



# ELECTRICAL CONNECTIONS

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## UL's Prefabricated Building Certification Program

*The National Electrical Code (NEC) Article 545 addresses the requirements for manufactured buildings and building components.*

The NEC defines a manufactured building as, "Any building that is of closed construction and is made or assembled in manufacturing facilities on or off the building site for installation, or for assembly and installation on the building site, other than manufactured homes, mobile homes, park trailers, or recreational vehicles." The NEC defines a building component as, "Any subsystem, subassembly, or other system designed for use in or integral with or as part of a structure, which can include structural, electrical, mechanical, plumbing, and

fire protection systems, and other systems affecting health and safety."

Manufactured buildings and building components are nothing new to the electrical construction industry. They have been around in one form or another for many years — examples include guard sheds, toll booths, communication buildings, water pumping stations, refrigeration units, power distribution skids, and power wall units to name a few. These buildings and components are generally constructed from pre-engineered metal panels, structural metal framing

members or poured concrete. Typically, they contain wiring methods and electrical equipment that may be concealed or inaccessible for inspection at the final installation site. Other than interconnections and the connection of field installed conductors, cables, and associated service and feeder systems, manufactured buildings and building components are completely wired and ready for site installation and use.

The manufactured building and building component industry continues to grow. With this growth Authorities Having Jurisdiction (AHJs) as well as building

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and component manufacturers have expressed interest in ensuring that these structures are electrically safe and code compliant. Although most manufacturers have quality control programs in place, many of these structures were being built without third-party oversight. As with any building or structure, electrical safety is of the utmost importance! With this in mind, UL has answered the call with the Commercial and Industrial Prefabricated Buildings and Units program.

### Certified Commercial and Industrial Prefabricated Buildings and Units

Commercial and industrial prefabricated buildings are certified under the product category Commercial and Industrial Prefabricated Buildings and Units, (QRXA), located in the 2013 UL White Book or by using UL's Online Certification Directory at [www.ul.com/database](http://www.ul.com/database) and by entering QRXA at the category code search field. This category covers the installation of electrical systems in commercial or industrial prefabricated buildings and units. Prefabricated buildings and units found to be in compliance with the requirements are issued a UL Certificate of Inspection and a UL Inspection Report.

The UL Certificate of Inspection is the only method provided by UL to identify that prefabricated buildings and units were inspected by UL's Building Inspection Certificate Services Program. No UL Mark is applied to the product. The prefabricated buildings and units for which UL issues certificates are considered by UL to comply with the applicable requirements of the NEC at the time of inspection. The UL Certificate of Inspection is only valid when accompanied by a completed UL Inspection Report. The UL Inspection Report includes an electrical plan drawing that indicates all the electrical equipment included in the building at the time of manufacturing. If a prefabricated

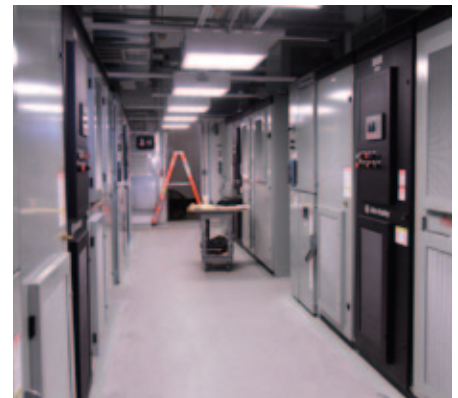
building is modified after it leaves the factory, UL does not know what effects the modifications may have on the electrical system or equipment, or to the construction of a prefabricated building or unit, or the safety of the product or the continued validity of the UL Certificate of Inspection. Unless UL investigates the modified product, UL cannot indicate that the product continues to comply with the applicable requirements of the UL Certificate of Inspection or the NEC.

The final installation site of these prefabricated buildings and units is subject to approval by the AHJ. However, the UL Certificate of Inspection and the UL Inspection Report provide the AHJ with assurance that the prefabricated building or unit is in compliance with the requirements of the NEC at the time of manufacture. The UL Certificate of Inspection notes the date the certificate was issued, a certificate number, a file number, an inspection report number, the building model and serial number, and the selected edition of the NEC.

If the prefabricated building or unit is shipped in multiple sections or "knocked down," the number and description of the sections required to complete the building or unit are included on a building's nameplate. Instructions for completion of the building, including any wiring connections to be completed at the installation site, are also provided.

### UL's Electrical Plan Review and Inspection Service for prefabricated buildings and units

As part of the QRXA certification, UL provides manufacturers of prefabricated buildings and units with an electrical plan review and electrical inspection service. First, the manufacture submits a set of electrical plans to UL for the prefabricated building or unit; the plans are then reviewed for compliance with the selected edition of the NEC. Issues such as working space, access and egress, overcurrent



Above: A sampling of prefabricated buildings that were certified by UL under the product category Commercial and Industrial Prefabricated Buildings and Units (QRXA).

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## UL's Prefabricated Building Certification Program (continued)

protection, conductor sizes, raceway fill, etc. are properly addressed so they do not become an electrical inspection issue.

