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Life Safety **DIGEST**



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The Use of Fire Resistance Glass for Industrial Applications
Smoke and Draft Control Door Assemblies

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On the Cover:

Fire rated doors can also have electronic controlled locking systems.

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Editor's Message

As an association, FCIA believes that the cumulative effect of design, installation, inspection and maintenance (DIIM) of Total Fire Protection including Effective Compartmentation components are vital to fire and life safety. However, even with excellent DIIM, building owners and managers as well as occupants can impact safety in buildings through their actions.

In Chicago in 2012, an occupant left the door of a burning apartment open upon fleeing a fire. This resulted in a young woman dying when her elevator reached the fire floor. Just a few weeks ago, it was reported that another apartment building fire occurred. However, the occupants closed the door when leaving, containing the fire to the apartment of origin. A less happy ending occurred in Brazil. In this nightclub fire, people caused a structure to have life safety issues due to locked egress doors.

In this issue, you will find a "call to action" from the National Association of State Fire Marshals to building owners, managers, and occupants to prevent deaths in emergencies. Plus, a fire service professional's

account of a night at a multifamily structure fire, a fire protection engineer's view of multifamily construction technologies and interesting articles about industrial fire safety from doors to photoluminescent markings and fire rated glazing.

Enjoy this issue of *Life Safety Digest* and wherever you and your families are, take time to understand how to stay safe in buildings. Regardless of occupancy, people do make the difference. 🔥

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Multi-Family Homes: Balancing Aesthetics, Sustainability, and Technology with Safety, and Security

Scott J. Tobias, AHC/CDC, CDT, CFDI, CSI, FDAI, LEED AP

There's no place like home. So when it comes to selecting vital elements that are used everyday such as locks, doors and hardware, homeowners prefer products that will make their abode feel like a castle. Thanks to technological advances, in addition to egress and fire safety, doorway components are now multifunctional tools that bring aesthetics, sustainability, safety and security together. This diversity of functionality demands careful consideration in its selection, particularly in multi-family homes that have numerous openings.

Typically, most high-end, multi-family homeowners have very specific preferences for lockset functionality, handle design, and cost. But they have a number of choices for other doorway components, including the door, frame and hardware. While fire and life safety compliance are required, aesthetics are an obvious consideration—who doesn't want a good-looking door with coordinating hardware—there are also issues to think about that aren't visible to the naked eye, such as sustainability.

No longer are fire rated and egress doors, frames, and hardware considered individually as components; they are considered instead a total door opening solution. Designer lever handles, pulls, doors, and other components allow the opening to become part of the total space design, rather than a necessary component as it was in past. Also, energy-efficient doors and frames save energy by keeping the heat or cold inside or outside of the opening as needed.



Fire rated doors can also have electronic controlled locking systems.
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Sustainability can be achieved by using components that have been made of recycled or renewable resources, as well as using materials that are better and less harmful to the environment. With that said, there are very strict requirements and codes related to the egress, fire safety and security of an opening, which might conflict with the owner's preferences or desires.

Today, there are locksets and locking systems that comply with fire and life safety codes similar to those used in hotels, but are even simpler and easier to program, use, and maintain. These are designed for residential applications, especially multi-family, where there are many to program and maintain at any given time. Those that have experience with staying in hotels know how easy it is to use electronic card key locksets. And as simple as they are for the hotel guest to use, it is even easier for the hotel staff. An electronic key, also known as a "credential," allows the hotel or residential management staff to reprogram access privileges and locking codes at the hotel or residential management computer by either swiping the card through a magnetic programmer or waving it in front of the reader with radio frequency identification technology. How many times have you either misplaced a hotel key while on vacation? The ease of use really comes in handy when the keys are lost; thanks to the electronic reprogramming, there's no longer a need to replace a conventional cylinder. Imagine having to call a locksmith every time a key is lost and the amount of labor and time needed to take apart a lockset and either install a new cylinder or re-key the existing one, not to mention cutting the keys necessary to operate the lockset. In addition, key control with electronic keys as compared to conventional keys can be much more secure and easier to maintain.

Another positive attribute of these locksets is the ease of maintaining key control and not allowing guests, or in this case tenants, to duplicate keys at will at any hardware store. They might want duplicates made for a number of reasons including giving them out to friends and family, or having a bad habit of losing keys. Achieving key control with a mechanical system would necessitate factory-controlled high-security systems that would only allow key duplications through an authorized user or an authorized locksmith with access to factory direct cut keys. For a hotel or residence this option would be virtually impossible as keys are needed rather quickly, almost immediately. With electronic keys, as described above, all of this can be completed right at a computer with the proper software and card reader equipment. This convenience is now available not only to hotels and their guests, but also to residences and their owners or tenants.

These hotel-type residential locksets have the ability to audit the electronic locking system. This means a query can be made to the lockset to see what keys either attempted to open the door successfully or unsuccessfully, at what time, and who the key is issued to. This brings accountability to each action at the door as well as to the credential owner. Another “pro” to having electronic keys is their physical size; since they are the same dimensions as a credit card, they fit into a wallet or pocket compared to a physical key that can be more difficult to store making it easier to misplace or lose. If you still use a keychain and prefer a credential more similar to a conventional key, there are other options known as a key fob that are typically plastic and will hook onto your keychain like a metal key.

For existing multi-family, or in fact any type of opening on any facility type, mechanical cylinders with added electronic features are available to provide electronic security similar to mechanical locksets, without the need to replace the lockset itself. These electronic cylinders have audit trail capabilities and can keep track of what key opens or attempts to open the cylinder along with the time, again holding the owner of that key accountable.

Using electronic locking devices and keys such as these in a multi-family environment allows assigning of access privileges to various parts or openings within the building using the same key to the residential unit. This eliminates the need to carry more than one key when you require access to the fitness room, pools and spas, meeting rooms, and storage facilities while maintaining security to your dwelling. Electronic devices also allow for special programming of the keys for access to certain areas during certain hours of the day, for instance if the pool is only open from 7 a.m. through 10 p.m., the lockset and key can be programmed accordingly, not allowing access before or after the permitted time.

Concerns about installing electronic locking devices on building entrances, exits, and any other type of exterior door opening have been addressed by manufacturers that build strong and reliable mechanical platforms with sealed electronic components. This keeps the electronics safe from weather and tampering, while providing a heavy-duty mechanism for reliable performance, safety and security.

A newer technology known as Near Field Communication (NFC) can now be incorporated into these types of electronic locking devices. With this technology, you can receive your lockset codes via email or text message to your smart phone and then use your phone as the electronic key, eliminating the need to carry another credential such as a separate electronic key card. This is a fast-growing technology already being used by hotels and being manufactured into the multi-family electronic locksets being specified and installed today.

Recently you might have seen television commercials or advertising material introducing a

digital or electronic home environment. This means a smart phone, tablet or computer can be used to remotely control various home components, like arming or disarming the security system, adjusting the heat and air conditioning settings, turning lights on or off, activating garage door openers, and monitoring the status and issuing commands to your locksets. This lockset functionality includes immediate audit trail capability that indicates which key or codes attempted to enter your home, as well as the battery life of your locking device. Some systems also allow



Logic M3 – Smart keys can also be used in fire rated hardware systems.
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you to program users immediately or by date and time so you can schedule access for a repairman or other visitor in your home while you are not there. With this low-power draw technology, you can also have cameras installed in your home and monitor them from anywhere in the world. If there is an issue with any of the devices hooked up to the system, you can program the system to send you an email or text message and alert you of the issue so that you do not return home to any surprises. This is like taking your alarm system into your own hands, rather than paying a central alarm station to do the same, except you will have to be the one to call the police or fire department as necessary in an emergency.

Software is the driving force behind all of these electronic door opening solutions, and the devices can be manufactured with open or closed architecture. Open architecture devices—also known as interoperable devices—integrate with non-proprietary network processors, controllers, integrated locking hardware, card readers and other third-party applications, while closed architecture devices—also known as proprietary devices—are limited to the choices of the manufacturer’s components. In other words, if you choose a closed architecture system and you are not satisfied with the system or its components, you are not able to change unless you invest in and install an entire new system and components. With open architecture, you can mix and match components as available in the industry at your choice. The most common open architecture is the

Wiegand Output, which is the standard communication protocol used to transmit information from a card reader to a centralized control panel. The proprietary and encrypted card key or credential data is transferred to the reader and converted to Wiegand Output, which travels through the wires to the control panels that communicate with the computer systems, where it is converted back to the proprietary and encrypted information to be programmed or monitored.



Auto Operators – Specially designed for disabled occupants, door systems can have automated door operators and provide fire resistance.

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Even with these new technologies, fire resistance and life safety can be maintained as residences and hotels have similar fire resistance compartmentation and life safety requirements as most other building and facility types. This allows for continuity of the fire barrier, which can be maintained with fire ratings of the electronic hardware.

In many areas of the country, exterior and some interior openings in a multi-family (and other types of facilities) may require special openings for protection from tornados and hurricanes, and comply with strict codes depending on the authority having jurisdiction (AHJ). There are door opening assemblies available to meet these codes and guidelines such as the Federal Emergency Management Agency (FEMA) and the International Building Code (IBC). Other life safety codes govern what type of hardware is required on specific openings, such as the use of panic hardware, also known as exit devices or fire exit hardware for fire-rated openings. These devices, which comply with the Life Safety Code, are not typically considered the most aesthetically pleasing to some, but allow for a more simple and evident egress from a doorway than a conventional lever handle to help save lives in case of any type of emergency that would necessitate a fast exit from the building or facility. The release mechanism is a push pad or cross bar, which extends at least half way across the door width, if not the entire door width, allowing someone to lean against the release mechanism, which releases the latch and allows egress through the opening as compared to having to grab and rotate a handle for the same.

