



THE CODE AUTHORITY®

A NEWSLETTER FOR THE CODE COMMUNITY

AN UPLIFTING EXPERIENCE —

UL's evaluation of asphalt shingle roofing systems

By Bob James, Warren Shill & Dwayne Sloan

Due to the record number of recent hurricanes that made landfall along the Atlantic Coast and Gulf Coast regions of the United States, Underwriters Laboratories Inc. has received many questions relating to the wind, uplift and impact resistance of roofing systems and roof covering materials. UL has many years of experience evaluating and testing these products under a wide variety of conditions. In fact, UL first starting testing roofing products in 1903.

UL comprehensively investigates and certifies more than 30 roofing-related product categories using a number of different standards for testing and evaluation. These standards provide detailed test methods for evaluating the performance of a roof system or roof covering material. This article focuses on the standards and product categories that address wind, uplift and impact resistance of asphalt shingles.

UL has wind-tested shingles since the early 1960s. The following standards are currently used for evaluating asphalt shingles:

- UL 997, Standard for Safety for Wind Resistance of Prepared Roof Covering Materials, evaluates products for resistance to nominal 60 mph wind velocities. Materials complying with these requirements have not been evaluated for their ability to withstand the wind forces of tornados, cyclones or hurricanes.
- ASTM D3161, Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method), is similar to UL 997, except it evaluates products for resistance to wind velocities up to 110 mph.
- ANSI/UL 2390, Test Method for Wind Resistant Asphalt Shingles with Sealed Tabs, and ASTM D6381, Standard Test Method for Measurement of Asphalt Shingle Mechanical Uplift Resistance, both evaluate the wind resistance of tab sealant for wind velocities up to 150 mph, and measure the actual uplift-resistance capability of the tab sealant using mechanical means. It is important to note that the magnitude of wind velocity across a roof deck and resulting uplift pressures depend on many factors, such as wind gusts, roof deck shape, edge configuration and the landscape surrounding the installation.
- UL 2218, Standard for Safety for Impact Resistance of Prepared Roof Covering Materials, evaluates products for resistance to impact using a steel ball, up to 2 inches in diameter, dropped on the roof covering material from a height of up to 20 feet.

Continued on page 5



THE LIGHTER SIDE OF SAFETY

Vending machines: amusing diversion or aggravation therapy?

Some people have rich, well-rounded lives. Me? I often find myself living vicariously through vending machines. Not video games, not slot machines — ordinary vending machines. What's more, mankind's fascination with vending machines is not a new phenomenon, but dates back to the dawn of civilization.

Ancient history (actually, a Google search) documents the first vending machine in 215 B.C. when the mathematician Hero invented a device that accepted bronze coins in exchange for holy water in the temples of Alexandria, Egypt. This was followed by a Chinese coin-operated pencil vendor (1076 A.D.), coin-activated tobacco boxes in English taverns (the 1700s) and machines that dispensed tutti-frutti gum for a penny on New York City train platforms (1888).

Vending machines dispense not only snacks and sodas, but also pain and pleasure. The pain is experienced when you insert your coins in the machine, and the bag of Reese's Pieces gets caught on the spiral instead of dropping. After shaking the machine a little, the candy still doesn't drop. You move on, defeated. PAIN!

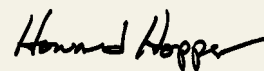
After you leave, along comes a vending machine veteran. His intends to buy a bag of Fritos, but immediately spots the bag of Reese's Pieces hanging by a corner, ready to drop. This changes everything! A rookie would change his selection from Fritos to Reese's Pieces and hope that two bags drop with a single payment. However, this is no rookie, but a top-notch vending machine jockey. After a careful review of anticipated trajectories, he makes the bold decision to purchase a bag of Cheetos in the slot directly above the imperiled treat. This will a.) provide a reasonable alternative to his salty snack craving, and b.) introduce the possibility of the

Cheetos dislodging the Reese's Pieces as they fall. The coins are inserted, "A" and "5" are selected, and whirl, whoosh ... success! Our triumphant hero returns to his or her desk with two well-earned snacks. PLEASURE!

