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Metering Electric Power

New safety and performance certifications

***By John Taecker** / Senior Regulatory Engineer*

For many years, electric meters have been the sole responsibility of electric utilities. Building owners are now installing their own electric meters to determine the power produced by on-site renewable energy sources, such as solar or wind. Green construction codes require a means for measuring, monitoring and reporting on energy use, production and reclamation in a building, which is accomplished by smart meters.

The idea behind smart meters is simple: Let technology help conserve energy and lower energy costs. Smart meters represent a new way of managing power, one that enables two-way data and energy exchange. With smart meters, devices can be set to power on when demand for power is low. For consumers, smart meters mean more control over how energy is used, allowing them to take advantage of off-peak decreased utility rate structures. For utilities, smart meters

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Scan with your mobile QR Code Reader to find out more about UL support for code authorities.

UL-ese

Definitions of terms frequently used at UL

LEED

LEED—or Leadership in Energy & Environmental Design is a green building rating tool that addresses large portions of a building's lifecycle, recognizing best-in-class building strategies. It is a program that provides third-party verification of green buildings, and utilizes prerequisites and a point system to achieve different levels of certification. For information on how UL Environment's programs can help show compliance throughout the LEED program, please visit our recently developed LEED toolkit at www.ul.com/LEED/. If your jurisdiction is looking to start implementing green rating systems or green codes, please contact Josh Jacobs in Atlanta, at Josh.Jacobs@ul.com for further information about how to do this and how UL can help.

Protecting the Protectors

Managing Editor's Column */ by Howard Hopper*

Over the years I have worked with numerous fire service organizations and individuals. It's a good feeling to work with professionals who are committed to protecting the citizens in their communities, whether they are involved in fire prevention, public education or suppression. It is also gratifying to work for an organization that is involved in protecting firefighters and emergency responders.

Earlier this year, we launched UL's Firefighter Safety Research Institute, which is dedicated to increasing firefighter knowledge to reduce injuries and deaths in the fire service and in the communities they serve. The institute utilizes our infrastructure, equipment, knowledge and insights to conduct and disseminate cutting-edge research and training programs that focus on the changing dynamics of residential, commercial and industrial fires and the impact they have on fire service tactics and strategies. The institute is led by Steve Kerber, a UL fire protection engineer and a noted researcher, instructor and friend of the fire service.

Learn more about the institute and the activities we are involved with to protect the protectors by visiting http://ulfirefightersafety.com/, and stay safe.

Continuity Head-of-Wall Joint Systems

By Richard N. Walke */ Senior Regulatory Engineer*

The 2012 International Building Code (IBC) introduced new requirements to protect the voids where a fire barrier wall intersects the lower side of a non-fire-resistance rated roof assembly. The intent of the new requirement is to prevent flame passage over the top of a wall in the event of a fire. This article describes one method available to comply with these requirements.

New 2012 IBC requirements

Prior to the 2012 edition of the IBC, Section 707.5 required fire barriers to extend from the top of a floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above and to be securely attached thereto. The fire barriers were required to be continuous through concealed space, such as the space above a suspended ceiling. If joints were provided at the intersection of fire barriers with the underside of the floor or roof sheathing, slab or deck above, Section 707.8 required the assembly to comply with the Section 714 requirements for fire-resistant joint systems (this is now Section 715 in the 2012 IBC).

However, since the provisions of Section 714 only covered the methods used to protect joints in or between fire-resistance rated assemblies, there were no specific requirements to cover the situation where the floor or roof sheathing, slab, or deck above did not have a fire-resistance rating.

Section 707.9 was added to the 2012 IBC and requires voids created at the intersection of a fire barrier and a nonfire-resistance rated roof assembly to be filled with an approved material or system that is securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases. One example of such a void is a fire barrier used to separate occupancies in a metal building.

ASTM E 2837 solutions

At the time Section 707.9 was proposed, no consensus test standard existed to test head-of-wall systems involving nonfire-resistance rated horizontal assemblies. Therefore, the 2012 code described how the void protection is to be provided. However, it is rather subjective for the designer and code official to determine whether the material used to protect a void will not dislodge, will accommodate expected building movements and will prevent the passage of fire and hot gases.

To address this situation, the ASTM E 2837 Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies was developed.

This standard includes a procedure in which a joint system is installed within a test assembly at the intersection of a rated wall assembly and a non-rated roof assembly. Once cured, the assembly is subjected to a cyclical movement in the direction, magnitude and frequency as requested by the test sponsor based on the intended use of the system. Following the movement cycling, the system is subjected to a fire exposure representing a fully involved building fire for the time period equivalent to the fire-resistance rating of the wall construction. The fire exposure test is followed by the hose stream test, intended to evaluate the structural integrity of the test specimen. After these tests, the system is assigned an F rating and a T rating.