In addition to fire resistance and egress, doors and frames also play an important part in sustainability

and sound control. Depending on the AHJ, certain minimum levels of Sound Transmission Class (STC) levels are required in order to contain sound within a space and prevent disrupting others in the building or facility, including residences. In New York City, for example, the local building codes state that a dwelling entrance must have a minimum STC of 35, which is a low rating, but is better than having no sound control at all. Other ratings such as STC 53 might be used on band rooms or auditoriums in a school. These ratings are achieved by the use of STC rated door openings, which typically require some type of sound seals or gasketing, and if a high rating would require seals and thresholds of the same at the bottom of the door to seal the undercut.

When it comes to multi-family residences, there are many people accessing a door opening. This is especially true at the entrance doors and where any door opens into public spaces. Where corridors are the only egress option for multifamily structures, the fire-rated door becomes a big protector of fire resistance continuity. Additionally, there are some manufacturers that offer anti-microbial finishes or coatings, on both doors/frames, and hardware, which help to limit the spread of bacteria.

Automatic operators are also very common on exterior doors of a multi-family building, which helps the residents operate the opening more efficiently while carrying packages. These operators are also required in some cases for accessibility to help assist someone with a disability to operate the opening without struggling or possibly not being able to open it at all due to its size or weight, or surrounding conditions such as wind or pressurization inside the building.

These are just some of the rapidly growing aesthetically and sustainably designed safe and secure openings solutions in the door opening industry for multi-family residences, as they become more and more widespread with high-rise apartment buildings and condominiums being built in most major cities every day. 🔥

About the Author: Scott J. Tobias is Senior Director of Architectural Development for ASSA ABLOY Door Security Solutions leading a national team of Door Opening Consultants. He is a past-president of the NY Chapter of DHI and past-president of the NE Region of the Construction Specification Institute (CSI). Most recently serving five years on the national board for CSI, Scott is the Chairman of the Mid-Hudson Chapter of ASIS International. Chosen repeatedly to speak at annual events such as the CSI National Convention, CONSTRUCT, and the AIA NYS Convention, Scott has also spoken at other industry events and provided industry-related continuing education to more than 200 individual architectural firms throughout the country. He also has ten published articles in various trade magazines, and can be reached at 845/742-4827, scottjtobias@gmail.com, Twitter: [@scottjtobias](https://twitter.com/scottjtobias), or LinkedIn: www.linkedin.com/pub/scott-j-tobias-ahc-cdc-cdt-csi-leed-ap/1/b01/212.



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“When All Lights Are Out ...”

By Marina Batzke

Whether caused by a power outage or a building fire with smoke, photoluminescent exit path markings help building occupants find their “way out” of the dark. Nowadays we find these glowing markings required in many occupancy types in high-rise buildings. High rise buildings are defined in the building and fire codes as those structures 75 feet and higher above lowest fire department access.

Photoluminescent markings installed on the steps, landings and handrails inside the emergency staircases of the New York City World Trade Center towers were praised in aiding the evacuation of building occupants during the 9/11/2001 events. The positive findings quickly led to New York City high-rise building code requirements in Local Law 26, Reference Standard RS6-1.

Nationwide since 2009, the IBC, *International Building Code*, and the IFC, *International Fire Code*, have requirements for photoluminescent egress path markings in high-rise buildings such as office, hospital, hotel/motel structures. When traveling or commuting, it is not uncommon to encounter photoluminescent markings as low location lighting in passenger trains, passenger ships and airplanes.

Continuous Path

A major advantage of photoluminescent exit path markings is the continuous outlining of the entire length of the escape path. From the place of work, around machinery, along shelves, up or down steps, all the way to the safe place, these photoluminescent markings show evacuees the way out either as a continuous low location line, or by using floor dots every foot distance.



Low location allows people to see a “way out”. American Permalite photo.

Low Location Lighting

During a fire, smoke forms from burning plastics, fabrics and other interior materials, and – being lighter than air – smoke rises under the ceiling. When smoke starts filling from the top down, ceiling lights and high-installed exit signs become obscured even if there is no full power outage.

To avoid inhaling the toxic smoke, occupants need to drop to their hands and knees and evacuate underneath the smoke layer. Down low to the floor, photoluminescent egress path markings, installed either on the floor or along the wall-base, help guide occupants out to safety.

States like California and Connecticut have requirements for floor proximity egress path markings and low location exit signs. Both these technologies help occupants see the “way out” especially during fires

with smoke. According to standards, floor proximity egress path markings shall get activated with at least 1 foot-candle = 11 lux of lighting for 60 minutes.

Industrial Environments

Warehouse environments with rows of shelves, production floors with machinery and equipment, storage facilities, machine rooms – just a few examples where a familiar work environment may quickly turn into a maze during a power outage or building fire, making it tough for employees to evacuate.

Again, photoluminescent markings can help but you need to find the right product for each specific application. Questions need to be answered for the right application too:

- Shall marking be installed directly on the floor or on the wall/ rack/ equipment in low location?
- What type of floor (e.g., concrete, grating/ catwalk, high-gloss epoxy)?
- What kind of floor abuse? (e.g., heavy forklift traffic, soiled floor with greasy liquids, just foot traffic)

Material Options

The all familiar glow tape is one solution for use in clean, smooth surface environments with no forklift traffic. Many building owners think of photoluminescent paint. However, they need to consider a few things:

- Epoxy paint is typically recommended on concrete floors, while latex paint (soft, water-based) should only be used on wall surfaces.
- Polyurethane paint is well suited on metal, such as parts that need to be identified in the dark (i.e. wheels or levers).

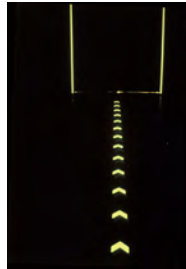
Installation according to the manufacturer’s instructions is imperative. To accomplish a strong, long-lasting glow, photoluminescent paint should get installed as a system in several layers:

- First thoroughly dry- and wet-clean the floor. Apply masking tape.
- Then install a white primer, which lightens up the installation surface and fills in any slight surface unevenness.
- Then apply at least two layers of glow paint.
- Remove the masking tape and finally apply a wider layer of clear protective coating.
- Take an extended drying time for these four layers into consideration which closes down the installed area for several days.

Typically it is much quicker to install a ready-made photoluminescent marking with one-step installation and product with manufacturer-guaranteed luminance.

Tape may sound like a quick choice BUT tape should NOT be used in industrial environments with greasy floors or in areas with heavy forklift traffic where pallets may be pushed around and similar high-use areas.

Instead, the building owner and manager may need to choose durable industrial solutions such as:



Epoxy Casting Resin (a paste, NOT a paint) that gets applied using a stencil and a spatula. *American Permalite photo.*



Metal discs (aluminum with a hole, ideal to mount onto gratings or catwalks) *American Permalite photo.*



Enamel round markings with a pin (drill hole into concrete floor; fill in construction adhesive; insert pin into hole and place enamel flush on floor).

Installation Considerations

A marking can only adhere to something as well as the surface to be adhered is prepared. If the installation surface has been coated with numerous paint layers over the years and the paint is starting to peel or chip, then complications may arise. Such weak paint layers need to be removed before starting the photoluminescent application.

If concrete is porous and brittle, any loose areas need to be removed completely. Deep holes, cracks and damaged areas need to be filled with an appropriate concrete filler and thoroughly dry.

It is always important to first dry-clean installation areas (e.g., brush away any dust and dirt), then thoroughly wet-clean the installation areas. Depending on the type of surface contamination, a simple water-cleaning may be enough or in oily environments, a thorough degreaser or chemical cleaner may be necessary.

Markings will only adhere to well-prepared, dust-free, dry, clean, smooth surfaces. Also, many accessories, like edge sealant for floor tapes, pressure rollers for firm application and other helpful tools are available to help the installation process along.

How Does it Work?

The photoluminescent markings absorb ambient lighting (i.e., the illumination from your ceiling lights). Fluorescent lighting, metal halide, mercury vapor or LED are all suited activating light sources. The glowing luminance becomes visible when the area is plunged into darkness. Photoluminescence is best suited for indoor use. Photoluminescent markings are non-radioactive and non-toxic.

EXIT Signs - Similar Terms but Different Meaning

Photoluminescent EXIT signs with a UL924-listing comply with the building codes and may be installed instead of electrical exit signs if there is sufficient activating lighting present. Sufficient activating lighting is defined as at least 5 foot-candles = 54 lux fluorescent lighting at all times of building occupancy. The photoluminescent effect may also be called glow-in-the-dark, phosphorescent or self-illuminating.

There is a HUGE difference though between self-illuminating and self-luminous.

Self-luminous refers to radio-luminescent EXIT signs, with tubes behind the exit letters filled with radioactive Tritium. These self-luminous exit signs have to have their expiration date clearly visible on the front of the sign. These are typically 10, 15 or 20 year life expectancy products. At useable life-end, the self-luminous signs have to be returned to the manufacturer for radioactive waste recycling and incur a recycling fee.

Self-illuminating, photoluminescent EXIT signs on the other hand are NON-radioactive. They do not carry an expiration date. Should the need arise to discard photoluminescent exit signs, signs made from plastic may be placed in plastic recycling or aluminum exit signs in metal recycling.