This leads me to vending machine safety. UL 751, Standard for Safety for Vending Machines, and UL 541, Standard for Safety for Refrigerated Vending Machines, include requirements to reduce the risk of fire, shock and personal injury that may occur during the normal use and potential misuse of products. However, misuse of a vending machine can be manifested in a variety of unique ways. In particular, hazards associated with tipping the vending machine or beating on it must be considered. UL standards address these hazards with a variety of tests, including a 10-degree tilt test for floor standing machines, an antitheft device test on refrigerated machines and strength and impact tests required for exterior glass.

Recently, UL revised both UL 751 and UL 541 to require a ground-fault circuit-interrupter (GFCI) on any cord-connected vending machine manufactured after April 10, 2007. Providing a GFCI in the cord of a vending machine will help protect against shock hazards, thereby increasing the safety of these products.

Knowing that UL Listed vending machines reduce the risk of hazards should give you one less thing to worry about. Now you can concentrate fully on that next excursion into the world of vending machines. And don't even get me started on the strategies my daughters use on the "Claw" vending machine at our local coffee shop to get their fair share of plush toys.



By Howard Hopper
Managing Editor,
The Code Authority®

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INSTALLING “POKE-THROUGH” FLOOR BOXES

IN FIRE-RATED CONCRETE FLOORS

By Warren Shill

Poke-through floor boxes are commonly used to provide access for power, data and communications in existing construction. They are mounted in core-drilled holes in concrete floors. When installing these devices in fire-resistive floor-ceiling assemblies, code compliance is achieved by following the details of the certification and the manufacturer’s installation instructions.

The certification and the installation instructions detail the type of fire-resistive assembly in which the poke-through floor box may be installed. The assembled device and fittings will not reduce the ratings of the floor assembly when installed in accordance with the certification and the installation instructions, which specify:

- The type of floor assembly, typically reinforced concrete or poured concrete over a steel deck

- The minimum thickness of the concrete
- The required unit weight of the concrete, in pounds per cubic foot
- The size of the core-drilled hole
- The minimum spacing between poke-through devices
- The density of poke-through devices, in number of devices per unit area

Additionally, the certification and the installation instructions indicate the maximum number of conductors for power circuits, data cables, telephone cables or a combination thereof.

An important installation consideration is the minimum spacing requirement. Currently, all poke-through floor boxes Classified by Underwriters Laboratories Inc. must be spaced a minimum of 2 feet on-center apart, and not more than one device per 65 square feet of floor area may be installed in a single span.

UL Classifies poke-through floor boxes for fire resistance under the product category “Outlet Boxes and Fittings Classified for Fire Resistance (CEYY/QBWW).” Guide Information for this product category can be found in UL’s Online Certifications Directory at www.ul.com/database. The

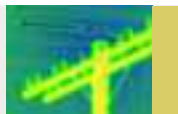
basic Standard used to investigate fire-resistive assemblies is ANSI/UL 263 (ASTM E119), Fire Tests of Building Construction and Materials. Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces. Such products are intended for use in accordance with Section 300.22(C) of the National Electrical Code® (NEC®) and Section 602.2.1.4 of the International Mechanical Code (IMC).

Poke-through floor boxes are also Listed by UL under either “Metallic Outlet Boxes (QCIT)” or “Nonmetallic Outlet Boxes (QCMZ),” depending on their construction. Both types of devices are designed for floor installation as covered in the NEC. They are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations.

For more information on installing poke-through floor boxes in fire-resistive floor assemblies, contact Bob Berhinig in Northbrook, Ill., by phone at +1-847-664-2292; or by e-mail at Robert.M.Berhinig@us.ul.com.



UL-ese



Listed, Classified, Follow-up Services, Category Control Number (CCN), Recognized Component ... these are just a few examples of the UL-ese spoken at Underwriters Laboratories Inc. on a daily basis. More frequently, these expressions are being used outside the office in publications, during technical conversations and on various Web sites. This column will explain and clarify UL terminology.

