



THE MAGAZINE OF EFFECTIVE COMPARTMENTATION

Life Safety

DIGEST

WINTER 2018

Fire Resistance Terminology

Fire-Resistance-Rated Assemblies-
Loading of Horizontal Assemblies & Columns

Project FAIL-SAFE

Fire Code Requirements and "Inventory"

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LIFE SAFETY DIGEST

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As this magazine's Table of Contents is opened, you'll notice that the terms Fire Resistance and Fire-Resistance Rating, Fire Resistance Maintenance - are all dominant. The theme of this issue is Fire-Resistance Rated (and smoke resistant) assemblies and continuity.

Why? Multifamily Residential Occupancies have one of the greatest amounts of fire-resistance rated assemblies in buildings next to hospitals. Fire resistance protects building occupants during the 'defend in place' type occupancies. Fire-resistance rated assemblies also provide safe egress paths to exit the building. Industrial Occupancies use fire-resistance rated assemblies, especially Fire Walls to protect the continuity of operations in addition to egress routes in the buildings to safe exit points.

When giving presentations to audiences far and wide, we ask a question of building owners and managers. How many have a budget for sprinkler systems maintenance? Fire and smoke detection and alarm testing? All the hands go up for these disciplines. Then, when we ask, how many have a budget for fire-resistance rated assemblies and the features that protect their continuity... All the hands stay down.

That's why we're focusing on Fire Resistance. To get fire-resistance rated assemblies to work, they must be properly D-Designed, I-Installed, I-Inspected and M-Maintained. The M-Maintained starts at D-Design through communication of fire-resistance rated and smoke resistant assemblies and all the key building elements that protect its continuity.

Firestopping, fire rated swinging and rolling doors, fire rated glazing, fire and smoke dampers, are all part of the assembly fire resistance to keep the wall or floor continuously fire-resistance rated. The structure is protected in some cases by the SFRM or IFRM fireproofing.

Enjoy this issue of Life Safety Digest. Pass it on to those who need to know more about maintaining the integrity of fire-resistance rated and smoke resistant assemblies. Our lives depend on it. 🔥

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FIRE RESISTANCE TERMINOLOGY

Building owners and managers need to understand what they are buying. General and subcontractors need to understand requirements to provide accurate estimates to purchase and install products for their intended use. Building owners and managers need to maintain their structures for the building's life cycle to comply with fire-code requirements. That's why Construction Documents need to communicate clearly, concisely, and consistently to the many audiences that use the documents - for the building's life cycle.

Clear communication from the specifier and designers to the audiences gets that done. (see article on fire resistance and the Fire Code, this issue) Terminology is as important for consistent communication of the requirements to those that need to live with the structure.

TERMINOLOGY IS CRITICAL

As such, FCIA recommends specifiers and designers use the terminology from the applicable building codes where the building is constructed. The defined terms are used in the building code for specific reason, as we'll explain below.

Since the building code is a consensus document with requirements that need to be communicated, why not stick with these terms in project manuals and drawings?

In the US, the fire resistance terms come from the International Building Code (IBC). In Canada, it's from the National Building Code of Canada. (NBC)

The definitions below have a [XX] in front of the term. In the case of [BF], it stands for the ICC Code Development Committee that votes at the ICC Committee Action Hearing on the code proposals resulting in a building code term. BF stands for 'Building, Fire'. That's the Fire Safety Committee that is responsible for the definition. A [G] would stand for General Committee, [S] Structural, [F] Fire Code. There are other acronyms as well in the International Codes.

IBC'S FIRE RESISTANCE TERMS

In the IBC, there is a definition for Fire Resistance. As shown below, the definition is not a noun, but almost a verb. It suggests actions, or properties, that prevent or retard the passage of heat, hot gasses or flames.

[BF] FIRE RESISTANCE. That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

[IBC 2018, 2021]

There are several methods to determine fire resistance in the IBC. This topic will be the subject of another article in Life Safety Digest.

The definition for fire-resistance rating is shown below. This is the period that the building element, component or assembly protects against fire spread and or maintains structural function based on the methods stated in Section 703.

[BF] FIRE-RESISTANCE RATING. The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.

A fire protection rating is different than a fire-resistance rating in that the fire protection rating does not have the ability to restrict temperature rise of the assembly on the unexposed (non-fire) side of the assembly.

[BF] FIRE PROTECTION RATING. The period of time that an opening protective will maintain the ability to confine a fire as determined by tests specified in Section 716. Ratings are stated in hours or minutes.

EXTERIOR WALLS ARE UNIQUE.

[BF] EXTERIOR WALL. A wall, bearing or nonbearing, that is used as an enclosing wall for a building, other than a fire wall, and that has a slope of 60 degrees (1.05 rad) or greater with the horizontal plane

FIRE BARRIERS ARE DEFINED NEXT IN THE IBC.

