



ELECTRICAL CONNECTIONS

2014 • Summer Issue

a supplement of **THE CODE AUTHORITY**®



Modular Data Centers and the 2014 National Electric Code

New for the 2014 National Electric Code (NEC), Article 646 covers modular data centers (MDCs). Section 646.2 defines MDCs as “prefabricated units, rated 600 volts or less, consisting of an outer enclosure housing multiple racks or cabinets of information technology equipment (ITE) (e.g., servers) and various support equipment, such as electrical service and distribution equipment, HVAC systems, and the like.” NEC Section 646.4 requires that listed and labeled MDCs shall comply with Sections 646.3(N) and 646.5 through 646.9. Otherwise, MDCs must comply with all of the provisions of Article 646.

Even though Section 646.4(2) permits installation of unlisted and unlabeled

MDCs, complying with all of Article 646 requirements presents some design and inspection challenges. Some of the challenges to consider would be the requirements of Section 646.7 for short-circuit current ratings as well as Section 646.13 which requires that equipment that is an integral part of the MDC, including lighting, control, power, HVAC, emergency lighting, alarm circuits, and the like, shall comply with the requirements for its use and installation and shall be listed and labeled. Then there are the lighting requirements of Part III and the working space requirements of Part IV to also consider when designing and installing an MDC. Lastly, the fact that MDCs are pre-fabricated and

often installed materials, wiring and equipment are concealed and may not be easily accessible for inspection at the final installation site. This may place the Authority Having Jurisdiction (AHJ) in a tough situation, how does the AHJ approve the installation as required by Sections 90.4 and 110.2 if not all of the installation is open and available for inspection?

Certified (Listed) Modular Data Centers

MDCs are certified by UL under the product category Modular Data Centers (PQVA) and evaluated in accordance with UL 2755, Outline of Investigation for Modular Data Centers. Product category PQVA covers self-contained assemblies of

continued on page 2

Modular Data Center (continued)

information technology equipment (ITE) installed within prefabricated enclosures. UL Certified MDCs may include integral support equipment such as power distribution units, HVAC equipment, standby power, illumination and the like, required for operating ITE. In some cases, the support equipment may be housed in its own separate enclosure, and certified as part of the MDC system. MDCs, as covered under this category, are sometimes referred to as “containerized data centers.”

MDCs are investigated as complete equipment including subassemblies, power distribution, cabling, cooling system components, lighting and the like installed within the enclosure. Emergency egress of maintenance personnel and working space around equipment is included within the evaluation of MDCs certified to UL 2755. MDCs are rated 600 volts or less and are intended to be installed in accordance with the NEC. When provided, fire protection and detection equipment has been investigated for compliance with the appropriate codes and standards applying to these installations such as NFPA 72, National Fire Alarm and Signaling Code; NFPA 12, Carbon Dioxide Extinguishing Systems; NFPA 12A, Halon 1301 Fire

Extinguishing Systems; and NFPA 2001, Clean Agent Fire Extinguishing Systems.

MDCs are not investigated as an ITE room described in NFPA 75, Fire Protection of Information Technology Equipment, and Article 645 of the NEC. Additional information can be found in the UL White Book PQVA or online using the **UL Online Certifications Directory** and entering “PQVA” at the category code search field.

Markings and Installation Instructions

MDCs are required to be plainly and permanently marked in a location readily visible after installation with:

- Manufacturer’s name, trademark or other descriptive marking by which the organization responsible for a generator is identified
- Distinctive catalog number or the equivalent
- Electrical ratings
- Reference to a drawing or other documentation that shows or lists all factory installed equipment that is part of a certification. This documentation is to be attached to the MDC (such as in a plastic sleeve attached to a door or panel,