For definitions of other UL terms, visit UL’s glossary of terminology Web site at www.ul.com/about/glossary.html. If you would like a UL term added, contact Jill Witt in Northbrook, Ill., by e-mail at Jill.Witt@us.ul.com; or by fax at +1-847-313-2175.

Primary Designated Engineer (PDE) —

The PDE’s primary responsibility is to drive consistency, integrity and engineering quality in the establishment and application of UL product certification requirements. The PDE has expertise in UL’s basic safety principles and hazard-based safety engineering (HBSE). A PDE’s responsibilities include development and maintenance of UL Standards for Safety and UL Guide Information for assigned product categories, technical support to UL staff, and participation as a UL technical representative in meetings and committees (e.g., industry, government and national and international standards development organizations).

Exit signs — EVOLVING PRODUCTS, EVOLVING STANDARD

By Mike Shulman

The original “EXIT” sign was probably black paint on a white wall. Such painted signs and placards are still in use today, but their effectiveness is dependent on external light sources. To comply with model code requirements stating that exit signs be continuously illuminated while the building is occupied, most facilities choose internally illuminated exit signs. Per Section 7.10.7 of NFPA 101-2006, Life Safety Code, and Clause 1011.4 of the International Building Code (IBC), such internally illuminated signs must be listed.

The ninth edition of ANSI/UL 924, Standard for Safety for Emergency Lighting and Power Equipment, was published on Feb. 24, 2006. In addition to updating terminology and streamlining requirements, the new edition directly addresses some of the technology changes that have occurred over the past decade. Light-emitting diode (LED)-based designs have replaced incandescent or fluorescent technology as the dominant electrical product. Electroluminescent designs provide considerable energy savings over these historically dominant technologies. All of these electrical exit signs are Listed under either “Emergency Lighting and Power Equipment (FTBR)” or “Exit Fixtures (FWBO).” Photoluminescent and tritium products have become increasingly competitive, offering installation ease, flexibility and zero direct energy consumption. These signs are Listed under the product category “Exit Signs, Self-luminous and Photoluminescent (FWBX).”

LED, electroluminescent and photoluminescent products are also widely available as floor proximity path markers, as may be required by NFPA 101, clause 7.10.1.7. They are Listed under the product category “Floor Proximity Egress Path Marking Systems (IMZI)” for compliance with UL 1994, Standard for Safety for Low Level Path Marking and Lighting Systems.

UL 924 still offers two paths to determine compliance with minimum visibility requirements. The luminance and contrast measurement method determines a sign visibility’s equivalence to the historic benchmark — the black-on-white placard that is externally illuminated at 5 footcandles. The observation test uses human observers and statistical analysis to directly determine whether the image on the sign is discernible at its intended viewing distance, at the end of its rated time (typically 90 minutes), when



compared to a slightly different image. With few exceptions, electrically powered signs are tested using the luminance and contrast measurement method, while photoluminescent and tritium signs are tested using the observation method.

Both the observation visibility and the luminance measurement and contrast measurement test procedures have been expanded to accommodate graphical symbol (pictogram) signs, such as the silhouette of a man running through a door. The allowance for regulatory authorities to accept such signs was added to NFPA 101-2003 (7.10.3.2), with an annex note (A7.10.3) that states such signs need to provide "equal visibility and illumination." Prior to the new edition of UL 924, there

was no test protocol to make this determination. Both NFPA 101 and UL 924 require the symbols themselves to conform to those shown in NFPA 170, Standard for Fire Safety and Emergency Symbols. The IBC does not yet address graphical symbol signs and still requires the text letters "EXIT."

More changes are surely ahead for UL 924. Many have expressed interest in replacing the observation test with an equivalent measurement approach to eliminate "human" variables. Interest has also been expressed in developing a Listing program for smaller exit signs, for transportation and other applications where viewing distances are less and space constraints are greater. There have also been interesting developments in the

field of audible guidance systems to supplement (or replace) visual systems in dense smoke conditions.