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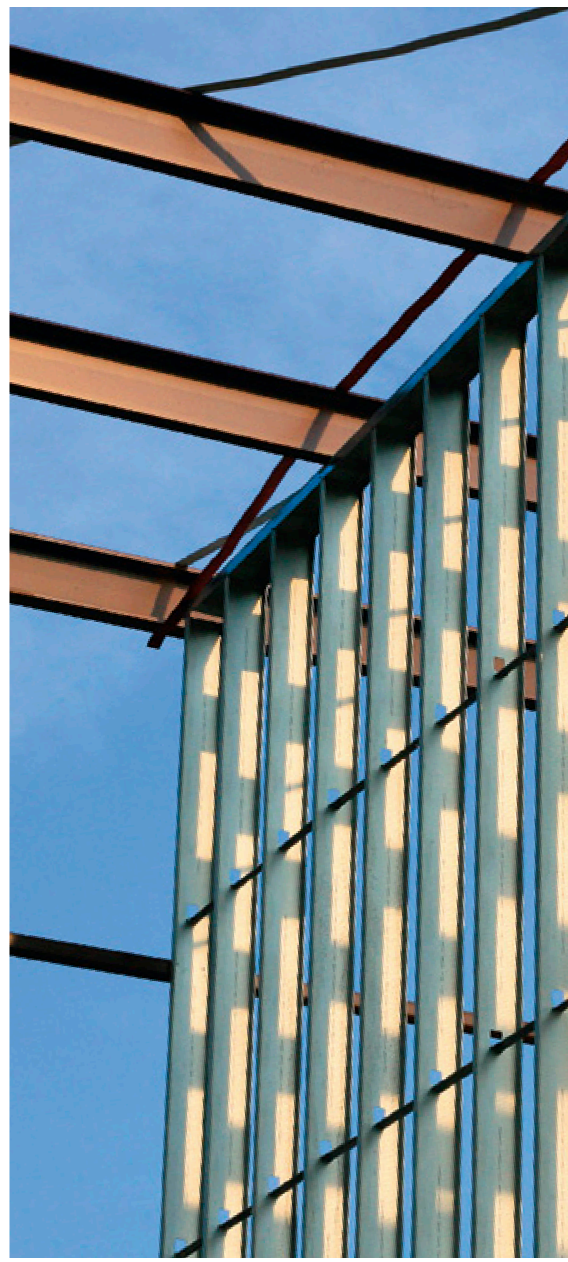


Continuity Head-of-Wall Joint Systems (continued from page 3)

The F rating relates to the ability of the system to:

1) Accommodate cyclical movement

2) Prevent the passage of flames and hot gases sufficient to ignite cotton waste on the unexposed side of the assembly

3) Prevent the projection of water through the system during the hose stream test.

The T rating adds the requirement that a system limit the temperature rise at any individual point on the unexposed side of the system to 325°F. Systems with a maximum joint width greater than 4 inches. must also limited the average temperature rise on the unexposed side of the system to 250°F.

The ASTM E 2837 F rating directly address the requirements of Section 707.9 of the 2012 IBC, and verifies that the material or system will not dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases. The ASTM E 2837 T rating would also address the requirements of Section 707.9.

UL certifications

UL has certified over a dozen systems to ASTM E 2873 under the Continuity Head-of-Wall Joint Systems (XHBO) product category, which can be found in the UL Online Certifications Directory at www.ul.com/database. Each system describes the construction of the wall assembly and the roof assembly, along with the material or materials used to fill the linear opening between the two assemblies. UL's certification information also includes the movement capabilities of the system in terms of intended use, magnitude and direction, and the established F and T ratings. Tests done to date have achieved the rating without additional protection or modifications to the non-rated roof assembly.