which may be inside) and is to be made available by a manufacturer upon request

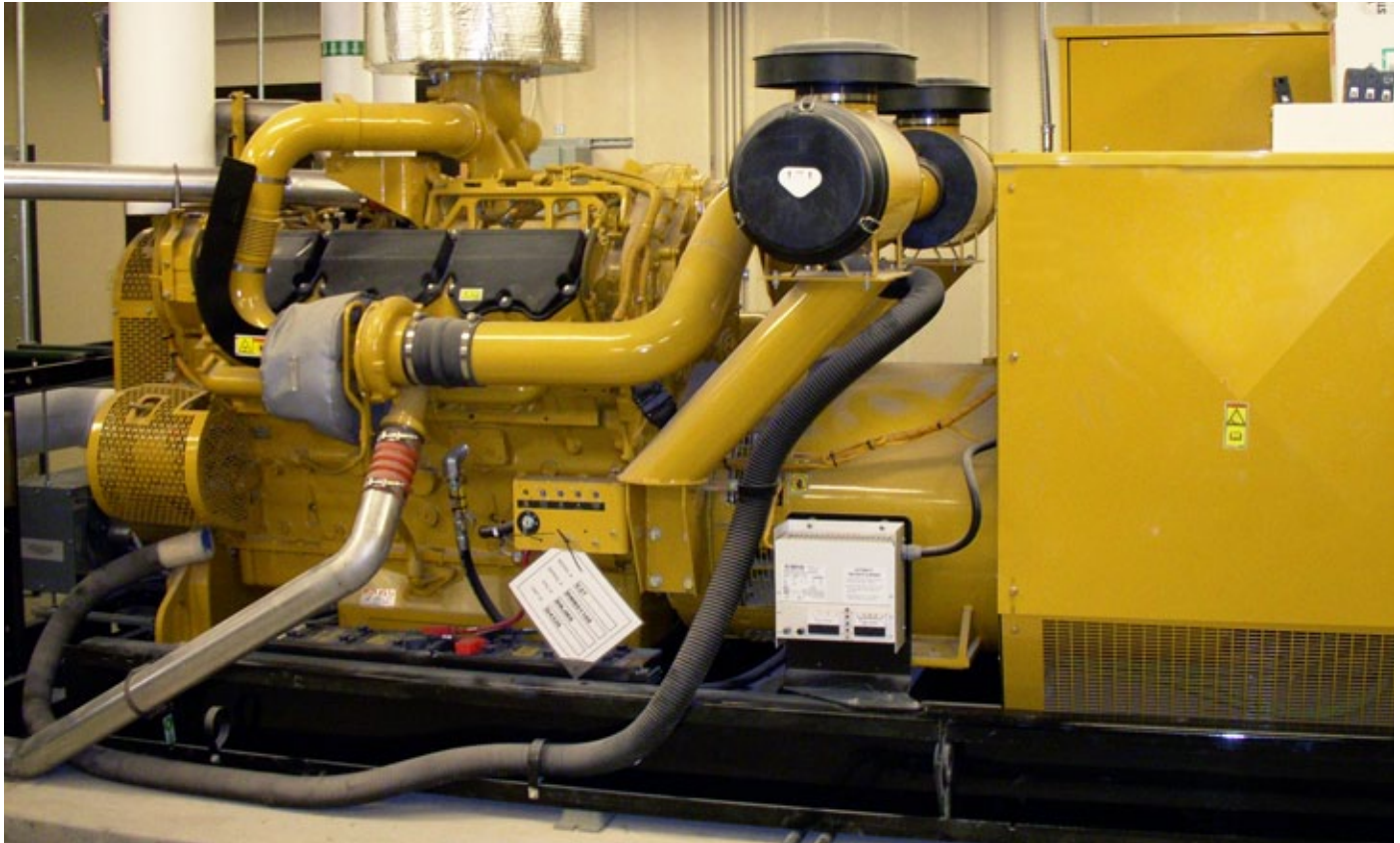
If multiple electrical sources are present, a warning marking is required in a location that it is visible before entering the MDC. An MDC consisting of two or more sections intended to be connected together in the field must have the following marking on each section, “Section ___ of ___, see diagram No. ___ for interconnections” or equivalent wording. When an MDC is shipped in multiple sections, complete reassembly instructions are required.

Summary

MDCs are a unique, hybrid piece of equipment that falls somewhere between a large enclosure and a pre-fabricated building. UL 2755 and the new NEC Article 646 have been specifically developed to address the complexity, customization and scalability of MDCs. They provide requirements that address the risks of fire, electric shock and personal injury, including emergency egress of maintenance personnel and working space around equipment considered necessary for safety.

For additional information on modular data centers, please contact Jeff Fecteau at Jeffrey.Fecteau@ul.com or at +1.952.838.5453.





Understanding Engine Generator Certifications

The National Electric Code (NEC) Article 445 contains specific requirements for generators. NEC Section 445.10 states that generators are to be suitable for the locations in which they are installed, and Section 445.11 identifies the markings required on generators. In addition to Article 445, other articles of the NEC apply to generator installations such as Article 700 (Emergency Systems), Article 701 (Legally Required Standby Systems) and Article 702 (Optional Standby Systems). However, other codes may be applicable as well. The International Building Code (IBC) Section 2702.1.1 and the International Fire Code (IFC) Section 604.1.1 both identify that stationary emergency and standby power generators required by the respective code are to be listed in

accordance with UL 2200, Standard for Safety for Stationary Engine Generator Assemblies. Therefore, since both the IBC and IFC require generators to be listed, it is important to understand how to identify UL Listed (Certified) generators that comply with the requirements of these codes.