Guide Information for each of the exit sign (FTBR, FWBO and FWBX) and path marker (IMZI) product categories provide use and installation information that should be consulted to ensure that a particular type of sign is appropriate for the needs and constraints of a given application. This can be found in UL's Online Certifications Directory at www.ul.com/database.

For more information on emergency lighting equipment, contact Mike Shulman in San Jose, Calif., by phone at +1-408-754-6703; or by e-mail at Michael.Shulman@us.ul.com.

Asphalt shingle roofing systems

Continued from page 1

The International Building Code (IBC); NFPA 5000, Building Construction and Safety Code; and the International Residential Code (IRC) all provide specific installation requirements for wind and uplift resistance. Additionally, some insurance companies require certification for impact resistance to minimize hail damage risks. Compliance with these requirements can be demonstrated by the use of UL Listed and/or Classified roofing products.

UL Listed asphalt shingles that have been evaluated for wind resistance using UL 997 or ASTM D3161 are found under the product category "Prepared Roof Covering Materials (TFWZ)." These materials are primarily investigated for resistance to an external fire in accordance with ANSI/UL 790, Tests for Fire Resistance of Roof Covering Materials (ASTM E108 and ANSI/NFPA 256).

However, where indicated in the individual Listings, these products have also been investigated for wind resistance. The wind resistance classes under TFWZ based on wind speed are Class A (60 mph), Class D (90 mph) and Class F (110 mph).

UL also Classifies asphalt shingles for wind-resistance under the product category "Prepared Roof Covering Materials, Asphalt Shingle Wind Resistance (TGAH)." These products are evaluated for resistance to wind uplift forces using a calculation method described in ANSI/UL 2390 and ASTM D6381. The uplift resistance classes under TGAH based on wind speed are Class D (90 mph), Class G (120 mph) and Class H (150 mph). This test method is also described in the newly released ASTM D7158, Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method).

UL Classifies roof coverings and components of roof systems for impact-resistance under the product category "Roof Covering Materials, Impact Resistance (TGAM)." The basic Standard used to investigate these products is UL 2218. Guide Information for all product categories can be found in UL's Online Certifications Directory at www.ul.com/database.

Though Mother Nature can produce many surprises, proper installation methods coupled with the right model building codes and product standards provide our best protection against unwanted damage to roofing systems and roof covering materials.

For more information on UL Listed or Classified roofing products, contact Dwayne Sloan in Research Triangle Park, N.C., by phone at +1-919-549-1676; or by e-mail at Dwayne.E.Sloan@us.ul.com.



NEWS BRIEFS

Bob James brings fire expertise to Regulatory Services

In October 2005, Bob James joined the Regulatory Services Department as a staff engineering associate. He brings a strong background in fire code development and enforcement. In this new position, Bob will interact with fire and building officials organizations in the eastern United States, and provide technical support for regulatory officials nationwide.

Previously, Bob was the fire marshal for the city of Bloomington, Minn., and the president of The Fire Marshal's Association of Minnesota (FMAM). His position included code enforcement oversight of the Mall of America. Over the years, Bob has been involved in code development on a local, state and national level.



He has served on National Fire Protection Association (NFPA) technical committees, most recently NFPA 1, Uniform Fire Code, NFPA 400, Hazardous Chemical Code, and the NFPA Pyrotechnics committees. He was also a member of the International Code Council (ICC) Board for International Professional Standards, and the Fire Service Exam Development Committee (FS-EDC).

Bob also served as chair of the Minnesota State Fire Chiefs Code Committee, which brought together local and state fire and building officials to review proposed national code changes. Bob was also a code specialist and inspector for the Minnesota State Fire Marshal Division from 1987 to 1994. During that time, Bob was active in the International Fire Code Institute.

Contact Bob James in Minneapolis by phone at +1-651-261-0949; or by e-mail at Robert.J.James@us.ul.com.

UL helps authorities seize counterfeit goods in Miami

A federal grand jury in Miami has indicted five people for importing goods bearing counterfeit UL Marks and trademarks into the United States from China in January 2006. The defendants could each face years in prison and millions of dollars in fines.

