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Residential Attic Fire Mitigation Tactics and Exterior Fire

Spread hazards on fire fighter safety

***By Steve Kerber and Robert Backstrom**/ Research Engineers*

Continuing a history of contributing to firefighter safety, UL (Underwriters Laboratories) will lead a two-year study to examine fire service attic fire mitigation tactics and the hazards posed to firefighter safety by the changing modern residential fire environment and construction practices. The purpose of this study is to increase firefighter safety by providing the fire service with scientific knowledge on the dynamics of attic and exterior fires and the influence of coordinated fire mitigation tactics from full-scale fire testing in realistic residential structures.

The US Fire Administration estimates 10,000 residential building attic fires are reported to U.S. fire departments each year and cause an estimated 30 civilian deaths, 125 civilian injuries and $477 million in property loss. These attic fires are very challenging for the fire service to mitigate and have led to numerous line of duty deaths and injuries. Further complicating attic fires, current building

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Scan with your mobile QR Code Reader to find out more about UL's research on residential flooring hazards.

Residential Attic Fire Mitigation Tactics and Exterior Fire (continued from cover)



practices include new products to achieve better energy performance to meet newer code requirements with little understanding of fire performance or the impact on firefighter safety.

Attic fires pose many hazards for the fire service. When a fire occurs in an attic, it is common that it will go unnoticed until smoke or flames are visible from the outside of the structure. Because they take longer to detect, attic fires are more dangerous for firefighters and residents. A fire in the attic may involve insulation and wood structural members as well as a variety of stored belongings. In a fire situation, the attic ventilation system, which is designed to reduce moisture accumulation by drawing fresh air low from the eaves and exhausting moisture laden warm air near the peak, create an optimal fire growth and spread situation by supplying oxygen to the fire and exhausting hot gases. Examples of the danger to firefighters are unfortunately illustrated by events resulting in firefighter deaths and injuries in St. Louis, Chicago, Syracuse and Prince William County, Va., and Hyattsville, Md.

The project consists of the following tasks:

- Formation of Project Advisory Panel
- Incident Documentation Update
- Test Supplies, Instrumentation and Contractor Acquisition
- Test Fixture Design
- Design of Experiments
- Conduct Experiments
- Data Compilation and Analysis
- Design and Develop Outreach Program
- Develop Final Project Report

The experimental portion of the project will include experiments to develop ignition sources, full scale wall and eave fires, full and reduced scale model fire experiments, and acquired structure attic fire field fires.

Consistent with previous research projects for the fire service, the results of the experiments and findings will be summarized in a formal report. In addition, a Web-based training program will be posted on UL's website. Previous projects have included lightweight construction, horizontal and vertical ventilation, smoke exposure and photovoltaic installations. Reports and training can be accessed at www.ul.com/fireservice.

For more information, please contact Steve Kerber at Stephen.Kerber@ul.com or +847.664.3329.

Two New Canadian Standards

Tomorrows integrated systems testing in building fire and life safety systems

As Underwriters Laboratories of Canada (ULC) Standards enters the next stage of the code cycle for the Canadian National Model Construction Codes, the needs of its stakeholders are moving just as fast if not faster. The movement underway in Canada for new construction is Commissioning* of the building — or the process of verification of all the subsystems in new construction that make up the building. This ensures that they all work as intended and as designed.

Discussions with builders across Canada have shown ULC the need to develop Standards to support their drive to have commissioning or integrated systems testing become as regular a practice as having the AHJ inspect for occupancy. Buildings today are becoming more complex structures and include such a wide array of components in the process of building, that the need for more standards that support all aspects of Commissioning is required.

To begin to meet these needs for 2012-2013, ULC has developed a new standard and revised an existing one. They are: *CAN/ULC-S540 Residential Fire and Life Safety Warning Systems: Installation, Inspection, Testing and Maintenance*, and *CAN/ULC-S1001 Integrated Systems Testing of Fire Protection and Life Safety Systems.*

These will provide a methodology for installing, verifying and documenting all the interconnections between systems provided for fire and life safety so that they are operating and functioning in conformance with their design criteria.

CAN/ULC-S540

Since 1986, CAN/ULC-S540 has been titled “Standard for the Installation of Residential Fire Warning Systems.” The revised title shows that the update not only includes Inspection, Testing and Maintenance of Fire Systems but also Life Safety Warning Systems.