Energy-Efficient Life Safety

Photoluminescent signs and exit path markings guide occupants when the lights are on and work without electricity to guide people out of the dark. 🔥

Marina Batzke, general manager of American PERMALIGHT, Inc., has been in the photoluminescent safety field for 24 years. She is ASTM Committee E12.13 Chairperson on "Photoluminescent Safety Products" and a member of the UL Standards Technical Panels UL924 for Exit Signs and UL1994 for Egress Path Marking Systems.

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The Changing Face of Fires in Multi-Family Housing

By Diana Hugue, P.E.

While recent fire statistics from NFPA state that reported home fires have fallen 50% from 1980 to 2011, residential fires remain a large part of the fire problem in the United States. Few things in the world stay the same over time, a fact that is also true with home fires. Over the past decades, our construction methods and materials, both for interiors and exteriors, have undergone a drastic transformation. Partnered with evolving codes and performance-based design, today's multi-family homes can be quite different from those built half a century ago.

Multi-family housing poses some unique fire risks. While fire protection systems can be installed building-wide, it is possible for occupants to disable safety devices. Smoke alarms can have batteries removed and smoke detectors and sprinklers can become obstructed. Occupants frequently don't realize the danger that can be created when the devices are not functioning. Building owners and the fire service are not likely to inspect individual dwelling units, so deficiencies may go undetected. Families are dependent on the responsible actions of surrounding units for safety. You may never leave a pot unattended in the kitchen, but your neighbor could fall asleep with a deep fryer going and you still have to face the consequences.

Passive systems can help stop the spread of fires in multi-family housing and ensure safe egress. Compartmentalization is used in building design to prevent fire and smoke from spreading throughout a building. Walls and floors not only provide structural and architectural framework, but are a safety feature as well. Proper doors and windows and firestopping can aid in keeping the damage from a fire contained.

Of course no building is static. New systems are added, cables are run, and renovations occur. Maintenance of the fire protection systems (whether alarms, sprinklers, doors, or barriers) is just as important as proper initial commissioning of the systems. System maintenance in multi-family dwellings may be difficult as there is much coordination required with individual unit occupants. If the system was not properly installed to begin with and is not properly maintained, it cannot be relied upon when a fire does happen.

Current Statistics

The U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) gathers data from fire departments throughout the United States. Between 2006 and 2010, there were an average of 108,530 fires annually in apartments or other multi-family dwellings, accounting for 21% of fires in the US during that time. The fires in apartments or other multi-family dwellings resulted in an annual average of \$1,232.8 million in direct property damage. During this

time frame, approximately 422 civilians were killed and 4,127 injured annually.



Never throw water on a cooking fire!
([http://en.wikipedia.org/wiki/File:Kitchen_oil_fire_demonstration_\(4\).jpg](http://en.wikipedia.org/wiki/File:Kitchen_oil_fire_demonstration_(4).jpg))

While cooking and heating equipment are the top causes for fires in both single- and multi-family dwellings, their incidence varies greatly. The 2012 Home Structures Fires Report compiled by Marty Ahrens with the National Fire Protection Association states that multi-family homes are more likely to have fires started by cooking equipment. Single-family homes are more likely to have fires started by heating equipment. In multi-family homes and apartments, 66% of all fires start with kitchen equipment, compared to 32% in single-family homes. It is theorized that there may be fewer heating equipment fires in multi-family homes as they tend to have centralized HVAC systems that are regularly maintained. It should be noted that researchers question whether multi-family home fires are more likely to be reported than those in single-family homes, resulting in statistics that may be slightly skewed.

Comparing Past and Present

Those that say things were better in the good old days may be right, at least when it comes to the fire performance of room furnishings. Though fewer residential fires begin in dens and living rooms, fires in these areas have the highest number of fatalities. Home furnishing materials have drastically changed over time. Side and end tables used to be made of solid wood, but today's tables are frequently constructed with engineered wood. A wooden toy box has given way to a plastic one and cotton sofas have become made with polyurethane. The potential fuel load has changed, as well as the construction materials evolving from cement board to gypsum.

It is interesting to see the difference in a fire between a “legacy” room and modern one. The “legacy” room would be one with contents from times when different materials were used for furnishings.

A video from Underwriters Laboratories showing a side-by-side comparison of a “legacy” room to a modern one can be seen at: https://www.ul.com/room_fire/room_fire.html. The fire in the modernly furnished room quickly spreads and produces a toxic gas. The modern room reaches flashover (where everything in the room is on fire) in a mere 3:40 minutes, while it takes until 29:25 minutes for the legacy room to flash over.

The increased speed with which flashover is reached decreases an occupant’s time for evacuation, as well as any chance of the fire service being able to contain the fire.



Modern furnishings lead to different fires. UL Photo

Moving Forward

In April of 2012, the National Institute of Standards and Technology (NIST) published “Reducing the Risk of Fire in Buildings and Communities: A Strategic Roadmap to Guide and Prioritize Research.” In an attempt to address the evolving fire problem in the US, NIST looked at the biggest issues the country faces and broke down potential solutions into steps from short to long term.

The three most pressing fire problems in the US that NIST chose to address were reducing the fire risk in buildings, advancing fire service technologies, and reducing wildland-urban interface (WUI) fire risk.

In order to reduce building fire risk, a priority was placed on:

- Engineered Fire Protection
- Safety of Building Occupants

- Advanced Flammability Performance of Materials and Products
- Next Generation Reliable Detection of Incipient Fires
- Performance-based Design.

The advancement of fire service technologies focused on researching new firefighting equipment and tactics, increasing and improving firefighter training and situational awareness, and optimizing firefighting resource allocation. The reduction of WUI fire risk looks at fire prevention, response, fire protection engineering approaches, and recovery guidelines in the event of a loss in a WUI community.

The reduction of the fire risk in buildings looked at both fire prevention and mitigation techniques. The report discussed the many benefits of residential sprinklers, but acknowledged that widespread adoption of mandatory residential sprinklers has been slow to catch on and only benefits new construction. Other suggestions from NIST spanned from developing unique materials that take longer to ignite and burn cleaner, to non-plumbed fire suppression systems for cooking appliances.

NIST also recommended a focus on enhanced compartmentalization and the control of heat and smoke. Creating validated fire models for smoke- and fire-rated barriers will allow designers to see how walls, floors, and potentially firestop systems, would perform in a fire. An improved test method for fire-resistance-rated or smoke-resistant construction is also suggested. Being able to predict how a partition will withstand fire and smoke can lead to more accurate performance-based designs and a greater safety of building occupants.

While many of our society’s technological advances are leading towards greater fire safety, science is also creating a more unique fire load. Current fire statistics show a positive downward trend for fires and fire fatalities, but we cannot rely on the past to predict the future. Coupled with ever-changing and more challenging structural designs, providing fire safety in multi-family dwellings and buildings of all types is an evolving field. 🔥

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Multi-Family Structure Fire - A Fire Service View

By Richard J. Keyworth

I was on duty as the shift commander on Labor Day 1998 for the Elk Grove Village, IL Fire Department. The day had been uneventful with several ambulance calls and an automatic fire alarm which was unfounded. Shortly after 1 a.m., the dispatch tone went off for a fire at Terrace Apartments. This Incident called for a first alarm response with two engine companies, one ambulance, the ladder truck and the shift commander.

Terrace Apartments is a complex of wood-frame, three-story structures with mansard roofs. These buildings did not have automatic fire sprinklers (and still do not have sprinklers). Over the years, we have had several working fires in this complex and we have been fortunate to make some good saves. There were six apartments on the front side and six apartments on the rear side of each wing and floor.

The buildings are L shaped with each leg about 200 feet x 50 feet and an elevator lobby in the center. There was a single stairway from each wing to the ground floor. The mansard roof had no fire blocking and was open for the entire 200-foot length across the entire building roof line and each leg of the L. Thus the roof was actually 400 feet of wide open spaces with no walls blocking the fire spread. The masonry wall in the center of the L houses the elevator and two stairwells, one for each wing. There were rated-fire doors for each corridor that were frequently blocked open. There were open pipe chases which run from the ground floor to the roof line with no firestopping to slow the vertical spread of a fire. The mansard roofs were not constructed with fire-treated wood. There was a ½-inch layer of gypsum board on each side of the 2" x 4" stud wall separating the apartments. Sound deadening insulation also was installed in the interstitial space.

I was in the first vehicle en route to the call in the command car. As I went on the radio, the dispatcher advised she was receiving numerous

calls reporting the fire and people trapped on balconies. I requested a second alarm response which would bring two more engine companies and two more ambulances from Elk Grove. The dispatcher had already anticipated my needs and was notifying by toning them out. As I was about a block away, I could see we had flames through the roof. I requested a second alarm for mutual aid.

I pulled into the complex and immediately saw

people on every balcony screaming for help. There were six balconies on the front side per floor and six balconies on the back side per floor. I requested a third alarm for mutual aid and then advised all responding companies to start 'throwing ladders' into strategic places for rescue of occupants. I assigned the first arriving ambulance crew to a primary search on the third floor east and the next crew to the third floor north for a primary search. There were initially no fire hose lines laid as we were in rescue mode. The truck company was sent to the roof to make a trench cut at the firewall to attempt to keep the fire from spreading into the north-south wing. A trench cut is a 6-foot-wide opening all the way across the roof. The objective of a trench cut is to allow the fire to vent up and out rather than continue further through the roof. The mansard was also cut to prevent the fire from traveling along the front and rear sides of the mansard.

As additional units arrived, they were assigned to primary search on the second and first floors east wing and then north wing. As additional fire companies arrived, there were fire hose lines up and into the stairwells to slow the spread, holding the fire to the east wing. Primary searches reported all clear. The third floor east wing was totally involved and the second floor was rapidly becoming involved in the fire.