U.S. Immigration and Customs Enforcement (ICE) agents and the Miami-Dade Police Department conducted searches of the defendants' homes, warehouses and flea market booths in mid-December 2005. They confiscated counterfeit electrical cords, batteries, handbags, suitcases, shoes, hats and different items of clothing and accessories. Underwriters Laboratories Inc. participated in testing the counterfeit items, which bore counterfeit UL Marks as well as counterfeit trademarks of Duracell, Rolex, Gucci, Disney, Nike, Major League Baseball and others.

For the past decade, UL has worked in coalition with the U.S. Customs Border Protection (CBP) and ICE to pursue the protection of its certification Marks. Through this partnership, UL is involved in identifying and inspecting the goods that bear the counterfeit Mark after seizures take place. In addition, UL's anti-counterfeiting unit is directly involved in seizures and sting operations.

"Even though only a small percentage of goods bear counterfeit UL Marks, UL works very hard to protect its integrity, and more importantly the integrity of manufacturers whose products undergo the series of rigorous tests necessary to obtain the UL Mark," said Brian Monks, managing director of anti-counterfeiting for UL.

For more information on UL's anti-counterfeiting program or to report a suspected misuse of UL Marks, contact Brian Monks in Melville, N.Y., by phone at +1-631-271-6200, ext. 22856; or by e-mail at Brian.H.Monks@us.ul.com.

Questions & answers

In this column, Underwriters Laboratories Inc. engineers answer questions concerning UL and its operations, or inquiries about UL Standards for Safety and how they coincide with installation codes, such as the National Electrical Code® (NEC®) and various building codes.

Q: How large do the openings in a suspended acoustical lay-in ceiling need to be to accommodate fire sprinkler penetrations?

A: American Society of Civil Engineers (ASCE) 7-02, Minimum Design Loads for Buildings and Other Structures, specifies that sprinkler penetrations in suspended acoustical lay-in ceilings, installed without rigid bracing, shall have a minimum 2-inch oversize ring, sleeve or adaptor through the ceiling tile. This oversize opening in the ceiling tile is necessary to allow for independent movement of the ceiling system and sprinkler piping in the event of seismic activity of at least 1 inch in all horizontal directions. Furthermore, the use of a flexible connection to the sprinkler is also permitted as an alternative installation method.

Section 803.9 of the International Building Code (IBC) addresses additional installation requirements for these ceiling types. Many ceiling system designers and installers are unaware of the seismic requirements specifying the minimum size openings for sprinkler penetrations of acoustical ceiling systems. The IBC specifies that the acoustical ceiling system be installed in accordance with ASTM C 635 and ASTM C 636.

Sprinklers in these types of installations are generally fitted with escutcheons for decorative purposes. Sprinkler escutcheons can also be used for reducing the protrusion of the sprinkler body beyond the surface of the ceiling without adversely affecting water distribution and sprinkler operation. Underwriters Laboratories Inc. Lists these products under the categories “Sprinklers, Automatic and Open (VNIV)” and “Sprinkler Escutcheons (VNUV).” Guide Information for these product categories can be found in UL’s Online Certifications Directory at www.ul.com/database. Sprinkler escutcheons are investigated using UL 199, Standard for Safety for Automatic Sprinklers for Fire-Protection Service, and Subject 199C, Outline of Investigation for Plastic Escutcheons for Sprinklers.

For more information on UL Listed sprinklers, contact Kerry Bell in Northbrook, Ill., by phone at +1-847-664-2629; or by e-mail at Kerry.M.Bell@us.ul.com.

Q: What is the intended use for UL Listed ground clips, and are there any limitations for using these clips on round outlet boxes?

A: Ground clips are intended to be used to connect the grounding conductor of

nonmetallic-sheathed cable to an outlet box, or to connect the bonding jumper from a receptacle or switch to an outlet box.

Ground clips Listed by Underwriters Laboratories Inc. have only been investigated for use when pressed on the flat surface of a square, rectangular or octagonal box to hold a grounding conductor against the side wall of the box. They have not been evaluated for use on round boxes.