This change better reflects the standards application to a wider scope of buildings. The previous scope covered Residential Fire Warning Systems. Yet, Fire Warning Systems have application not only in residential buildings, but also in larger buildings that include such services as elevators or sprinkler systems. Also, the current development of the standard is forward looking towards emerging technologies and trends in Fire Warning Systems. With these systems beginning to include carbon monoxide and burglary or intrusion detection functions, the term Fire Warning System is becoming too specific to one function only—whereas Life Safety Systems indicates the broader function of these systems.

By definition per[1] – CAN/ULC-S524-06 Installation of Fire Alarm Systems, a fire alarm has a minimum of a manual pull station, a controller and audible signaling devices and not all of these could be present in some of the Life Safety Systems installed. It is for this reason the introduction of this expanded scope within Standard S540 will be able to benefit stakeholders with a single



* To remove any confusion with the intent of CAN/ULC-S1001 and any future related Standards, ULC established that two types of commissioning processes existed. The commissioning process required by the NBCC and NFCC was determined to be Integrated Systems Testing, which represents the minimum level of testing required to confirm that two systems are functioning together correctly. The second process was determined to be Fire Commissioning, which represents a process for ensuring that a building design meets the Owner’s requirements.

[1] CAN/ULC-S524-06 Installation of Fire Alarm Systems

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CHINA'S FIRST UL10 WITNESS TEST LAB

UL announced the authorization of witness test lab qualifications to Guangzhou Building Materials Institute Limited Company (GML) for UL 10B, Fire Test of Door Assemblies, and UL 10C, Positive Pressure Fire Tests of Door Assemblies. This is the first time for UL's testing and certification services to be localized for fire resistant doors and hardware produced in China.



Chen Shao Qing, Director of GML and Wesley Kwok, UL Engineering Director of Greater China

This means that Chinese manufacturers will be able to conduct fire resistance product testing locally. UL Greater China Director Wesley Kwok and GML Director Chen Shao Qing attended the September 12, 2012 award ceremony held in GML's headquarters in Guangzhou city, Guangdong Province. Meanwhile, UL and GML jointly held a seminar on standard for fire door and hardware standards and to decode the newest trend of fire protection technology.

The Fire Resistant Door Witness Test Lab built by UL and GML is located in Qingyuan, Guangdong, covering an area of approximately 18,000 square meters. The laboratory has been equipped with a vertical fire resistance test furnace and ancillary testing system. Fire resistant tests in accordance with UL10B and UL10C and hose stream tests can be performed in this lab. Compared with the previous foreign lab testing, the service provided by this convenient local lab will greatly shorten the time of sample delivery and testing.

The Chinese fire door industry has been going through restructuring and there is ongoing public distrust due to recent fire door quality mishaps.

"The timing of this UL and GML cooperation couldn't be better, with both parties utilizing their areas of expertise and experience to help domestic manufacturers improve product quality and regain public trust and consumer confidence by providing UL testing services," said Chen Shao Qing of GML. "As we all know, the UL fire door standard has always been known for its rigor, impartiality and authoritativeness. It is widely recognized in the international market. At the same time, more and more Chinese fire door enterprises have realized that UL certification is a must to develop a product export passport and is the key to improve brand recognition. A UL certification is an important part of product differential in a competitive market," Mr. Shao Qing continued. "We hope that the cooperation of both parties will help Chinese fire door enterprises to enhance competitiveness and to stand out in the industry by providing the standard interpretation and technical support on testing."

As a global leader in fire safety services, UL has more than 100 years of fire safety testing and certification. The fire resistant product standards set by UL have been widely accepted around the world, now including China. The fire door standards UL10B and UL10C are widely referenced in high-end projects, government

promoted constructions, and commercial and entertainment developments around the world.

"UL has always been committed to promoting the development of the fire safety industry," UL Greater China Director Weiping Guo. "With its authoritative standards and a profound understanding of the industry, UL provides manufacturers with professional testing, certification and consulting services. This highlights UL's commitment to improving localized services. We are very pleased to work with a leading third-party construction testing organization, GML, to create a localized platform of international certification for Chinese fire doors, windows and hardware manufacturers, helping them to seize the opportunities in a competition market and to regain the trust of the consumers."

UL and GML recently held a joint seminar where UL experts covered the new safety challenges of architectural products and proposed comprehensive fire safety concepts architectural designs address. Additionally, UL experts were able to review how compliance to requirements of a safety standard can enhance the value and competitiveness of any new building product or product assembly. Participants were able to discuss detailed requirements of UL10B and UL10C Standards with UL technical experts. Participants stated an understanding of the standards is an important prerequisite for the improvement of product quality and performance. Participants also confirmed fire door manufacturers view UL certification as a product safety feature that they can leverage as they seek out business opportunities in current market conditions.