[BF] FIRE BARRIER. A fire-resistance rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

For the 'Fire Barrier', the term states that the assembly is a wall, and not a floor. The assemblage of materials is designed to restrict the spread of fire and is fire-resistance rated. The section also states that there be continuity of the fire resistance. The continuity clause is what dictates treating any breaches, gaps, openings, joints and voids in the vertical Fire Barrier assembly. Continuity is mentioned in section 707.5 to be continuous through concealed spaces including suspended ceilings. This means the assembly is continuous from Exterior Wall to Exterior Wall and from Horizontal Assembly to Horizontal Assembly.

The fire-resistance rating definition takes the user to section 703. In section 707.5.1, the supporting construction of the Fire Barrier requires an equal or greater fire-resistance rating. The Fire Barrier is securely attached to the horizontal assemblies as well.

A Fire Partition is different than a Fire Barrier. The fire partition lacks the continuity requirements of a Fire Barrier. The Fire Partition does not need to be continuous through ceilings.

[BF] FIRE PARTITION. A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

The Fire Partition continuity states that the assembly be securely attached to either the underside of a floor or roof sheathing, deck or slab above or the underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating not less than the fire-resistance rating of the partition. Additionally, Fire Partitions are not required to extend above the ceiling in certain conditions, based on 708.4 of the IBC.

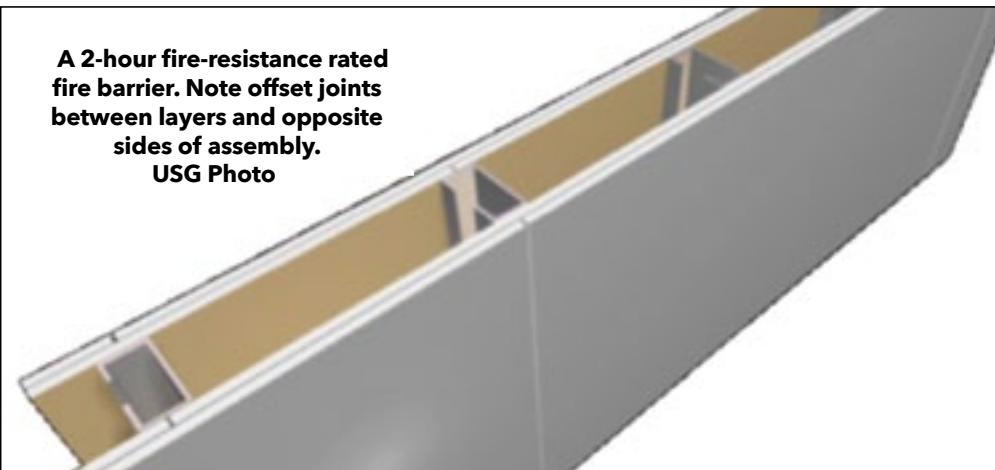
Like the Fire Barrier, the Fire Partition requires supporting construction to be of equal or greater fire resistance than the fire-resistance rating of the fire partition. Openings, penetrations and joints are protected where located below the ceiling membrane.

THE MOST ROBUST OF THE FIRE-RESISTANCE RATED ASSEMBLIES IS THE FIRE WALL.

[BF] FIRE WALL. A fire-resistance rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

The Fire Wall is unique in that it is independent from either side of the building. In Section 706.2, the structural stability clause states that floors on either side of the wall can collapse under fire conditions and the wall be unaffected, and still standing. The Fire Wall built in accordance with NFPA 221 shall be deemed to comply with the requirements of a Fire Wall, according to the IBC. Fire Walls can be built of any type of materials including gypsum wallboard and concrete or concrete block.

A 2-hour fire-resistance rated fire barrier. Note offset joints between layers and opposite sides of assembly.
USG Photo



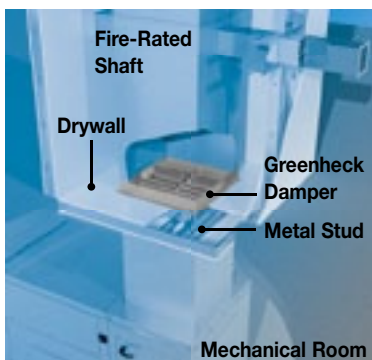


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SMOKE BARRIERS ARE DIFFERENT THAN FIRE BARRIERS.

[BF] SMOKE BARRIER. A continuous membrane, either vertical or horizontal, such as a wall, floor or ceiling assembly, that is designed and constructed to restrict the movement of smoke.

The Smoke Barrier is used mostly in hospitals and prisons. That does not mean it's the only place that Smoke Barriers should be used. Where the building wants to restrict the passage of smoke, a smoke barrier can and should be used. Designers and building owners and managers can specify 'above code' assemblies if they want.