UL Lists ground clips under the product category “Grounding and Bonding Equipment (KDER).” Guide Information for this product category can be found in UL’s Online Certifications Directory at www.ul.com/database.

For more information on ground clips or other wire connecting devices, contact Jake Killinger in Northbrook, Ill., by phone at +1-847-664-2018; or by e-mail at Jacob.Killinger@us.ul.com.

Send your questions to:
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or Howard.D.Hopper@us.ul.com.

WHAT’S NEW @ ul.com

The Regulators page of UL.com (www.ul.com/regulators) was developed specifically for you, the regulatory authority. Here are the most recent additions we hope you find useful:

TCA: Electrical Connections — The January and February 2006 issues of The Code Authority® (TCA): Electrical Connections, a newsletter published by the Regulatory Services Department of Underwriters Laboratories Inc., are now available online at www.ul.com/tca. Log on now to learn more about de-icing and snow melting equipment, voltage limitations, wire sizes and support of metallic wireways, industrial control panels, and more!

Regulatory Services contacts — Due to the recent relocation of UL’s California office to Silicon Valley, phone and fax numbers for staff members you’ve come to depend on have changed! Visit our “Contact Us” page at <https://www.ul.com/auth/regcon.cfm> to obtain new phone and fax numbers. Our staff is available Monday through Friday to assist you with your code-compliance issues.

Articles in Electrical Contractors (EC) Magazine by Mark Ode — Read Mark’s latest articles published in EC Magazine: “In the Interim,” “Use Your Metal” and “Now Hear This!” These and other articles are available at www.ul.com/regulators/ode.cfm.

IAEI Question Corner — Learn about hard-wired smoke alarms and how to address flood-damaged Type NM-B nonmetallic-sheathed cable in UL’s Q&A segment from the January-February 2006 IAEI News magazines now available at www.ul.com/regulators/iaei.cfm.

New product categories — The “New Product Categories” page is updated monthly and provides a list of newly developed UL product categories added to UL’s certification programs for both the United

States and Canada. Access the UL Guide Information and current UL Listings and/or Classifications for the following new product categories at www.ul.com/regulators/regulators_new.cfm:

- Multi-point Interconnection Power Cable Assemblies for Industrial Machinery (PVVA)
- Fire-resistive Structural Steel (CCFZ)
- Gas Hose Connectors for Portable Outdoor Gas-fired Appliances (JPJZ)

If there is something you would like to see on the Regulators page, send your suggestions to Jill Witt in Northbrook, Ill., by e-mail at Jill.Witt@us.ul.com; or by fax at +1-847-313-2175.



CALENDAR of events

International Code Council (ICC) 2006 Codes Forum

March 20–22, 2006
Sacramento, Calif.

For more information, visit www.iccsafe.org

The 50th Annual Construction Specifications Institute (CSI) Show & Convention

March 28–31, 2006
Las Vegas

For more information, visit www.csinet.org

The Traditional Building Exhibition and Conference

April 5–8, 2006
Chicago

For more information, visit www.traditionalbuildingshow.com

National Conference of State Legislatures (NCSL) Spring Forum

April 6–8, 2006
Washington, D.C.

For more information, visit www.ncsl.org/forum

National Fire Sprinkler Association (NFSA) Annual Seminar

April 26–29, 2006
Southampton, Bermuda

For more information, visit www.nfsa.org

International Association of Fire Chiefs (IAFC)/ National Fire Protection Association (NFPA) 2006 Metropolitan Fire Chiefs Conference

May 6–11, 2006
Las Vegas

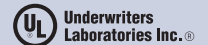
For more information, visit www.iafc.org

National Fire Protection Association (NFPA) World Safety Conference & Exposition

June 4–8, 2006
Orlando, Fla.

For more information, visit www.nfpa.org

Following is a list of meetings and important events for the code community. If you would like The Code Authority® to consider publishing your upcoming events in this column, contact Doug Schultz, editor, in Northbrook, Ill., by fax at +1-847-407-1265; or by e-mail at Code.Authority@ul.com. Please type “Calendar” in the subject line.



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