After completing three searches of the structure, there was still one woman unaccounted for and her whereabouts were unknown.

The arrival of additional fire companies allowed the fire attack to continue in earnest. The interior stairwell crews were taking a beating but held their ground and the fire was prevented from entering the north - south wing of the building. The trench cut also did its job and with two aerial pipes throwing large volumes of water, they prevented the fire from proceeding further in the mansard roof.

Shortly after 7 a.m. a police officer approached the command car escorting a young lady. As I stepped out of the vehicle, he introduced me to the missing tenant. She had been away for the weekend. I picked her up and gave her a kiss on her cheek. I was doing my best to avoid having a death on my record or the department's record.

The fire investigation team had been interviewing all residents of the building who had been sent to the complex offices/recreation center. The individual who lived in the third floor apartment on the east front of the building admitted that he was intoxicated and was too lazy to take a stack of newspapers down to the garbage bin. He said he put the papers in the open barbecue grill on the balcony, and then lit them on fire and went to bed.

The open flames from the burning paper went up into the open mansard roof and found additional fuel from the interior of the mansard, and the rest was history. The cause of the fire was accidental - human negligence.



Terrace Apartments. Mansard roofs allowed fire to travel from balcony to open attic spaces. Keyworth photo.

The damage to the building was so extensive that the owners would have to rebuild under current codes. They deemed it too costly and the east wing of the building was torn down and turned into a green area.

Epilogue: There are still about 20 buildings left in this complex which are still in the same condition as the building that burned. The local fire department has required a new life safety alarm system in each building with central station supervision. The fire doors at the entrance to each hallway are now on electronic releases to eliminate the door stops and bricks that were previously used.

In this case the fire blocking, as it is known today, mentioned in the article does not pertain to thorough penetration firestop systems, nor joint firestop systems. In this article fire blocking refers to 2 inch x 4 inch wood fastened to span horizontally between the studs to slow the fire spread inside walls. Other materials may also classify as fire blocking. In earlier editions of codes, firestopping was the term used for 2 inch x 4 inch wood spanning studs inside wall assemblies to slow fire spread. Wood is not classified as nor should be confused with a penetration or joint firestopping system. Firestop systems are assemblages of materials including the gap size, penetrating item type, size and covering that when installed to the tested and listed system become a



Terrace Apartments. Some mansard roofs extend to only 8-10' above ground level. Keyworth photo

firestop system. This is unlike many other industries where the product is the solution.

There is no practical way to require retroactively installing firebreaks or firestopping in between the studs and trusses of the mansard roof assembly. There is also no practical way of installing fire walls now to compartmentalize the floors and divide them up. If there was a way to accomplish this, we would save a lot of lives and property in the

future. I have little doubt that sometime in the future this scenario will be repeated here or somewhere similar and the firefighters will not be as fortunate as we were that night. 🔥

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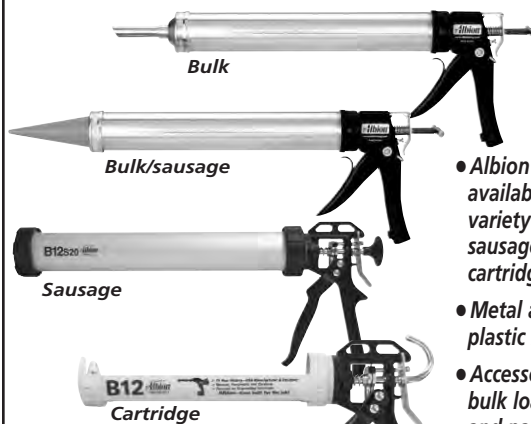
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Gypsum Board Construction

2012 International Building Code

By Ronald L. Geren, AIA, CSI, CCS, CCCA, SCIP

Gypsum board has been an important part of the multi-family construction industry for more than 100 years. Its humble beginnings started in the late 1800s as “Sackett Board,” named for Augustine Sackett, one of the inventors of the early gypsum product. Sackett Board consisted of Plaster of Paris between two layers of felt paper. The board was ¼-inch thick and 36 inches square with exposed edges. Although not suitable as a finish product as is today’s gypsum board, Sackett Board made an excellent base for gypsum plaster. In 1910, the evolution of gypsum board took another step forward when a process for wrapping the exposed edges was implemented in manufacturing. This was followed shortly by the replacement of felt paper with a true paper-based facing. Over the next 40 years other developments in gypsum board were introduced, such as air-entrainment to make the board lighter, exterior wall and roof sheathing, and Type X fire-resistant board.

Gypsum board is frequently called “drywall,” a term whose origin has been lost over time, but was likely used to differentiate it from the “wet” gypsum plaster method. Other terms have also worked their way into the gypsum board vernacular, such as “Sheetrock” (a brand name for gypsum board produced by United States Gypsum), and “plasterboard” (commonly used in Europe, Australia, and New Zealand). ASTM C 11, *Standard Terminology Relating to Gypsum and Related Building Materials and Systems*, considers *gypsum board* to be “the generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing”; thus, *gypsum board* will be used throughout this article.

Gypsum Board Materials

In the *International Building Code* (IBC), gypsum board or gypsum wallboard are mentioned numerous times—primarily regarding fire-resistive construction—but the basic requirements for gypsum board, regardless of where gypsum board is mentioned, are located in Chapter 25. Section 2506 requires that gypsum board materials comply with the material standards in Table 2506.2. For standard gypsum board products, the table lists ASTM C 1396, *Standard Specification for Gypsum Board*, which includes the following:

- *Gypsum Wallboard*: A gypsum board defined in ASTM C 11 as being “used primarily as an interior surfacing for building structures.”
- *Predecorated Gypsum Board*: A gypsum board with a factory-applied decorative surface or coating.
- *Gypsum Backing Board*: A thin, ¼-inch to 5/8-inch, gypsum board used as backing for gypsum wallboard, acoustical tiles, or other dry cladding.
- *Gypsum Core Board*: A thick, ¾-inch to 1-inch,

laminated gypsum board used for solid or semi-solid partitions.

- *Gypsum Shaftliner Board*: A gypsum board, usually 1-inch-thick, used in specialized shaft assemblies.
- *Water-Resistant Gypsum Backing Board*: A gypsum board with a water-resistant core used as a backing material to ceramic and other types of tile.
- *Exterior Gypsum Soffit Board*: A gypsum board used for exterior soffits that is protected from liquid water.
- *Gypsum Sheathing Board*: A gypsum board suitable for use as a backing for exterior wall coverings and which consists of a water-resistant paper and may have a water-resistant core.
- *Gypsum Base for Veneer Plaster*: A gypsum board used as a substrate to a thin coating of specialized plaster.
- *Gypsum Lath*: A gypsum board used as a substrate for gypsum plaster in lieu of metal or board lath.
- *Gypsum Ceiling Board*: A gypsum board designed for ceiling applications where water-based finishes are applied.
- The IBC Table 2506.2 also identifies other gypsum-based board materials along with the required material standards. These include:
 - *Fiber-reinforced gypsum panels* per ASTM C 1278. These panels consist of gypsum with cellulose fibers for strength and have no paper facing.
 - *Glass mat gypsum backing panels* per ASTM C 1178. These panels consist of a gypsum core surfaced with a fiberglass mat that is embedded or partially embedded in the core and has a water-resistant coating applied to one surface.
 - *Glass mat gypsum panels* per ASTM C 1658. These panels are similar to the backing panels, but are suitable to receive a decorative finish.
 - *Glass mat gypsum substrate* per ASTM C 1177. These panels are used for exterior sheathing and consist of a water-resistant gypsum core surfaced with a fiberglass mat that is embedded or partially embedded in the core.

Joint treatment materials, such as joint compound and joint tape, are required to conform to ASTM C 475, *Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board*. Joint tape may consist of paper or fiberglass mesh; self-adhered tapes are also permitted. Gypsum board accessories must comply with ASTM C 1047, *Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base*. Accessories include cornerbeads, edge trims, and control joints fabricated from zinc-coated steel, zinc, and ABS and PVC plastic. Metal accessories may include paper flanges.

Fasteners for attaching gypsum board to steel framing shall conform to either ASTM C 954 or ASTM C 1002 for steel screws. The former standard is for screws used to attach gypsum board to steel studs having a thickness of 0.033 to 0.112 inch, which are commonly referred to as cold-formed steel framing. The latter standard applies to screws used for attaching gypsum board to nonstructural steel studs. For attachment to wood framing, screws complying with ASTM C 1002 or nails complying with ASTM C 514 are used. Standard wood fasteners complying with ASTM F 547 or ASTM F 1667 are also permitted by the IBC for attaching gypsum board to wood framing. If adhesives are used for securing gypsum board to wood framing, the adhesive must comply with ASTM C 557, *Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing*.

Gypsum Board Installation

The IBC provides few requirements regarding the installation of gypsum board. Instead, the IBC relies on the provisions of ASTM C 840, *Standard Specification for Application and Finishing of Gypsum Board*, or Gypsum Association's GA-216, *Application and Finishing of Gypsum Board*. The ASTM standard addresses materials and preparation in addition to the various methods of attaching gypsum board. Although both standards include provisions for stapling gypsum board to wood studs in two-ply installations, this method is not permitted by the IBC, since Section 2508.1 only permits the materials listed in Table 2506.2, which does not include staples. On the other hand, IBC Section 2306.3 provides criteria for stapling of gypsum board used as shear walls in wood frame construction.

ASTM C 840 provides 11 different systems for application of gypsum board, including typical interior installations on wood and steel stud framing, adhesive application to interior masonry and concrete, and installation for exterior soffits and other protected areas. Curved installations are also addressed using the two methods of moistening the board or cutting the back side. GA-216 includes applications similar to those in ASTM C 840, but it also includes installations for solid gypsum panel partitions and installations over existing interior walls and ceilings.