Smoke Barriers are regulated under Section 709 of the IBC. Section 709.3 states a minimum 1-hour fire-resistance rating requirement, with continuity and supporting construction requirements like the Fire Barrier.

Smoke Barriers are unique in that they can be either a horizontal (floor or roof) or a vertical (wall) Smoke Barrier assembly. Fire Barriers are only vertical (wall) assemblies.

Smoke Barriers also need to be continuous through concealed spaces as stated in Section IBC 709.4, Continuity. Openings are protected in accordance with Section 716, Opening Protectives, including fire doors and fire rated glazing. Joints are to be protected in accordance with Penetrations, 714, Section 715, and Ducts and Air Transfer Openings, 717.

Based on this description and code requirements, Firestopping of the Smoke Barriers requires an "L-Rated" firestop system. That's a firestop system that has undergone an air leakage test prior to fire exposure at ambient temperature and elevated temperatures, 400°F. The two temperatures are used to test cold and hot smoke movement through the assembly in cubic feet per minute per square foot of opening area (CFM/SF).

Smoke Barriers are used to form a Smoke Compartment, another IBC defined term.

[BG] SMOKE COMPARTMENT. A space within a building enclosed by smoke barriers on all sides, including the top and bottom.

The Smoke Partition is different than the Smoke Barrier in that it does not require a fire-resistance rating.

[BF] SMOKE PARTITION. A wall assembly that extends from the top of the foundation or floor below to the underside of the floor or roof

sheathing, deck or slab above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.

This definition removes the requirement for fire resistance, and states to limit the transfer of smoke. The limit term is different than restrict, the term that is used in the Smoke Barrier.

Even though there is no fire-resistance rating inherent in the Smoke Partition, firestopping these assemblies is still required. Why? FCIA's position is that a L-Rated Firestop System is still needed for this application at a Smoke Partition. The L-Rating is the suitability for use statement for the firestop product to restrict, limit the passage of smoke - and it is tested at temperatures that the Smoke Partition might be exposed to during a situation.

If the firestopping air leakage L-Rating proves that the product installed to the system requirements resists the passage of smoke, why use anything that someone 'guesses' limits or restricts the passage of smoke? Plus, installation is the biggest part of the cost for protecting penetrations and joints, meaning cost of material is an incremental cost.

THE IBC DEFINES THE HORIZONTAL ASSEMBLY AS BOTH A FLOOR OR ROOF ASSEMBLY THAT'S DESIGNED TO RESTRICT THE SPREAD OF FIRE.


[BF] HORIZONTAL ASSEMBLY. A fire-resistance rated floor or roof assembly of materials designed to restrict the spread of fire in which continuity is maintained.

In the Horizontal Assembly, the Roof Assembly - that's the roof deck and roof covering - is part of a fire-resistance rated assembly.

In Canada, the Fire Separation is the unique Term. Look for another article on the Fire-Separation in a future issue of Life Safety Digest.

WHAT HAPPENS WHEN TERMS ARE INCORRECT?

Each of these terms from the International Building Code is used elsewhere in the code. If the project manual or drawings use different terms, then how is the contractor to know how to build the assemblies properly? How is the building owner and manager to maintain the assemblies correctly?

Terminology is important to all. Use the code terminology so that requirements get communicated clearly, concisely so the building occupants get protected as the building code, designer, contractor and building owner and manager want. 

FIRE-RESISTANCE RATED ASSEMBLIES

LOADING OF HORIZONTAL ASSEMBLIES, COLUMNS

The National Fireproofing Contractors Association has been requested many times to reply about the use of products that have been tested to ASTM E119 without a load applied to the horizontal assembly and if the tested assembly meets the intent and spirit of the building code.

The ASTM E119, "Standard Test Methods for Fire Tests of Building Construction and Materials" is one of two test standards accepted by the International Building Code (IBC) for determining fire resistance. The other is the UL 263, "Standard Fire Tests of Building and Construction Materials". There are other methods for determining fire resistance as allowed by the building codes. However, fire testing assemblies of building elements is the most recognized and able to really build comparisons among materials and manufacturers.

In several sections of ASTM E 119, there are references to adding weight, or loading, to building elements or assemblies "throughout the fire resistance test", to simulate fire performance under load. The Floors and Roofs, and Beams, are all subject to a stated load in the standard. Some column designs have been tested as loaded as well. There are not as many loaded column designs because the most deflection is in beams and Horizontal Assemblies. In each section listed above, the charging language in ASTM E119 states,

"...Throughout the fire resistance test, apply a superimposed load to the test specimen to simulate a maximum-load condition."
[ASTM E119]

One reason the Horizontal Assemblies (floors, roofs), columns and beams have fire resistance testing with loads is that *fire-barriers*, *fire-partitions* and *smoke barriers* might be built on the assemblies, adding weight.