Certified (Listed) Generators

There are two key UL product categories impacting engine generators and understanding the certification marks is critical to understanding what has been certified about the products covered in each category. Equipment covered by both UL product categories FTSR (Engine Generators) and FTTP (Engine Generator Enclosures, Construction Only) are evaluated to UL 2200, the Standard for Safety for Stationary Engine Generator Assemblies.

However, only products Certified (Listed) under category FTSR will comply with the listing requirements of stationary engine generators required by both the IBC and IFC.

Product category FTSR covers stationary electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal combustion engines. Certified stationary engine generator assemblies are rated 600 volts or less and are intended for installation and use in accordance with the NEC; NFPA 37, Installation and Use of Stationary Combustion Engines and Gas Turbines; NFPA 99, Health Care Facilities; and NFPA 110, Emergency and Standby Power Systems. Also, certified stationary engine generator assemblies may be used in emergency and standby power systems required by both the IBC and IFC.

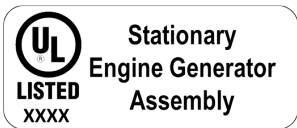
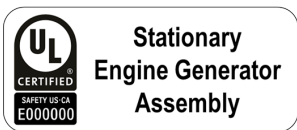
continued on page 4

Engine Generator Certifications (continued)

In contrast, product category FTTP covers engine generator enclosures (also known as weather housings) evaluated for **electrical and mechanical construction only**. These enclosures are intended to be installed on certified stationary engine generators in the field or in a factory. In most cases, the combination of a certified engine generator enclosure and a stationary engine generator will require additional investigation and testing to establish the compliance of the overall combined product. If an enclosure has not been identified for use with specific generators as part of the certification, then the effect of the enclosure on the generator operation has not been investigated. These effects include resistance to the elements as well as the effects of the enclosure on operating temperatures of the generator, either of which may mean noncompliance with NEC Sections 445.10 and 110.3(B).

Markings and Installation Instructions

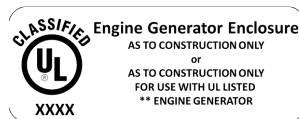
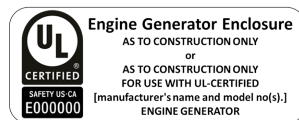
The UL Certified (Listed) Mark on a product is the only method provided by UL to identify products have been manufactured under the UL Certification and Follow-Up Service. UL certified stationary engine generators covered by product category FTSR will bear one of the following marks:



The UL Certified Mark or Classification Mark on the outside of an engine generator enclosure assembly is the only method provided by UL to identify products have been manufactured under the UL Certification and Follow-Up Service. UL



certified engine generator enclosures covered by product category FTTP will bear one of the following marks:



** Manufacturer's name and model no(s)

A generator that has been evaluated for outdoor use is to be marked "Rainproof" or "Raintight." In addition to the required markings, certified generators are required to have an instruction manual that includes important safety instructions.

Summary

A UL certified engine generator enclosure may be mistaken as a UL certified stationary engine generator assembly. Remember to look closely at the UL Certification Mark on the product and it will tell you what is actually certified. If the UL Certification Mark identifies a product as an engine generator enclosure, this indicates that the certification covers **only the construction aspects of the enclosure and the stationary engine generator is outside the scope of the certification**. Caution is needed when inspecting an enclosed stationary engine generator to ensure that it bears the appropriate certification mark as required by the IBC and IFC.

For additional information on listed engine generators, please contact Jeff Fecteau at Jeffrey.Fecteau@ul.com or at +1.952.838.5453.



Meet Your UL Representatives at the 2014 IAEI Section Meetings

Section	2014 Dates	Location	UL Representatives	Meeting Information
Southwestern	AUGUST 24 – 28	Sparks, NV	Rich Berman John Taecker Lanny McMahill Chuck Mello Maggie Carroll	CLICK HERE
Northwestern	SEPTEMBER 7 – 10	Anchorage, AK	Jeff Fitzloff Bob Eugene Chuck Mello Maggie Carroll	CLICK HERE
Western	SEPTEMBER 21 – 24	Independence, OH	Tom Lichtenstein Jeff Fecteau Terry Russ Chuck Mello Maggie Carroll	CLICK HERE
Canadian	SEPTEMBER 26 – 28	Niagara-on-the-Lake, ON	Pierre McDonald Frank Donati Chuck Mello	CLICK HERE
Eastern	OCTOBER 5 – 8	Annapolis, MD	John Cangemi Jeff Fitzloff Jimmy Wong Chuck Mello Maggie Carroll	CLICK HERE
Southern	OCTOBER 12 – 15	Addison, TX	Jeff Fecteau Jeff Fitzloff Chuck Mello Maggie Carroll	CLICK HERE