electricians (where required), third-party electrical inspectors, and utility company representatives would be considered qualified, having the training and knowledge of electrical systems and equipment necessary to evaluate damage caused by contact with floodwaters. The code enforcement official may also recognize other individuals as being qualified, based on other criteria.

**Question: It's been determined that portions of the electrical system and/or equipment in a dwelling are damaged and have to be removed. What are the requirements for Code compliance?**

**Answer:** The requirements for Code compliance depend on whether the work necessary to restore the electrical system and/or equipment to its pre-damaged state is a repair or a Level 1 alteration.

Repairs. If the municipality determines that the restoration work is a repair, the installation of new system components and equipment do not have to meet new construction standards. A repair is defined as the restoration to good or sound condition of any part of an existing building for the purpose of its maintenance. Examples of what could be considered repairs to an electrical system would be the replacement of receptacles, switches, and light fixtures. Repairs do not normally require a building permit.

Level 1 Alterations. If the municipality determines that the restoration work is a Level 1 alteration, the installation of new system components and equipment must comply with the requirements for new construction. Level 1 alterations are defined as the removal and replacement or the covering of existing materials, elements, equipment or fixtures using new materials, elements, equipment or fixtures that serve the same purpose, without

reconfiguring the space. Examples of what could be considered Level 1 alterations to an electrical system would be the replacement of panelboards, circuit breakers, and branch circuit wiring. Level 1 alterations require a building permit.

**Question: The restoration work to the electrical system in the dwelling has been determined to be a repair. What are the requirements for Code compliance?**

**Answer:** Appendix J Section J4 of the *2010 Residential Code of New York State* (RCNYS) contains the provisions for repairs to one- and two-family dwellings and townhouses.

Section J401.3 requires that in a flood hazard area, if the repairs will be a substantial improvement, the building must comply with the new construction provisions of Section R324. A substantial improvement is any repair or alteration to a building where the cost equals or exceeds 50 percent of the market value of the building before the repairs or alterations were started. Section R324.1.5 requires that electrical systems, equipment and components replaced as part of a substantial improvement meet the requirements of the section, including being located at or above the design flood elevation plus a 2-foot freeboard as specified in Section R324.1.3.3. An exception allows electrical systems, equipment and components to be located below the design flood elevation provided specific conditions are met.

If the repairs will NOT be a “substantial improvement,” and in most cases, they are not, compliance with Section J407 is all that is required. Section J407 allows existing electrical wiring and equipment to be repaired or replaced with like materials, with some exceptions.

**Question: The restoration work to the electrical system in the dwelling has been determined to be a Level 1 alteration. What are the requirements for Code compliance?**

**Answer:** Appendix J Section J5 of the *2010 Residential Code of New York State* (RCNYS) contains the provisions for Level 1 alterations to one- and two-family dwellings and townhouses.

Section J501.3 requires that in a flood hazard area, if the alterations will be a substantial improvement, the building must comply with the new construction provisions of Section R324. Section R324.1.5 requires that electrical systems, equipment and components replaced as part of a substantial improvement meet the requirements of the section, including being located at or above the design flood elevation plus a 2-foot freeboard as specified in Section R324.1.3.3. An exception allows electrical systems, equipment and components to be located below the design flood elevation provided specific conditions are met.

If the alterations will NOT be a substantial improvement, compliance with Section J508 is required. Section J508 requires that any alteration made to the electrical system meet the requirements for new construction found in Chapters E33 through E42.

**Question: It's been determined that portions of the electrical system and/or equipment in a building (which isn't a one- or two-family dwelling or a townhouse) were damaged and have to be removed. What are the requirements for Code compliance for that building?**

**Answer:** Repairs or alterations to buildings that are not one- or two-family dwellings or townhouses must be made in compliance with the *2010 Existing Building Code of New York State* (EBCNYS). The municipality will still determine whether the buildings are undergoing repairs or Level 1 alterations.

Alterations or repairs may comply with Section 302.6 of Chapter 3 Prescriptive Compliance Method of the EBCNYS. Alternatively, Chapter 5 of the EBCNYS contains the provisions for repairs, and Chapter 6 contains the provisions for Level 1 alterations. The requirements in Chapters 3, 5 and 6 are similar to those in Appendix J – repairs or alterations to buildings in a flood hazard area that are substantial improvements require compliance with Section 1612 Flood Loads of the *2010 Building Code of New York State*.

### **Summary**

Electrical systems and equipment exposed to the contaminants in floodwaters must be carefully evaluated by qualified personnel. While some electrical equipment and system components may be reconditioned or salvaged, in most cases, it is safer, less expensive and less time-consuming to replace them. The municipality will determine if the work necessary to restore the electrical system components and/or equipment in a structure to its pre-damaged state will be a repair or a Level 1 alteration. The requirements for Code compliance are based on that determination.

### **Source Documents:**

19 NYCRR 1220 - *2010 Residential Code of New York State* (RCNYS)

19 NYCRR 1227 - *2010 Existing Building Code of New York State* (EBCNYS)

19 NYCRR 1221 - *2010 Building Code of New York State* (BCNYS)

*Evaluating Water-damaged Electrical Equipment* - National Electrical Manufacturers Association (NEMA)

**For Additional Information:**

- **NEMA - <http://www.nema.org/>**
- **Section 3.3 - New and Substantially Improved Buildings - Electrical Systems. Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems - FEMA**  
**([http://www.fema.gov/pdf/fima/pbuffd\\_chapter\\_3-3.pdf](http://www.fema.gov/pdf/fima/pbuffd_chapter_3-3.pdf))**

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