Second, the floors will be loaded with furnishings, people, non-rated walls and more, causing deflection of



Applied load, weight to a Horizontal assembly.
GCP Applied Technologies, Inc. Photo

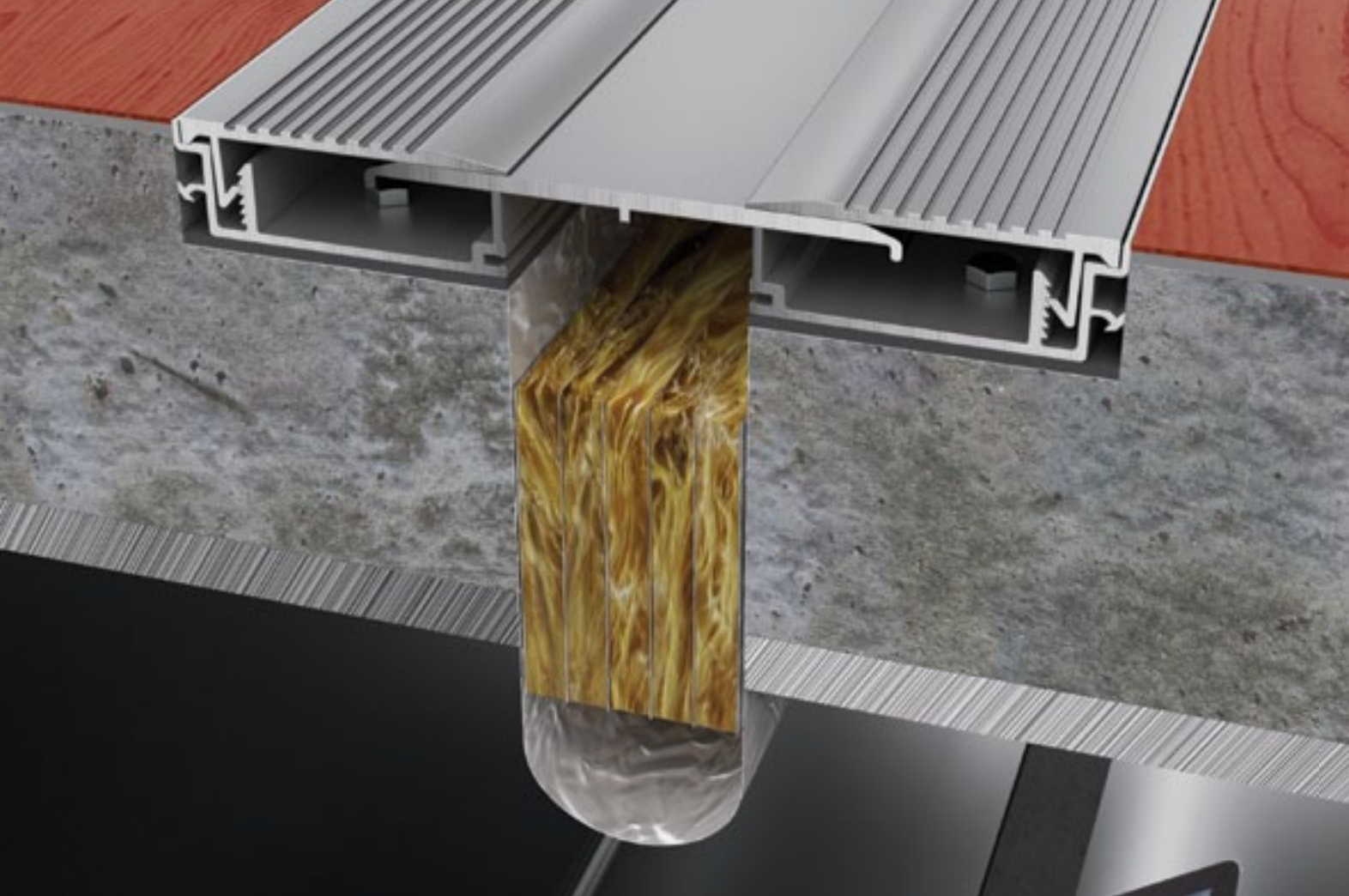
the assembly. Without the loading, materials might pass fire resistance tests that might not have passed with loading of the column, beam, floor or roof assembly.

Section 703 of the IBC really lays out the requirements for fire-resistance ratings.

703.2 Fire-resistance ratings. The *fire-resistance rating* of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E119 or UL 263 or in accordance with Section 703.3.

The *fire-resistance rating of penetrations and fire-resistant joint systems* shall be determined in accordance Sections 714 and 715, respectively.
[IBC 2018, 703.2]

The IBC's Section 703.2 clearly requires a fire-test standard or other methods to determine or calculate fire resistance.