General installation requirements common to both standards include minimum fastener length, cutting of gypsum board, location of control joints, fastener spacing, and fastener drive depth. Another commonly overlooked requirement within both standards is that the bottom edge of gypsum boards be at least ¼ inch above the floor surface—gypsum board is not permitted to be in contact with the floor surface.

The IBC requires in Section 2508.4 that gypsum board used in a fire-resistance-rated construction have the joints treated with tape and compound and that fastener heads be treated with compound. However, the treatment is not required if one of the following conditions exists:

The joints and fasteners will be covered with a decorative treatment that would provide similar

protection, such as wood paneling and acoustical finishes.

- The joints occur over wood framing members.
- Square- or V-edged gypsum board used as backing or sheathing.
- Multi-layer applications where the joints between layers are offset.
- Assemblies that are tested without treated joints.

IBC Section 2508.2 requires gypsum sheathing when gypsum panels are used as a substrate for exterior wall coverings. Installation of gypsum sheathing shall comply with ASTM C 1280, *Standard Specification for Application of Gypsum Sheathing*. According to ASTM C 1280, gypsum sheathing cannot be left exposed for more than 30 days, after which it must be covered by an exterior wall covering or water-resistive barrier. Requirements for water-resistive barriers are provided in IBC Section 1404.2. Some manufacturers advertise products that can be left exposed for much longer periods of time, but to do so may likely require approval by the building official using the manufacturer's test data or an acceptable evaluation report.

Interior and exterior gypsum board that is part of a fire-resistance-rated assembly or a shear wall assembly is required to be inspected by the building official per IBC Section 110.3.5. The inspection must take place after the installation of the gypsum board, but prior to the installation of any cladding or decoration, including taping and finishing of joints and fasteners.

Application Limitations

In Section 2509, the IBC limits the use of certain gypsum board types in areas subject to moisture. Where wall tile is used in tub or shower areas or as wall and ceiling panels in shower areas, the only gypsum-based panel product permitted is glass mat water-resistant gypsum backing board per ASTM C 1178. Cement-based panels complying ASTM C 1288 or ASTM C 1325 are also permitted, but are not considered gypsum products.

In water closet compartments, standard water-resistant gypsum backing board per ASTM C 1396 is permitted as a base for tile while other types of gypsum board, such as gypsum wallboard, is permitted as a tile base in other wall and ceiling locations. Water-resistant gypsum backing board, however, cannot be used in areas where it will have direct exposure to water or continuous high humidity. Additionally, on ceilings, ½-inch panels cannot be used when the framing spacing exceeds 12 inches or for 5/8-inch panels when the framing spacing exceeds 16 inches. The IBC also does not permit the use of water-resistant gypsum backing board in shower and bathtub compartments when installed over a vapor retarder, which will be interpreted to mean all water-resistant board, even the glass mat type.

Per IBC Section 403.2.3, interior exit stairways and elevator hoistways constructed of gypsum board in high-rise buildings in Risk Category III or IV per IBC Section 1604.5, or all high-rise buildings more than 420

feet in height, must meet certain structural integrity requirements. Assemblies surrounding stairways and elevator hoistways must conform to Classification Level 2 for Soft Body Impact per ASTM C 1629, *Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels*. The face of these assemblies not exposed to the interior of the assemblies is required to be constructed according to one of the following assemblies:

- A minimum of two layers of impact-resistant board complying with Classification Level 2 for Hard Body Impact per ASTM C 1629.
- A minimum of one layer of impact-resistant board complying with Classification Level 3 for Hard Body Impact per ASTM C 1629.
- Multiple layers of any material when tested together complying with Classification Level 3 for Hard Body Impact per ASTM C 1629.

Gypsum Board Myths

There are many myths surrounding gypsum board, but the most common that this author has encountered are the following two:

- **Myth #1** – *Gypsum board is considered a combustible material because of the paper facing.*
Chapter 7 of the IBC establishes the minimum criteria that must be met for a material to be considered noncombustible. Gypsum board is considered a composite material, thus it is required to meet the testing requirements indicated in Section 703.5.2. Per that section, the structural base (*i.e.* gypsum core) must pass the test established in ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, which it does.

In a composite material, the structural base may be covered with a surfacing not more than 1/8-inch thick which has a flame spread index of not more than 50 when tested per ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*. The paper facing or other facing type on gypsum board has flame spread indices that vary but are less than 50, since the ASTM standard for gypsum board requires a flame spread index of 25 or less. Thus, gypsum board products are considered noncombustible materials per the IBC.

- **Myth #2** – *The color of the gypsum board facing indicates the type of gypsum board.*
The facings used on gypsum board products are not part of a standardized identification system for gypsum board. Some products are referred to as “greenboard” (for mold or moisture resistance) or “blueboard” (for plaster base) because of the specific characteristics of the board facings, but this is not typical of all gypsum-based products. For the most part, the color is a branding initiative on the part of manufacturers to make their products readily identifiable as their products on a project site.

Conclusion

There are many gypsum board products available

that have not been mentioned in this article, mainly because the building code does not require or regulate them beyond the minimum requirements discussed. These products include:

- *Type X gypsum board* has a special core that gives 5/8-inch board a one-hour fire-resistance rating or 1/2-inch board a 3/4-hour fire-resistance rating, when applied parallel to wood studs at 16 inches on center and tested per ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.
- *Type C gypsum board* has improved fire resistance over Type X board, but is manufactured with a proprietary core that differs with each manufacturer and has varying levels of performance. Assemblies using this type of board are tested per ASTM E 119 or UL 263, *Fire Tests of Building Construction and Materials*.
- *Foil-backed gypsum board* has a foil backing which functions as a vapor retarder.
- *Flexible gypsum board* is a 1/4-inch-thick panel specifically designed for application to curved surfaces.
- *Abuse-resistant gypsum board* is used in areas not previously discussed where the board is frequently subject to damage from abrasion or impact, such as in corridors of schools and factories.
- *Mold-resistant gypsum board* is board complying with the basic requirements of ASTM C 1396, but is also tested for mold growth per ASTM D 3273, *Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber*. A rating of 10 (“totally absent of disfigurement by particulate matter”) per ASTM D 3274, *Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation*, is reported by manufacturers that provide these panels.
- *Acoustically enhanced gypsum board* (also called “acoustic” or “sound-deadening” gypsum board) provides improved resistance to sound transmission. These products typically consist of a viscoelastic membrane sandwiched between two gypsum board layers.

Many of the gypsum board products available on the market provide more than one of the gypsum board characteristics listed above. For example, some acoustically enhanced gypsum boards also provide mold resistance. Manufacturers will continue to improve their products and devise new gypsum products as building science expands. The building code may also evolve after these new products hit the market, but in the meantime, the basic requirements of the building code apply. However, the IBC does allow installation of *approved* materials as provided for in Section 2501.1.3. 🔥

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The Use of Fire Resistance Glass for Industrial Applications

By Bret Penrod

Fire resistance glass has been famously used in many high-profile applications that have received a lot of press and critical acclaim. Notable buildings such as the German Parliament in Berlin, the Modern Wing of the Art Institute of Chicago and the Morgan Library in New York City are examples where a lot of fire resistance glass was used to provide a transparent solution to meet the building codes. There are also many industrial applications where the photographs never make the architectural or engineering periodicals, yet the fire resistance glass is providing the same level of life safety to the occupants and property protection.

Clear fire resistance glass is commonly used today in oil and chemical refineries, off shore drilling platforms, pharmaceutical labs, truck loading or unloading stations, and almost any location where the employees must be protected from the dangers of radiant heat, flames, smoke and fumes in the work place with the need for clear vision. In terms of property protection, just think of the costs for IT and others processes that could occur to the interior of the building or factory affected by a fire.

The technical development of fire resistance glass has led to use of glass in walls where the codes require an ASTM E 119 rating, where just a few years ago heavy brick, block or gypsum was used to meet this fire code rating. The most modern fire resistance glass on the market today uses a multi-laminate configuration of low iron float glass and a special fire resistance interlayer that is clear and optically free of distortion enabling it appear to the eye once installed in the opening, wall or door as standard float glass. For most building code applications, the fire resistance glass must also pass the human impact safety standard CPSC 16CFR 1201 Cat II.

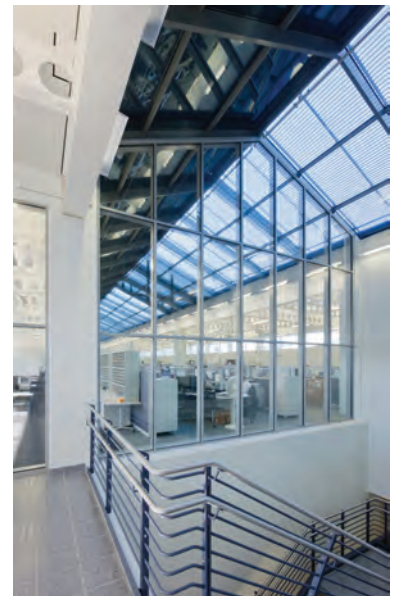
The building codes require that all fire resistance glass must be classified by a third party testing laboratory together with the frames to be used for the field installation. Therefore, when specifying fire resistance glass it is important to call out the system - glass, frames and other parameters - that are listed by the third party testing laboratory. The classification will define what glass and frames can be used together and other important glazing information including maximum sizes allowed. This information can be found on the third party laboratory website or the manufacturers will have this data available. All fire resistance glass is required by the building codes to carry a permanent label that identifies the third party laboratory that carries the listing, the manufacturer, the fire rating in minutes and human impact safety rating.