Once the prefabricated building or unit is completed, it is subject to an electrical inspection. The inspection confirms that the building is wired in accordance with the electrical plans and applicable NEC requirements. The manufacturer is required

to have all of the electrical equipment open for the inspection process. The electrical inspection includes, but is not limited to, items such as the supports and securement of the installed wiring methods, grounding and bonding of the electrical equipment, proper equipment markings and labels, appropriate size of conductors as well as proper conductor terminations.

### UL's Quality Control System

Prefabricated building and unit manufacturers are required to have a quality control system in place. UL performs audits of the manufacturer's factory quality control system to ensure the effectiveness of the system. The audit includes, in part, a review and evaluation of the following:

- **Calibration System for Test Equipment** — ensures that any testing equipment or tools are properly calibrated
- **Functional Check** — ensures that measuring and test equipment works properly
- **Corrective Action System** — a process for addressing any non-conformance issues identified during an inspection
- **Inspection and Test** — ensures that inspection and testing, such as insulation integrity or dielectric testing, is performed correctly
- **Incoming Equipment Inspection** — inspection and verification that incoming electrical equipment is certified (Listed)
- **Internal Audit** — an internal program to systematically review procedures and practices.

**Left:** This is a UL Certified Prefabricated Building containing a double-ended 2000-ampere, 480-volt, 3-phase, 6-section metal-enclosed switchgear to provide power to a municipal water treatment plant. The building's utilization power is provided by a step-down 120/240 volt single-phase transformer serving a 100-ampere panelboard that supplies building lighting, emergency lighting, HVAC equipment, receptacles, exhaust fan, and 48-volt battery charging system.



### Summary

UL's certification program for Commercial and Industrial Prefabricated Buildings and Units (QRXA), provides an avenue for the manufactured building and building component industry to ensure electrically safe and NEC compliant installations. In addition, the program addresses the needs of AHJ's by providing a factory quality control system as well as a third-party

electrical plan review and inspection process. The UL Inspection Certificate and UL Inspection Report issued with each UL Certified prefabricated building or unit provides the AHJ documentation that the certified prefabricated building met the requirements of the selected edition of the NEC when it left the manufacturer's facility.

For additional information on Commercial and Industrial Prefabricated Buildings and Units (QRXA), go to UL's Online Certification Directory at [www.ul.com/database](http://www.ul.com/database) and enter QRXA at the category code search field or contact Lanny McMahill at [Lanny.McMahill@ul.com](mailto:Lanny.McMahill@ul.com) or at +1.602.284.1943.



# UL Certifications Can Now Be Accessed on NECPlus

**Q.** I have used NFPA’s online Code tool NECPlus and noticed that they have the UL White Book information for each Code Section; can I also get access to the Listings for those product categories through NECplus?

**A.** Yes, as of January 2013, NFPA’s online Code tool NECplus has links to the UL Guide Information for each UL product category related to a NEC section. And, if you click on the title of the product category, it will link you directly to all the UL Certifications (Listings) for that product category on UL’s Online Certification Directory.

This is how it works. If you subscribe to NECplus at [www.necplus.org](http://www.necplus.org), just log in and select the Code you want to search from the Code Quick Links on the right side

of the page. Once the version of the Code is opened, find the Code section you are looking for. To the right of the code section will be a box titled “see related” with links to the ROP (Report on Proposals), ROC (Report on Comments) and UL all in red text. Each one of those links will provide the complete Code information that you need to make an informed decision on the Code. The link to the ROP and ROC will give you the technical background on the development of the Code section, and clicking on the UL link will provide the UL Guide Information in the window located below the Code text for the UL product categories applicable to the Code section. Then you can click on the UL category code in red text within the parentheses at the end of the category title and you will be linked to all the UL certifications for that product

category from UL’s Online Certification Directory located at [www.ul.com/database](http://www.ul.com/database).

This tool provides the user a complete paint by numbers approach to Code compliance for any designer, specifier, purchaser, installer, plan reviewer or inspector. It provides the Code text, the origin and intent of the requirement, the UL Guide Information for the applicable products and a list of the manufacturers with their UL Certified products that are intended to meet that code requirement.

UL has partnered with NFPA since 2007 on NECplus and looks forward to collaborating with NFPA on new and exciting products in the future.

## Meet Your UL Regulatory Services Representatives at the 2013 IAEI Section Meetings

| Section      | Dates   | Location             | UL Representatives                             | Meeting Information        |
|--------------|---------|----------------------|------------------------------------------------|----------------------------|
| Southwestern | 8/25—29 | Phoenix, AZ          | Rich Berman, John Taecker and Lanny McMahill   | <a href="#">Click Here</a> |
| Northwestern | 9/8—11  | Spokane, WA          | Jeff Fitzloff and Bob Eugene                   | <a href="#">Click Here</a> |
| Western      | 9/15—18 | Colorado Springs, CO | Tom Lichtenstein, Jeff Fecteau and Peggy Anest | <a href="#">Click Here</a> |
| Canadian     | 9/20—22 | Saskatoon, SK        | Pierre McDonald                                | <a href="#">Click Here</a> |
| Eastern      | 9/26—29 | Niagara Falls, NY    | John Cangemi, Jeff Fitzloff and Tom Malagisi   | <a href="#">Click Here</a> |
| Southern     | 10/6—9  | Wilmington, NC       | Jeff Fecteau, Jeff Fitzloff and Steve Frank    | <a href="#">Click Here</a> |

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