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In the IBC Section 704.1, it again refers to *fire-resistance ratings*. When in italics, there is a defined term in the IBC's Chapter 2. The two definitions are listed below:

[BF] FIRE RESISTANCE. That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use. [IBC 201]

[BF] FIRE-RESISTANCE RATING. The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703. [IBC 201]

As shown, the ASTM E119 fire-test procedure requires that fire-tests be performed on fully loaded Horizontal Assembly (floor or roof) test samples on a full-scale furnace. Fire-tests on these assemblies or columns/beams that are not conducted in accordance with the requirements in ASTM E119, or are modified in any way, are not allowed when reading the IBC literally under Chapter 7's requirements.

ASTM E119 and UL263, test standards that are almost 100 years old, are the benchmark levels of protection that the code prescribes for fire resistance. That means loading the assemblies for the duration of the fire-test is the lowest level of protection that AHJ's should expect.

An Authority Having Jurisdiction (AHJ) can approve materials and methods based on Chapter 7's under Section 104.10 and 104.11, Alternative Materials and Methods in the IBC. The Chapter 1 powers are the prerogative of the AHJ.

Based on 104.11, the AHJ can approve fire resistance building elements, components or assemblies.

However, the code already provides six (6) methods to determine fire resistance in Chapter 7, with the leading, charging language citing ASTM E119 and UL263.

703.3 Methods for determining fire resistance.

The application of any of the methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 or UL 263. The required *fire resistance* of a building element, component or assembly shall be permitted to be established by any of the following methods or procedures:

1. *Fire-resistance* designs documented in approved sources.
2. Prescriptive designs of fire-resistance rated building elements, components or assemblies as prescribed in Section 721.
3. Calculations in accordance with Section 722.

4. Engineering analysis based on a comparison of building element, component or assemblies designs having *fire-resistance ratings* as determined by the test procedures set forth in ASTM E119 or UL 263.
5. Alternative protection methods as allowed by Section 104.11.
6. *Fire resistance* designs certified by an approved agency.

Section 703.3, 1 refers to fire resistance designs in approved sources. Approved sources are the fire resistance directories from testing laboratories such as UL, FM Approvals or Intertek.

The 703.3.2 section describes prescriptive building elements, components or assemblies as stated in Section 721. This section is where certain types of materials of construction are assumed to have the fire resistance ratings as shown in tables. The tables are carefully assembled with 17 notes. At least one note refers to ASTM E119 or UL 263.

In 703.3.3, calculated fire resistance, the code directs the user to ACI 216/TMS 0216. Calculated thicknesses are discussed in this area.

Plus, section 104.11, places rigorous analysis on the building official's shoulders for evaluating alternative methods of construction, materials etc.

[A] 104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability and safety. Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons why the alternative was not *approved*.

[A]104.11.1 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

[A] 104.11.2 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does

not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made without expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved agency*. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

[IBC 104.11, 104.11.1, 104.11.2]

Of note is that ASTM E119 and UL 263 both require a load applied to the beam or horizontal assembly to successfully pass a fire-test. That means that it is the worst-case expectation of the assembly performance during testing.

Predicting fire resistance performance of these same elements or assemblies using small scale furnace testing without loading yields completely different results - better than if they were in a loaded assembly as required by the fire resistance test standards. Hence, fire resistant materials of much less capabilities are able to pass these small scale and unloaded tests - but not the ASTM E119 or UL263 testing.



**Fire-Resistance Rated Assembly, Large Scale Furnace.
UL Photo.**

Should a supplier or contractor submit materials used on structural members such as columns, beams and horizontal assemblies, ask key questions.

1. Was this tested to ASTM E119 or UL 263 with the test standard load applied to the horizontal assembly, beam?
2. Was the horizontal assembly, beam or column tested at a nationally recognized testing laboratory?
3. Was the horizontal assembly, beam or column tested in a small scale or large-scale test furnace?

If the answer is YES to all three elements, then code compliance is within reach. If NO, then the ability of the product to protect people, property or provide the resiliency the building needs to bounce back from a fire event is unknown.

Second, small scale furnace testing might not provide the appropriate temperature protection of the unexposed side of the horizontal assembly. There is a limit to the topside deck temperature rise to keep egress routes passable and prevent items above the fire area from reaching the ignition point.

If an AHJ is provided documentation that a small-scale fire-test that is not according to all aspects of ASTM E119 that's applicable, has been 'signed off' by a professional engineer, it's still not good enough.

Why? The ASTM E119 Fire-Test Standard is in the charging language and the basis test for fire-resistance ratings. Anything less puts people, building occupants and resiliency at risk. 🔥

John Dalton is Technical Service Manager at GCP Applied Technologies. Based in Cambridge, MA, John can be reached at John.A.Dalton@gcpat.com.