When specifying fire resistance glass for industrial applications, there are several parameters that must be addressed to determine what product will meet the needs.



Fire rated glazing provides continuity of fire resistance and a view of important work areas. *Pilkington photo.*

First one must know the fire rating in minutes, referenced in the code requirement, which will reference the test standard, and mention if it is an internal or external application. There can be requirements such as bullet (UL 752) and blast resistance, a sound rating requirement, one-way mirror, visible light transmission or opacity, hurricane, and for external applications, energy performance. If the glass will be used off-shore, there could be United States Coast Guard (USCG) or International Marine IMO A.754 (18) standards to meet. Glass used in the petroleum and chemical industry may require a classification to the Hydrocarbon pool fire standard ASTM E 1529-00. It is not unlikely that the fire resistance glass must meet several of the



Stairwells protected by fire rated glazing. *Pilkington Photo.*

above mentioned “special” requirements beyond just the fire rating.

Large areas of transparent glass provide employees a better view of processes while allowing natural or passive lighting to help with motivation. Fire resistance glass can be used in clear viewing areas to let the employees visually inspect a process in a room before entering safely.

Glass is an excellent indicator for safe areas. People feel protected when there is a clear, transparent separation in stairwells and elevators. People feel much better and more comfortable in areas that could be dark so natural light is used not only a motivator, but also as a psychological tool. If there is a fear of explosions or flying projectiles, an anti-spalling film can be added to the protected side. For blast and hurricane applications, the testing is much more rigorous with the system being the critical parameter.

One of the most spectacular uses of fire resistance glass in industrial applications is the Volkswagen Assembly plants in Germany and the USA. The newest plant was built in Chattanooga, TN. It was designed by the architectural and engineering firm SSOE in Toledo, OH and with the VW architects has been recently commissioned in April 2012.

In Chattanooga, large expanses of fire resistance glass were used for two-hour separations in stairwells and to separate production areas from administration

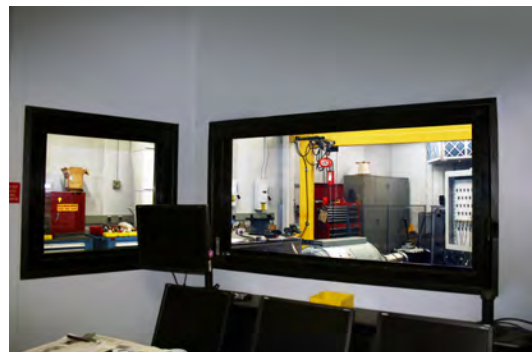


Fire rated glazing and framing must be installed as a system.
Pilkington photo.



Fire rated glazing allows light into stairwells.
Pilkington Photo.

and engineering. Gone are the days when factories were dark and dingy halls. The use of clear fire resistance glass enables modern production plants to be filled with natural and passive light which helps to improve the efficiency and morale of the workers.



Work areas can be viewed from a control room with fire rated glazing. *Pilkington photo.*

In conclusion, the technical advances in clear fire resistance glass and frames have allowed architects, designers, specifiers and engineers to build modern industrial facilities with fire resistance glass to improve the safety of the employees and provide property protection. Fire resistance glass is a very sophisticated product which allows it to be used for a wide range of applications so it is exciting to see clear glass in places where there has been a need in the past without a product to meet the application. Transparent fire resistance glass safety meets the application needs while providing aesthetic and individual solutions for natural lighting, human impact safety, energy performance, property protection and security. 🔥

Bret Penrod is General Manager for Pilkington Fire Protection Glass based in Toledo, OH, USA. Bret can be reached at Bret.Penrod@nsg.com.



Fire rated glazing has many design possibilities.
Pilkington Photo.

National Association of State Fire Marshals Issues a Call to Action

Editors Note: Although not necessarily a 'Multi-Family or Industrial' situation, this special NASFM alert applies to all readers and all occupancies.

The National Association of State Fire Marshals (NASFM) extends its deep sympathy to the families of the more than 230 individuals who perished in the tragic nightclub fire in Santa Maria, Brazil, in the early morning hours of Sunday, January 27. It is, unfortunately, a sad reminder that the world has not learned the lessons of similar fires in modern nightclubs over the past decade.

Nearly 10 years ago, in February 2003, our USA nation lost 100 souls in The Station nightclub in Rhode Island, and similar tragedies with large losses subsequently occurred in Argentina (2004), Thailand (2008), and Russia (2009). The deadly combination of factors we see again and again in these fires includes occupancy limits that were exceeded, indoor pyrotechnics, flammable finish materials and building contents, and blocked exits.

"NASFM calls on building owners and managers to work with the fire service and code enforcement officials to put an end to these worldwide losses," says NASFM President J. William Degnan, New Hampshire State Fire Marshal.

Degnan adds, "The recommendations issued by the National Institute of Standards and Technology (NIST) following an extensive investigation of The Station fire are still current and need to be aggressively enforced if nightclubs are to be trusted as a fire-safe place for our young people to gather." These recommendations can be seen at http://www.nist.gov/public_affairs/factsheet/ri_recomm_factsheet.cfm.

Among those recommendations were adoption and enforcement of the most current building and fire codes covering nightclubs. "Fire and buildings codes were shaped by tragedies such as these," said Degnan. "We don't necessarily need more codes at this point, but we do need to aggressively enforce the codes and standards that exist currently." Model codes issued by the International Code Council (www.iccsafe.org) and the National Fire Protection Association (www.nfpa.org) are available for use worldwide.

NASFM emphasizes several factors that state and local jurisdictions must consider to ensure safety in the nightclubs and other public assembly occupancies in their communities:

- Sprinklers should be installed in compliance with the most recent model codes for all new nightclubs and for existing nightclubs with an occupancy limit greater than 100 people.
- All fire protection systems – including fire sprinklers, fire alarms and emergency lighting – should be in good working order at all times.

- Interior finishes and contents should be constructed of flame-resistant materials. Non-fire-retarded foam plastic finish materials ignite easily and propagate flames rapidly, and should not be permitted in new or existing nightclubs.
- No indoor fireworks should be permitted. If it is not possible to have a total ban, pyrotechnics should be used only after careful evaluation of the facility, the pyrotechnics, and the qualifications of the operator, in accordance with applicable standards.
- All exits should be continually evaluated to assure they are not obstructed, are clearly marked, and always available for emergency egress.
- Occupant loads should be carefully monitored to prevent overcrowding.
- Trained crowd managers should be on site at a rate of one crowd manager for each 250 attendees to prevent the disaster if possible, and to direct evacuations if needed. A Crowd Manager Training Program endorsed by and available through NASFM at www.firemarshals.org is aimed at making public gatherings safer by teaching event staff how to comply with model codes that address safety in public assembly occupancies.

Additionally, customers who patronize nightclubs should always be aware of their surroundings, locate exits and make sure those exits are not blocked. If a building does not feel safe, do not stay. In an emergency, or at the sound of an alarm, leave immediately and do not return to the building for any reason.

"All of us -- from the owners and managers, to those who adopt and enforce the codes, to those who patronize nightclubs -- have a responsibility to aggressively pursue safety measures to avoid another nightclub tragedy," Degnan said. "Fire is Everyone's Fight™, and with the right preparation and diligence, we can win this fight."

About NASFM, "One Strong Voice for Fire Prevention"

The principal membership of the National Association of State Fire Marshals (NASFM) comprises the senior fire officials in the United States and their top deputies. The primary mission of NASFM is to protect human life, property and the environment from fire and related hazards. A secondary mission of NASFM is to improve the efficiency and effectiveness of State Fire Marshals' operations. Learn more about NASFM and its issues at www.firemarshals.org. 🔥

Smoke and Draft Control Door Assemblies

By Rich Walke

Designers and code authorities often have questions about how smoke and draft control door assemblies are certified, and want to know what markings should be provided on the assemblies to show compliance with building code requirements.

Fire door assemblies have been utilized for decades to protect openings in fire-resistance-rated construction. These doors are evaluated for their fire performance in accordance with the requirements of the Standards for Safety for Tin-Clad Fire Doors, UL 10A, Fire Tests of Door Assemblies, UL 10B or Positive Pressure Fire Tests of Door Assemblies, UL 10C. In more recent times, draft and smoke control door assemblies have been utilized to limit the smoke migration through door openings. These draft and smoke control door assemblies are tested in accordance with the Standard for Safety for Air Leakage Tests of Door Assemblies, UL 1784. (Provisions from this standard were previously included in the Uniform Building Code Standard UBC 7-2, Part II.)

Building Code Requirements

Various provisions of the International Building Code (IBC) require doors to meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784. The air leakage rate of the door assembly is not allowed to exceed 3.0 cubic feet per minute per square foot of door opening at 0.10 inch of water for both the ambient temperature test and the elevated temperature (400 °F) exposure test. However, this is only applicable when the doors are installed in the following applications as specified in the 2012 IBC:

- Smoke partitions (Section 710.5.2.2)
- Enclosed elevator lobbies (Section 713.14.1, exception 3)
- Corridors and smoke barriers (Section 716.5.3.1)
- Fire service access elevator lobbies (Section 3007.7.3)
- Occupant evacuation elevator lobbies (Section 3008.7.3)

Section 716.5.7.3 requires smoke and draft control doors that comply with UL 1784 to include the letter “S” on the fire-rating label of the door. This marking is intended to indicate that the door and frame assembly are in compliance when listed or labeled gasketing is also installed.