When selecting or approving a continuity head-of-wall joint system for use in a particular application, it is important to ask:

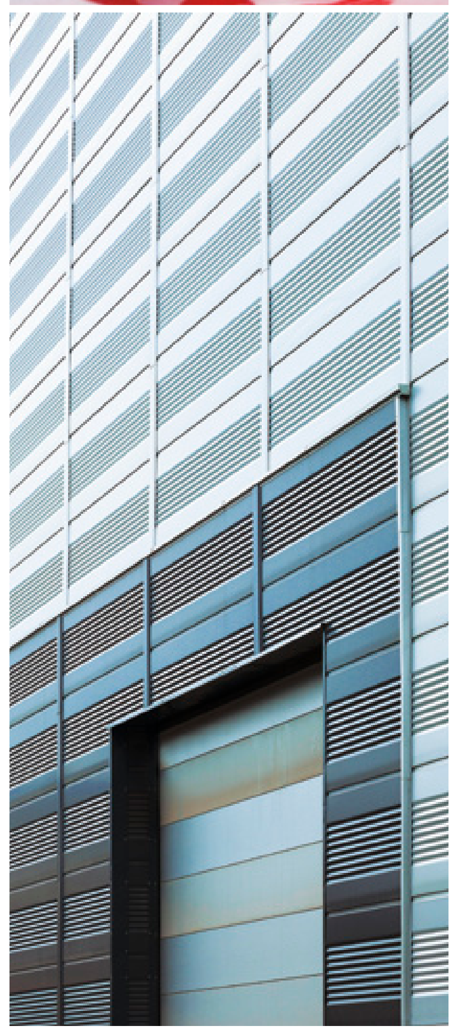
1. Does the construction of the wall assembly in the system match the field conditions?
2. Does the construction of the roof assembly in the system match the field conditions?
3. Does the published joint width match the field conditions?
4. Do the published movement capabilities of the system match the field needs?
5. Does the published F Rating of the system match the required rating of the wall assembly?

For more information on continuity head-of-wall joint systems, please contact Rich Walke in Northbrook, Ill., at Richard.N.Walke@ul.com or at +1.847.664.3084.

Questions & Answers

An office building in our jurisdiction is required to have portable extinguishers, and the owner provided several 2A-10BC rated non-rechargeable dry chemical extinguishers. Because these units are non-rechargeable they need to be removed from service and replaced no later than 12 years from the date of manufacture. Does UL verify that the date marking on the bottom of the extinguishers is the actual date of manufacture or should we look for additional documentation to determine the age of the extinguishers?

UL 299, the Standard for Safety for Dry Chemical Fire Extinguishers, requires the year of manufacture, or the last two digits of the calendar year, to be permanently marked on the extinguisher. This date marking applied to UL Listed extinguishers is verified as being accurate during our periodic factory surveillance audits. Therefore, as long as the portable extinguishers bear an appropriate UL Listing (Certification) Mark, it should not be necessary to look for additional documentation to determine the date of manufacture, other than the date marked on the unit.



I received plans for a building that includes exterior walls provided with insulated MCM panels. The plans indicate that the products are certified to UL 1040 and therefore do not need to be separated from the interior of a building by ½-inch gypsum wallboard. How can I determine if the panels indeed comply with this standard, and what kind of test has been conducted on this panel?

UL certifies metal composite materials (MCM) in accordance with UL 1040 under the insulated wall, Building Units category (NYWR). These certifications can be found in the UL Online Certifications Directory at www.ul.com/database. Panels complying with these requirements will be marked with the UL symbol, the word "CLASSIFIED" or "CERTIFIED" above the UL symbol and "BUILDING UNITS FOR INSULATED WALL CONSTRUCTION AS TO FIRE DAMAGEABILITY ONLY".

Section 1407.10.2 of the International Building Code requires that MCM panels be separated from the interior of a building by an approved thermal barrier consisting of ½-inch gypsum wallboard or a material that complies with NFPA 275. However, Section 1407.10.3 exempts the requirement for a thermal barrier where the MCM system is specifically approved based on tests conducted in accordance with NFPA 286, UL 1040 or UL 1715.

UL 1040 includes a large scale 30 minute corner fire test. It consists of a 4 by 4 by 3-½ foot high wood crib ignition source that produces a uniform flame for direct impingement on the walls and ceiling of a 20 by 20 by 30 foot high open corner configuration of test panels. During the test, surface burning cannot extend beyond 18 feet from the intersection of the two walls. Also, post-test observations must show that the combustive damage of the test materials within the assembly diminishes at increasing distance from the immediate fire exposure area.

If the panels have also been investigated for compliance with other fire test standards, such as surface burning characteristics (UL 723), hourly fire-resistance ratings (UL 263), or others, this will also be indicated on the product Certification Mark.

For additional information on UL 1040 please contact Dwayne Sloan in Research Triangle Park, N.C., at Dwayne.E.Sloan@ul.com or at +1.919.549.1676.

Metering Electric Power (continued from cover)

allow for remote reading, monitoring of load control and other important functions.

Smart meters utilize new construction materials and electronic components that need to be evaluated to address safety concerns. Because smart meters are not provided by nor determined as acceptable by a electric utility, code authorities are left to determine compliance of these meters with energy and electric code requirements. Fortunately, certifications are available to help them achieve safe, code compliant installations.