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PROJECT FAIL-SAFE

- A SUMMARY

Several years ago, the National Association of State Fire Marshals (NASFM) Fire Research and Education Foundation initiated Project FAIL-SAFE (Factually Analyzing Integrated Layers of Safety Against Fire's Effects) to evaluate if the adoption of sprinkler and other trade-offs is impacting the overall safety of buildings. The project was designed to make people, property, and communities more resilient and resistant to fire by examining the value and effectiveness of how passive and active fire safety systems interact holistically. The project consisted of four key steps.

- Code analysis: An examination of the 2015 International Building Code (IBC) to explore the relationship of trade-offs with both building type and occupancy type
- Literature review: Aimed at identifying and understanding existing gaps in the current knowledge of fire safety system trade-offs
- Computer modeling: Understanding better how fire and its byproducts move, and how structural components react to fire
- Matrix development and analysis: Development of a web-based app capable of intaking data about a particular structure and generating a fire-safety analysis for comparative analyzation of risk potential

This summary will not address the code analysis; but rather will focus on the subsequent three steps. With respect to sprinkler system reliability, there are numerous reports indicating a wide-range for sprinkler system reliability, ranging from 38 percent to 99.5 percent, with NFPA data typically showing a reliability in the range of 87 percent to 90 percent.^{i,ii}

LITERATURE REVIEW

The second phase of the project involved the NASFM Foundation commissioning Worcester Polytechnic Institute (WPI) to conduct a literature review, through which three major sprinkler trade-offs—building size/egress, unprotected opening area, and fire-resistance rating—were identified.

The major findings from the literature review include:

- Many provisions in existing fire-safety and building codes are empirical and are not based on any sort of data.

- Many building code trade-offs (due to the presence of sprinklers) lack a scientific basis.
- Building code trade-offs could be detrimental to overall disaster resilience of buildings.
- While sprinkler systems can significantly improve firefighter safety by reducing the risk of the fire, building code trade-offs may offset those advantages should sprinkler systems not perform as designed.

Separate from the NASFM project, Fire Safe North America (FSNA) is planning additional work addressing the third bullet above regarding the overall disaster resilience of buildings.

COMPUTER MODELING

After completion of the Literature Review, the NASFM Foundation commissioned WPI to perform the computer modeling. The modeling was designed to address the following issues:

- A comparative analysis of fire protection system impacts on fire behavior, occupant survivability and structural resiliency
- Evaluate three major sprinkler trade-offs including Egress, Unprotected Opening Area (UOA) and Fire Resistance Rating (FRR)

The modeling assumed a multi-family residential occupancy (Use Group R-2 as defined in the International Building Code) built of combustible construction (Type VA and VB as defined in the IBC), both with and without sprinklers present and functioning.ⁱⁱⁱ

The conclusions and recommendations from the modeling effort were:

- The single largest impact on occupant egress survivability is compartmentation of smoke and multiple egress routes.
- Major conclusions of UOA modeling is that minimum fire separation distance should be kept at no less than 6 ft.
- The size of the UOA has little relevance on building-to-building fire spread. Separation distance and exterior flammability are the key factors.
- FFR findings show fire will demonstrate more robust spread horizontally through fire separations, as opposed to vertically.
- A hybrid performance/prescriptive approach to structural stability should be pursued to enhance FRR features.

Based upon the modeling, FSNA is considering additional research related to the impact compartmentation and multiple egress routes have on occupant egress survivability and the use of a hybrid performance/prescriptive approach to structural stability.

RISK EVALUATION MATRIX™

The RISK EVALUATION MATRIX™ is a proprietary tool developed by the NASFM Foundation to aid in the measurement of fire-safety, providing a framework for the collection and analysis of data relating to building and fire-safety codes. It was and continues to be used to:

- Compare buildings and fire-safety before and after the implementation of the IBC in 2000
- Scientifically evaluate the impact of fire sprinkler trade-offs

The MATRIX is an online application used to index fire- and life-safety risk based on building characteristics. Evaluations are based on a numerical scoring system encompassing 23 safety parameters identified in Chapter 14 of the ICC's International Existing Building Code. These safety parameters can be combined into three aggregate safety metrics: Fire Safety, Means of Egress, and General Safety. Between May and July 2017, fire and building inspectors were engaged to gather and input into MATRIX data for a wide-variety of buildings across the United States. The buildings varied by age, occupancy, construction, height, and size and included a variety of active building-protection features. The data were cross-referenced with the codes under which the buildings were designed and built. Using data collected through MATRIX, PG Public Services analyzed changes in parameters following adoption of the I-Codes and identified those that were statistically significant. Additionally, PG Public Services analyzed impacts on fire-safety, means-of-egress, and general-safety scores to determine if adoption of the I-Codes resulted in statistically significant changes.^{iv}

PG Public Services placed buildings into one of two groups based on the code under which the buildings were built—either legacy (BNBC, UBC, SBC, other) or I-Codes. Mean safety parameters and safety scores were compared using the Student's t-test, a standard test used to determine whether the difference between two sets of data is statistically significant.