Certification Considerations

Certifications (Listing and Classifications) of doors which have been either fire tested or tested for their leakage characteristics, or both, are published in the UL Fire Resistance Directory, the Fire Resistance Directory on CD-ROM and the Online Certifications Directory www.ul.com/database. Draft and smoke control door assemblies meeting the code requirements for leakage can be provided in one of two ways:

First, a UL Classified swinging fire door, fire tested under a positive furnace pressure and leakage tested as a smoke and draft control door may be installed in conjunction with a UL Listed fire door frame and a UL Classified Category H gasketing material for fire doors.

These positive pressure fire doors are certified under the Positive-pressure Tested Swinging-type Fire Doors (GSZN) product category and bear a UL Classification Mark that includes the fire-rating. In addition, those doors which have also been tested in accordance with UL 1784 are eligible to bear a label which will read either “Smoke and Draft Control Door” or will be the letter “S”. Fire door frames used in conjunction with these doors are Listed under the Fire Door and Window Frames (GVTV) product category and bear a UL Listing mark. Listed frames whether of a welded or knocked down style are appropriate for use in smoke and draft control applications without the need for further markings.

The Category H gaskets used in conjunction with these doors and frames are Classified under the Positive-pressure Tested Gasketing and Edge-sealing Materials for Fire Doors (GVYI) product category. The gaskets are surface applied to the door and/or the frame so the overall assembly can comply with the air leakage requirements of the codes. The Category H gaskets are either Classified for general use on all products in a door type family, or limited to individual door manufacturers, as noted in the individual Classifications. Since the Classification Marking is applied to the gasket packaging, it is not verifiable after installation of the gasket.

Alternately, door assemblies, consisting of specific doors, frames, gasketing, hardware and other accessories which have been evaluated as a smoke and draft control door assemblies only are Classified under the Leakage-rated Door Assemblies (OPBW) product category. Leakage-rated door assemblies under this product category are intended for installation in accordance with the installation instructions provided with each leakage-labeled component product. The products are intended primarily for field installation in accordance with installation instructions packaged with the leakage-labeled components, but may be factory assembled.

Information concerning the specific air-leakage rating, mounting locations, installation clearances, and the like is provided in the detailed installation instructions accompanying each leakage-labeled component product.

Installation Considerations

Smoke and draft control door assemblies are intended to be installed in accordance with the Standard for Smoke Door Assemblies and Other Opening Protectives, NFPA 105, and the Standard for Fire Doors and Other Opening Protectives, NFPA 80.

Smoke and draft control doors are required to be self-closing or automatic closing in accordance with NFPA 80. Automatic closing smoke door assemblies shall be activated by smoke detection installed in accordance with the National Fire Alarm and Signaling Code, NFPA 72. 🔥

For additional information on smoke and draft control door assemblies, please contact Rich Walke at Underwriters Laboratories Regulatory Services in Northbrook, Ill. at Richard.N.Walke@ul.com or at +1.847.664.3084.

THE ADVENTURES OF THE APEX THE FIRESTOPPER™

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Industry News

FCIA's Firestop DIIM Seminars Coming in Canada in addition to the Middle East – FCIA's Canada Task Force is planning a 'Firestopping and DIIM' Symposium in Ottawa March 13, 2013. FM 4991 and UL Firestop Exams will be offered March 14. Additionally, FCIA secured a tour of the National Research Center of Canada's Laboratories as part of the Symposium on March 13. Look for more info through email and at FCIA.org over the next few weeks.

What's DIIM?

For the **D-Design**, firestop products become systems after being installed to instructions in tested and listed designs in ASTM E 814, UL 1479, and UL 2079 and Perimeter Fire Containment Systems and ASTM E 2307, plus ULC-S-115.

For the **I-Install**, FCIA Member, FM 4991 Standard for the Approval of Firestop Contractors and the UL/ULC Qualified Firestop Program, provide unmatched and education for the industry.

In the **I-Inspection**, the International Building Code 2012 Chapter 17 requires ASTM E 2174 and ASTM E 2393 Penetration and Joint Firestop Inspection Standards for verification that the contractor's processes are working. International Accreditation Services IAS AC 291 Accreditation Criteria for Special Inspection Agencies provides assurance that the inspection firm understands firestopping.

M-Maintenance of Fire and Smoke Resistant Construction in existing buildings is critical to successful fire and life safety and is spelled out in great detail in the International Fire Code, NFPA 101, National Building Code of Canada and UAE Fire Code of Practice.

UL Announces UL Evaluation Services – According to UL, the new UL service results in 'UL Evaluation Reports' to help get building products to market faster and offering one stop for complete code compliance.

UL Evaluation Reports present UL's findings from an evaluation of products to ICC-ES (International Code Council's Evaluation Service) Acceptance Criteria and compliance with the intent of code requirements. Reports are provided to manufacturers and made available to the public. UL Evaluation Reports combined with your UL Safety Certification for building products can streamline market acceptance in a fraction of the time normally required to demonstrate compliance with the family of International Codes.

- UL Safety Certifications and the trusted UL Mark assist code authorities, architects, designers, specifiers, contractors and other built environment influencers in determining code compliance for products where the model codes require testing and/or certification in accordance with specific standards.
- UL Evaluation Reports further assist code authorities in determining code compliance and enforcing building regulations and assist architects, specifiers and contractors in determining code

compliance in situations where products are not addressed in the codes, the codes are unclear or when the codes have multiple requirements for a single product.

For more information, visit the UL Evaluation Services section of UL.com, at <http://www.ul.com/global/eng/pages/offerings/industries/buildingmaterials/eval/>. Contact UL at +1.877.854.3577 or email firesafetyquote@ul.com for specifics.

FCIA submits ASTM Standard Proposals –

FCIA's Standards Committee has been busy working on improvements to ASTM E 2174 and ASTM E 2393, the 'Standards for On-Site Inspection of Installed Firestop Systems'. Proposals focused on the several items, including:

- Assuring that every entity that installs firestopping is inspected.
- Appendices for FM 4991 and UL Qualified Firestop Contractor Programs and International Accreditation Services IAS AC 291 Accreditation for Firestop Special Inspection Agency firms.
- Much more...

The Standards committee looks forward to a very active ASTM meeting in Indianapolis April 15 & 16, 2013.

International Accreditation Services (IAS) Special Inspection Requirement in NYC Results in Surge of Interest - On April 13, 2012, the New York City (NYC) Department of Buildings (DOB) put measures into effect that will require Special Inspection Agencies (SIAs) to become registered with NYC and firms working on larger projects will be accredited.

Firms performing Special Inspections on "Class 1" projects must become accredited by May 13, 2013. IAS has been accrediting special inspection agencies in New York to meet the DOB requirements and has two staff dedicated to New York. In addition, IAS is developing a "home team" of New York region assessors that can be brought in to conduct on-site assessments.

"With full implementation of the NYC Building Code of 2008 and the requirement for accreditation of SIAs, New York has taken a strong lead on the east coast in requiring higher levels of assurance in the quality of the constructed project. I expect that other jurisdictions in the region will see the benefits and this program will continue to grow," said Lawrence J. O'Connor, NSPE, IAS Eastern Operations Program Manager.

National Institute of Building Sciences welcomes 2013 Board, says Farewell to Retiring Directors - The National Institute of Building Sciences welcomes a number of new members to its Board of Directors this January and says goodbye to retiring directors. Joseph Donovan, the Honorable Stephen Ayers, Cindy Davis, Joy Marshall Ortiz and Richard Hayter are the newest members of the National Institute of Building Sciences Board of Directors. Three

members are retiring from the Board: John F. Bender, Emory R. Rodgers and Jim. W. Sealy. Learn more at www.nibs.org

FCIA Conferences bring Value - If you missed FCIA's Conferences in 2012, you missed a lot. Speakers such as the Past President of the International Code Council Ron Lynn, NFPA's Chief Statistician, Dr. John Hall, NFPA's, Gary Lougheed, the National Research Council of Canada, Anne Guglielmo of the Joint Commission and John Barrios, Chair of the Board at International Accreditation Services, shared their expertise with the FCIA audience.


Watch for details as the 2013 FCIA Education and Committee Action Conference is being planned by the Program Committee for April 30, May 1-3, 2013 at the Brown Palace in Denver. The FCIA Firestop Industry Conference and Trade Show is November 5-8.

Watch FCIA.org as the FCIA Program Committee organizes blockbuster events for the coming year and beyond.

Unifrax Announces new Fire Protection On-Line Education

Unifrax LLC, fire protection education courses for FyreWrap® Duct & Plenum Insulation are now available free online at www.unifrax.com.

An AIA accredited course is available and designed specifically to educate Architects, Engineers, Building Owners, Installers and Code Officials regarding flexible wrap applications and the benefits offered with this type of shaft alternative fire protection technology. Certificates of completion are provided as well as AIA/CEU credits if applicable.

For additional information regarding these fire protection online training courses or other FyreWrap Fire Protection Products please contact Sarah Brewer at 716-278-3808, email: sbrewer@unifrax.com, or John Connors at 716-278-3939, email: jconnors@unifrax.com. 