Type A and Type S meters

Smart meters are either detachable (Type S) or nondetachable (Type A). Their primary function is to monitor energy consumption for revenue metering. Plug-in type meters are intended for installation in meter sockets, meter-socket bases, metering transformer cabinets or other equipment (such as panelboards and switchboards) incorporating provisions for plug-in type meters. The UL certification product categories for these types of equipment are Meter Sockets (PJYZ), Meter-socket Bases (PJWT), Metering Transformer Cabinets (PJXS) and Meter Fittings (PJVV).

Traditional meters used by utilities are only evaluated to the NEMA C12 series of standards, which are performance standards used to determine meter accuracy and reliability. The introduction of smart meters raises new concerns about functional safety, performance and product safety data security, and interoperability, which are not fully addressed by the C12 standards.

UL has recently published the UL 2735, Standard for Safety for Electric Utility Meters, to provide the additional safety requirements necessary for certifying electric utility meters that measure, monitor, record, transmit or receive electrical energy generation or consumption information. These meters may or may not be under the control of an electric utility. These meters are certified by UL under the Electric Utility Meters product category (POCZ).

These meters may communicate with other devices via power-line carrier, satellite/radio frequency, telephone, cable or other communication means that may be one- or two-way. One-way communication is typically used for data collection and/or reporting, including automated meter reading (AMR). Two-way communication is typically part of an advanced metering infrastructure (AMI), that may include signaling other equipment in the infrastructure to take some action in response to electrical demand. Certifications do not cover any portion of the AMI other than the meter.

The ratings of these meters are limited to 600 V ac maximum, with a maximum of 400 A through any one meter. These meters are intended for installation in ordinary locations.

Testing and evaluation requirements

The requirements in UL 2735 were developed to address problems that have been reported from field installations of smart meters, including fires, meters ejecting from meter socket bases and exposed live parts. When electronic components are overstressed, there is a potential for the components to explode.

Among other things, UL 2735 addresses the potential flammability of plastic enclosure materials under fault conditions. Meter enclosures are evaluated for the intended environment, and for their ability to completely enclose all live parts and resist impact. Meters intended for connection to current transformers that are not provided with the meter are marked to indicate the

ratings of the current transformers to be used with the meter. For meters utilizing batteries, the batteries are evaluated to determine that they will not cause an explosion or produce a risk of fire as a result of either excessive charge or discharge, or if a battery is installed with incorrect polarity.

Meters are tested to single fault conditions in which the discrete components, such as capacitors, diodes and resistors are shorted and opened, and transformers are subjected to short circuit tests. No exposure of live parts and no molten metal, burning insulation or flaming particles are permitted.

Testing includes temperature, insulation resistance, effect of high voltage line surges, effect of temporary overloads, effect of electrical fast transient bursts, effect of radio frequency interference, effect of electrostatic discharge, and weather simulation. Meters are also subjected to static loading, impact, and drop tests.

Energy usage monitoring systems

Meters and other equipment for metering of electricity that are not plugged into a traditional meter socket are certified by UL under the Energy Usage Monitoring Systems product category (FTRZ) in accordance with UL 916, the Standard for Safety for Energy Management Equipment. This category covers products intended for use in metering of utility and nonutility electric power. The primary function of these devices is to monitor power consumption on a building main supply or separate branch circuits. These devices may communicate with other devices by means of power line carrier, satellite/radio frequency, telephone, cable or other means.

Summary

Certifications of all types of electric meters and metering equipment are now available. Smart meters are evaluated to both the NEMA C12 standards, which cover the reliability and accuracy of the meters, and UL 2735, which addresses safety considerations.

For more information on UL's meter certification program, please contact Paul Barnhart in Research Triangle Park, N.C., at Paul.D.Barnhart@ul.com or at +1.919.549.1446.

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Calendar of Events

January 13 – 15, 2014
2014 NEC Essentials Seminar
Quincy, Mass.
www.nfpa.org

January 19 – 21, 2014
INTERSEC
Dubai, UAE
www.intersecexpo.com

January 24 – 26, 2014
Emerging Professionals Summit
Albuquerque, N.M.
www.aia.org

February 6 – 7, 2014
CAFAA's 44th Annual Conference
Palm Springs, Calif.
www.cafaa.com

February 26 – 28, 2014
International Roofing Expo
Las Vegas, Nev.
www.theroofingexpo.com

To include your upcoming events, email Howard Hopper at Howard.D.Hopper@ul.com. Please add "TCA Calendar" in the subject line.

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