From the work performed to date, the key findings include:

- Overall building safety scores decreased, suggesting an increased risk:
 - Fire Safety score decrease of 23.4 percent
 - Means of Egress score decrease of 18.4 percent
 - General Safety score decrease of 13.2 percent
- The implementation of the IBC had a wide range of individual systems impacts:
 - Increased reliance on active fire protection systems in scoring
 - Means of egress capacity (the ability of a building to evacuate occupants) scores increased, suggesting a decreased risk
 - Standpipe system scores decreased, suggesting an increased risk

The increases and decreases in these scores, which may become statistically significant as more data are collected, are indicative of changes in structural tradeoffs—in particular, trade-offs of passive building features, such as compartmentation, tenant/dwelling separation, and travel distance, in exchange for active building features, such as automatic fire detection, fire-alarm systems, and automatic sprinklers.

CONCLUSION

While NASFM is still considering what future activities may result from Project FAIL-SAFE, other organizations, such as FSNA are evaluating the three reports and considering future research and activities. As noted above, FSNA is considering future work address the following three key findings of the various Project FAIL-SAFE reports:

- Building code trade-offs could be detrimental to overall disaster resilience of buildings.
- The single largest impact on occupant egress survivability is compartmentation of smoke and multiple egress routes.
- A hybrid performance/prescriptive approach to structural stability should be pursued to enhance FRR features. 🔥

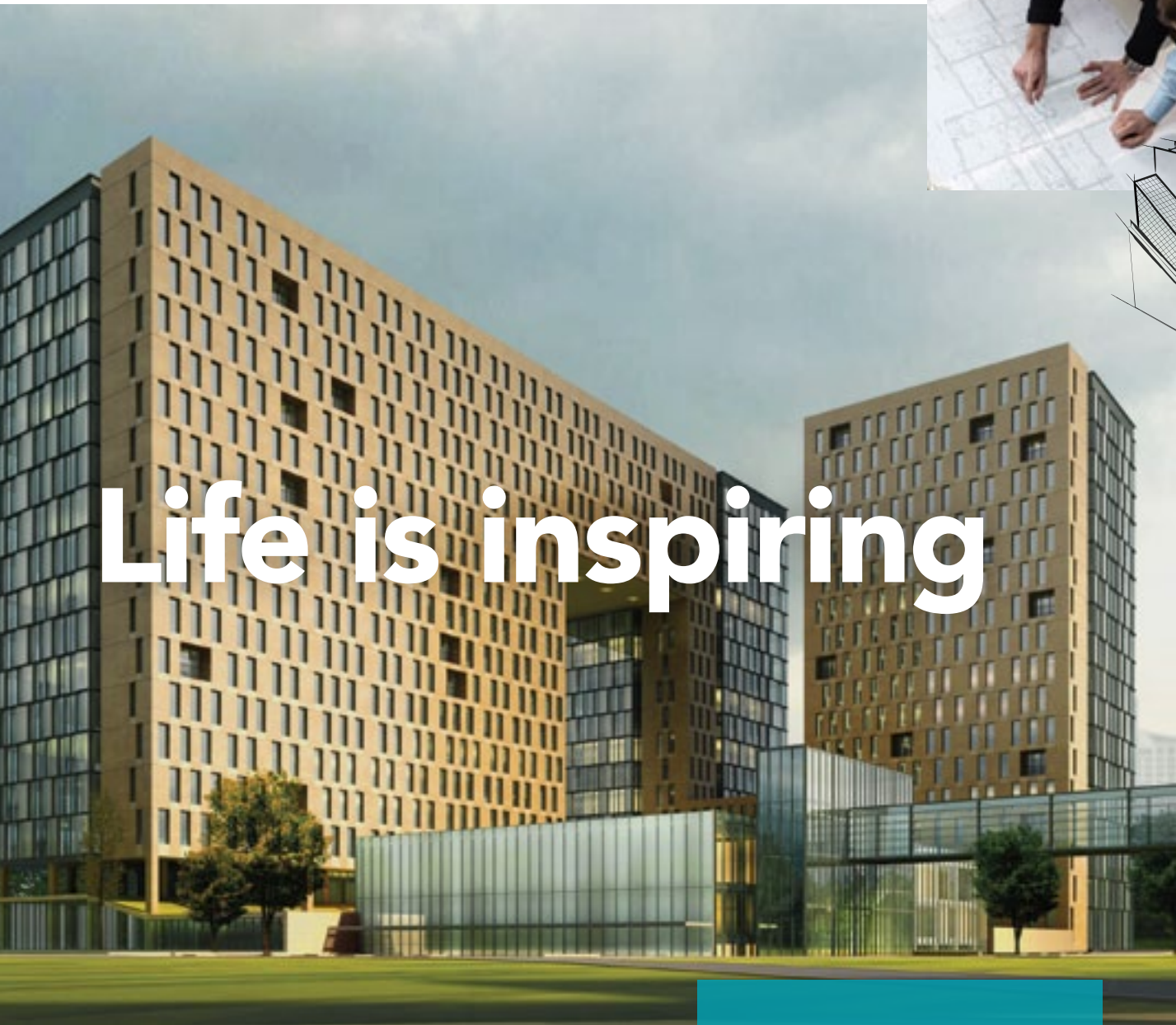
Bill Koffel is a consultant to the Firestop Contractors International Association (FCIA) as well as a consultant to Fire Safe North America (FSNA). He can be reached at wkoffel@koffel.com