Life Safety Digest

2013 Industry Calendar

March 11 to 15

EduCode International 2013, Las Vegas
www2.iccsafe.org/educate/

March 13

FCIA DIIM Educational Symposium
Ottawa, ONT, Canada
www.fcia.org

March 18 to 22

AWCI Conference & INTEX Expo,
San Antonio
www.awci.org

March 24, 25

FCIA DIIM Educational Symposium,
Abu Dhabi, UAE
www.fcia.org

March 27, 28

FCIA DIIM Educational Symposium,
Doha, Qatar
www.fcia.org

April 2, 3

FCIA Participates in Fire Safety in
Oman
Muscat, Oman

April 14 to 17

ASTM E06 Meetings, Indianapolis
www.ASTM.org

April 17 to 20

National Insulation Association
Annual Convention, Tuscon
www.insulation.org

April 21 to 28

ICC Code Development Hearings,
Dallas
www.iccsafe.org

April 30 to May 3

FCIA Education and Committee
Action Conference, Denver
www.fcia.org

May 21, 22

NFPA Fire Protection Features
Meeting, San Diego
www.nfpa.org

May 23-26

Construction Specifications Canada
National Conference,
Edmonton, Alberta
www.csc-dcc.ca

June 10 to 13

NFPA Conference & Expo, Chicago
www.nfpa.org

Aug. 7 to 9

National Association of State Fire
Marshals Convention, Indianapolis
www.firemarshals.org

Sept. 25 to 27

CONSTRUCT2013 and CSI
Convention, Nashville
www.csinet.org

Sept. 29 to Oct. 2

ICC Annual Conference & Expo
www.iccsafe.org

Code Corner

NFPA Codes and Standards seeking Public Input – Several NFPA Codes and Standards are being reviewed by committees later this spring and summer. NFPA documents in the Annual 2015 revision cycle are now accepting Public Input (formerly proposals) electronically through NFPA's Electronic Submission System (e-PI). The system will automatically pull in the text and show any changes in "track changes" and even saves your input.

To submit input electronically, select the document from the list of NFPA codes and standards or search for documents available for public input using the search feature. Once on the document page, select "The next edition of this standard is now open for Public Input (formerly proposals)" to begin the process. You can submit input or just start and save your work in progress before the closing date.

Review further instructions on how to use the e-PI system. If you have any questions when you use the new system, you can contact Carolyn Cronin at (617) 984-7240 or by email at ccronin@nfpa.org.

NFPA Conference and Expo – Registration is open for the NFPA Conference and Expo general session, 2-day Association Technical Meeting. Visit www.nfpa.org for info.

Canadian National Building Code – The Canadian National Building Code continues its development process for the 2015 editions of the code. The Canadian Commission on Building and Fire Codes meets in Winnipeg, Feb. 24-25. The Standing Committee on Fire Protection meets April 29-May 2 in Ottawa.

ICC Marks 10 Years – The International Code Council (ICC) marks 10 years of service to members and resilient codes to construct safe, sustainable homes and buildings.

Ten years ago, if a nationwide retailer or manufacturer wanted to build a new facility, the code requirements for the same structure would have been different in the East, Midwest, South or West. Home builders, architects, engineers, designers, and contractors faced the same obstacles—a patchwork of building safety regulations. And career opportunities for code officials and building safety professionals were also limited by regional barriers.

That all changed on Feb. 1, 2003, when three regional code organizations—Building Officials and Code Administrators (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International (SBCCI)—began operating as one consolidated association: the International Code Council.

The movement to develop a single set of comprehensive, coordinated model construction codes for use throughout the United States and globally began in 1994.

During the 2002 joint BOCA, ICBO, and SBCCI annual conference in Fort Worth, Texas, members voted to combine services, products and operations into one association. And on Jan. 21, 2003, a joint resolution of consolidation was signed by BOCA board chairman Steve Shapiro, ICBO chairman Roger Evans and SBCCI board president William L. Duck during the International Builders Show in Las Vegas. The action reaffirmed the construction industry's desire for a single model code system in the United States.

"For more than a century, the model code organizations, through the hard work of volunteers and staffs, have been serving our members and this nation to ensure safer communities," then-SBCCI CEO and now ICC CEO Dominic Sims said in a memo to staff. "Now ICC is positioned to carry on this rich tradition for the next 100 years."

The International Codes (I-Codes) combined the strengths of the regional codes without regional limitations, responding to the needs of the construction industry in a way that enhanced public safety. The ICC family of codes continues to enjoy strong support from code and fire officials, architects, engineers, builders and developers.

Today, the I-Codes are used at the state or local level in all 50 states and Washington, D.C., by federal agencies and referenced by architects, engineers and developers around the world.

The first I-Code published was the 1995 International Plumbing Code. By 2000, a complete family of I-Codes was available including the International Building, Residential, Fire, Energy Conservation, Mechanical, Fuel Gas, Property Maintenance and Zoning Codes. The ICC Performance Code for Buildings and Facilities joined the I-Code family in 2001. Two new codes debuted in 2003: the International Existing Building Code and the International Wildland-Urban Interface Code. In 2012 the I-Codes welcomed two new family members: the International Green Construction Code and the International Swimming Pool and Spa Code.

Congrats to the ICC for a significant accomplishment...10 years, one code development organization.

ICC Board Approves cdp ACCESS Steering Committee's Final Recommendations for Online Code Development




During its winter meeting, the International Code Council Board of Directors approved the Code Development Process (cdp) ACCESS Steering Committee's final recommendations. The board authorized staff to proceed with the initiative to increase participation in ICC's core function: Code Development.



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"The discussions, debate and suggestions that accompanied the report of the Steering Committee provided the Board of Directors with the information needed to establish a prudent course of action," explained ICC board president Ronald Piester. "There is still much to learn and the cdp ACCESS initiative is still evolving, but we are confident that ICC has established a sound plan to develop the governmental consensus Code Development Process of the future."

The cdp ACCESS Steering Committee's final recommendations outline several key elements for expanding participation in the ICC Code Development Process, including:

- Online collaboration for stakeholders in the development of Code Change and Public Comment submittals as well as collaboration in preparation for participating at hearings.
- Establishing a two-week period following the Committee Action Hearing for online voting on assembly motions by all ICC members. Successful assembly motions will continue to result in an automatic public comment. Committee recommendations remain as the initial motion for the Public Comment Hearing.
- Establishing a two-week period following the Public Comment Hearing for online voting by governmental members based on the actions that occurred on the Individual Consideration Agenda at the Public Comment Hearing. The online voting ballot will include the results from the Public Comment Hearing and access to video and other content of record from the hearing. The results will be added to the vote count from the Public Comment Hearing to determine the final disposition of the code change.

A flow chart (www.iccsafe.org/cdpACCESSFlowChart) has been created to illustrate the new process.

Testing of the online Governmental Consensus Vote will occur in October in Atlantic City at the 2013 Public Comment Hearings. After system and process adjustments the 2014 Cycle for the International Green Construction Code (IgCC) will be a binding Beta test for the entire cdp ACCESS process.

As outlined in the Steering Committee's reports, the required registration periods for in-person and online voting participants will be increased, and the new system will use state-of-the-art security technology to help preserve the integrity of ICC's governmental consensus Code Development Process. The in-person and online voting processes will maintain compliance with federal guidelines for consensus and accessibility.

Members and other Code Development Process stakeholders can email questions and comments to cdpACCESS@iccsafe.org along with their name and phone number for a timely response.

International Code Council, 'Group B' Code Hearings – ICC's 'Committee Action Hearings' occur April 21-29 in Dallas, TX where upwards of 2,000 proposals will be reviewed, debated and decisions made by the code committees.

There are several codes that will have proposals debated during the week.

International Fire Code
International Residential Code
International Existing Building Code
International Property Maintenance Code
International Energy Conservation Code
International Building Code, Administration
ICC Performance Code For Buildings and Facilities
International Zoning Code
International Wildland-Urban Interface Code
International Swimming Pool and Spa Code

To view the hearings live, connect in April to <http://www.iccsafe.org>. ICC broadcasts the hearings live. The committees are made up of representatives from industry and governmental organizations.

The ICC governmental consensus process is an open, inclusive process that allows input from all individuals and groups. Final decisions at the 'Committee Action Hearings' may be contested via 'Public Comment'. The Public Comment Hearings allow voting by ICC Governmental Member voting representatives and Honorary Members who represent the public's interest. Industry does not vote in the 'Final Action – Public Comment Hearings' but may testify in support/opposition to the proposals.

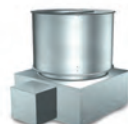
ICC Approves Deletion of IBC Chapter 34 in Favor of Reference to the IEBC - The ICC Board of Directors supported the Membership's recommendation and upheld action taken at the 2012 Public Comment Hearing in Portland on Code Change G201-12 that proposed the deletion of Chapter 34 of the *International Building Code* in favor of a reference to the *International Existing Building Code*. The IEBC, in Chapters 4 (Prescriptive Compliance Method) and 14 (Performance Compliance Methods), includes the same provisions that are in Chapter 34 of the IBC. 🔥

go smoke-free

Greenheck's life-safety **air** products.



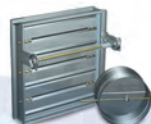
Utility Fans



Roof Mounted Exhaust Fans



Propeller Inline Fans



Smoke & Fire Smoke Dampers



A reliable emergency smoke management system is a life-saving component of any building's design. Clearing and blocking dangerous smoke from rooms, hallways and stairwells helps occupants breathe and see during evacuation procedures — and helps to safeguard emergency crews as they go about their work.

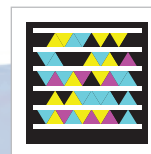
Greenheck offers a full line of smoke-control products licensed by AMCA and listed with UL/cUL, including centrifugal and propeller rooftop upblast fans, inline propeller fans, and a complete line of smoke and fire dampers. These products can be integrated into a dedicated fire/smoke emergency system, or serve double-duty as components of your everyday ventilation system.

As the industry leader, Greenheck is able to meet whatever air movement and control challenges you face, from simple to complex.

Learn more at
greenheck.com/4smoke

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