History of Cooperation

The cooperation between UL and GML has a long history. From 2006, UL has successively completed Mattress Flammability service and Network Equipment Building System (NEBS) fire testing service, and now resistant testing for fire door and hardware. Recently,



the two parties have reached an agreement to evaluate fire resistant testing of PV solar panels and roofing materials.

About UL

UL (Underwriters Laboratories) is a premier global safety science company with more than 100 years of proven history and employs nearly 10,000 professionals in more than 100 countries. UL Marks for Fire Protective products are recognized and accepted globally. UL is evolving its Fire Safety services provided outside the U.S. Limited fire safety testing capabilities are available in the Middle East and Asia with local marks recognized in Europe. For more information on these services, please visit: www.ul.com/firedoors.

About GML

GML was established in 1964. It is a professional third-party testing organization and engages in building material and building engineering testing. GML is one of Guangdong's biggest building testing services. GML is the earliest professional fire testing lab in Southern China. GML has invested in fire testing research since 2003. After 10 years of development, GML's Fire testing Center has advanced equipment and is the largest lab in Southern China.

With the assistance of Guangzhou and Guangdong governments, GML has set up the Guangzhou Key Lab of Testing Technology and Assessment for Building Materials and Element, Guangdong Province Enterprise Key Laboratory of Materials and Fire Elements Fire Testing Technology, Guangdong Province Technical Committee of Fire Resistant Materials and Elements Standardization. The purpose of the governments' support is to improve fire resistant performance of Guangdong Province, and to strive to build an advanced fire test, evaluation and research platform.

For Questions or additional information contact Elsie Lin at Elsie.Lin@ul.com or at +86 20 3213 1000 ext. 67067

Two new Canadian Standards (continued from page 3)

consistent application to the continuing evolution of Fire and Life Safety Warning Systems in today's and tomorrows buildings.

CAN/ULC-S1001

ULC was able to meet the needs of the National Building Code of Canada (NBCC) and the National Fire Code of Canada (NFCC). In 2010, these National Codes included the requirement for the Commissioning of integrated fire protection and life safety systems to confirm proper operation and inter-relationship between systems. This Standard has been developed to meet the needs for integrated systems testing of fire protection and life safety systems and the fire protection and life safety functions of other systems. It represents the process of integrated systems testing and is the first ULC Standard related to Commissioning. It is the ultimate intention of the ULC Committee to work with the National Building Code of Canada (NBCC) and National Fire Code of Canada (NFCC) Standing Committees to have CAN/ULC-S1001 introduced into the NBCC and the NFCC to address the integrated systems testing needs of a building's fire protection and life safety systems as a whole.

When describing CAN/ULC-S1001, this Standard prescribes the technical and practical knowledge for Integrated Systems Testing, which includes:

- Integrated systems testing qualifications
- Integrated systems testing process
- Integrated systems testing requirements
- Integrated systems testing documentation
- Periodic integrated systems testing
- Retro-integrated systems testing
- Integrated systems testing for modifications.

CAN/ULC-S1001 is a key Standard not just for the fire and life safety system installation and integration but through the life-cycle of the systems. With this approach, the issue of Unintended Consequences and the effects they have on builders and owners may be mitigated using CAN/ULC-S1001—as these consequences are often results of unknown or unanticipated code or regulatory changes or in product changes that result from evolving technologies, etc. In situations with complex integrations, an independent Integrated Testing Coordinator would provide additional assurance and act as a "second set of eyes" which will be beneficial to the process.

With the speed and pace of Code changes that we now experience in our global community, updating standards such as CAN/ULC-S540 and CAN/ULC-S1001 will be of immediate benefit to building owners, property managers, those who perform functions associated to integrated systems testing and commissioning, general contractors, regulators etc. As we move forward, development will continue to shape our Standards towards an integrated and ultimately safer world.

Additional information

For ULC Standards and current committee work, please visit the ULC Standards website at www.ul.com/canada/eng/pages/ulcstandards. If you are interested in being a member of a Standards committee or sub-committee, please contact Mark Ramlochan, ULC Standards specialist, at +1.613.755.2729, ext. 61416, or at Mark.Ramlochan@ul.com.

For the next code cycle, standards development organizations (SDOs) and the CCBFC are working together to improve coordination between standards and codes. Rae Dulmage, director of ULC Standards, is the SDO representative working with the CCBFC for this 2010-2015 code cycle. Rae Dulmage can be contacted at +1.613.755.2729, ext. 61429, or at Rae.Dulmage@ul.com.

ULC Regulatory Services also provide support and clarification on ULC product standards for code authorities. Regulatory Services contacts are Frank Donati at +1.613.247.0440, ext. 257 and at FrankDonati@ul.com, and Pierre McDonald at. +1.780.419.3202, or PierreMcDonald@ul.com.

Upcoming Standards

In addition, ULC Standards is presently working on growing our family of Commissioning standards with the following three standards to be published in 2013 and 2014:

CAN/ULC-S1002, Guidelines on Fire Commissioning

- Owner Project Requirements, Basis of Design, Design Documentation and Changes, Acceptance Testing, Integrated Systems Testing, & Closeout
- New Construction, Re-Commissioning, Retro-Commissioning

CAN/ULC-S1003, Recommended Practice for Acceptance Testing of Active Fire Protection and Life Safety Systems

- Guidelines for Design Professional in conducting acceptance testing
- Proper review and testing of systems
- Fire alarms, sprinklers, standpipes, fire pumps, generators, elevators, etc.

CAN/ULC-S1004, Recommended Practice for Acceptance Testing of Passive Fire Protection and Life Safety Systems

- Similar to CAN/ULC-S1003
- Fire rated assemblies, fire stopping, exits, interior finishes, exit signage, etc.

WHAT'S HOT: UL Now Offering CEU Credits

For one million firefighters in the U.S., shifts in modern home construction are contributing to a new reality where fires can become uncontrollable in less than three minutes and reach flashover eight times faster. They must continually modify tactics and better understand risks to safeguard both themselves and the communities where they reside.

UL, a world leader in advancing safety science, is introducing four new eLearning modules with continuing education units (CEUs) for fire service personnel. These modules are backed by several years of exclusive research, include tangible burn data, and provide insights required to enhance operational tactics.

Topics include:

- Hazards that exist in homes built with open floor plans and lightweight engineered lumber.
- Impacts of synthetic furnishings that generate toxic smoke and burn rapidly when ignited.
- Shock and casualty hazards firefighters increasingly encounter when attempting to dismantle photovoltaic (PV) systems.

Fire personnel can visit **www.ul.com/fireceus** to view the modules and learn how to receive CEU credits to apply toward professional development.



Questions & Answers

According to UL2034, are CO alarms required to generate an end of life signal? What conditions trigger this signal?

Per UL 2034, clauses 3.11 and 38.1.6 which became effective August 1, 2009, the end-of-life signal is required on all CO alarms. The Standard allows for an internal timer circuit to trigger the end-of-life signal. Other options to generate this signal are also defined, but the most commonly used method is an internal timer. A copy of the definition (3.11), test requirement (38.1.6) and marketing requirement (83.1) from UL 2034 is provided below.

Relevant UL 2034 Requirements:

3.11 END-OF-LIFE SIGNAL – An audible signal, differing from the alarm signal, intended to indicate that the device has reached the end of its useful life and should be replaced. It is permitted for the audible component of the signal to be of the same format as a trouble signal, provided a visual indicator is employed to differentiate between the end-of-life and other trouble conditions. The end-of-life signal shall repeat once every 30 – 60 seconds +/-10 percent.

38.1.6 The unit shall indicate end-of-life, based on the manufacturer's specified lifetime, with an end-of-life signal (see 3.11). This signal shall be triggered either by an internal timer or by a self-diagnostic test(s).

83.1 An alarm shall be permanently marked on a Class IIIC marking material with the following information unless specifically indicated that it appears on the installation wiring diagram. The marking shall be in a contrasting color, finish, or equivalent. Unless the letter height is specified, all markings shall be at least 3/64 inch (1.2 mm) high.

(l) Distinction between alarm, end-of-life, and trouble signals on units employing these signals.

See UL 2034 for complete requirements. For any questions or comments please contact Dave Mills at **David.Mills@ul.com**

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Spotlight

UL Evaluation Reports: You Asked, We Listened

UL Evaluation Reports are now available to meet customer demands. We recognize that in some specific situations, code approval for new building materials or construction methods may go a bit beyond the trusted UL Certification Mark.

Look for the next issue of *The Fire & Security Authority* for additional information.

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