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FIRE CODE REQUIREMENTS AND "INVENTORY"

Once a building has been properly D-Designed, the structure has been built and products have been I-Installed, and become systems, and then the project has been I-Inspected and accepted, then what happens?

That's when the building takes on a life of its own. New mechanical, electrical, plumbing, communications, doors, windows, and other types of services are demanded by occupants. And, the piping, cables and ductwork that carry the services need to be installed from the source point to the occupant locations, meaning through walls, floors, and ceilings.

As new services are installed in buildings, the fire-resistance rated assemblies - both horizontal floors and vertical walls - are breached, so the piping, ductwork and communications, etc. can find their way to the service location. When fire-resistance rated assemblies are breached, they need to be repaired.



Open breaches happen.
Pro-Firestop Photo

This brings us to the premise of this article - M-Maintenance - that completes the proper D-Design, I-Installation, I-Inspection and M-Maintenance of fire resistance. This keeps building occupant safety through reliable fire resistance.

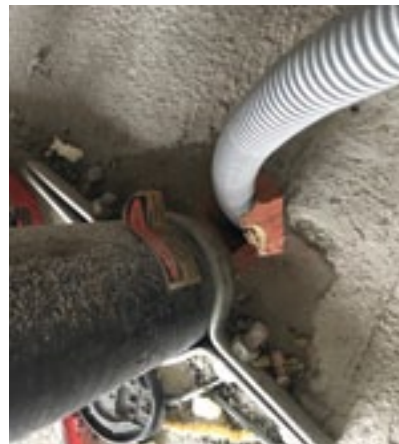
What responsibility does the Building Owner and Manager have to keep the sprinkler system working for the building life-cycle? What about the alarm system that notifies the occupants of fire or emergency? A Building Owner and Manager keeps on top of these two key fire- and life-safety building systems because it's what Facility Managers do.

What about the responsibility for maintaining the third and fourth elements of fire- and life-safety - The Fire-Resistance Rated and smoke resistant assemblies, such as effective compartmentation and structural fire resistance? What about the egress system and education of the egress system users? Does the Building Owner and Manager have responsibility for any of these?



Breaches made for penetrating items. Some are not pretty.
Pro-Firestop Photo

YES, is the answer. The effective compartmentation and structural fire resistance are key elements of the fire- and life-safety plans for a building. They are the 'silent policemen' that rest or stay dormant until fire or smoke starts in an area. The effective compartmentation and structural fire resistance resist the spread of fire or smoke 'to and from adjacent spaces', fire-compartment



Even when warning stickers exist, (on pipe), services breach firestops.
Pro-Firestop Photo

to fire compartment and to and from buildings.

The egress system needs to be obvious and intuitive for the building occupants - and it needs to be known. That's why there should be education and drills for building occupants to support the egress designs.



**NFPA 1 states that improper installation is the building owner's responsibility.
Specialty Firestop Services Photo.**

For years, the Fire Codes - The International Fire Code (IFC), NFPA 1, The Fire Code, and NFPA 101, The Life Safety Code - have had very specific language about maintaining effective compartmentation and structural fire resistance to the level of protection that the building was originally constructed.

The Building and Fire Codes speak clearly to the specifier and designer. The Building Code wants the construction documents to communicate a process to build the effective compartmentation and structural fire resistance correctly. The Fire Codes are usually thought to be for only new construction.

Since Fire Codes are retroactive codes, meaning buildings need to comply at new construction and during the building life-cycle, they require that the Specifier and Designer communicate Fire Code needs at new construction. And, the Fire Code dictates that there be documentation.

The documentation required for the Building Owner and Manager to keep on top of the fire resistance in the structure is called an "Inventory". The "Inventory" of fire-resistance rated assemblies is a new term that's in the Fire Code. The Building Owner and Manager really needs the inventory of "as built systems" as it's used to base their recordkeeping of existing fire resistance - which means build it right, document it right - so it can be maintained right.

To get maintenance Fire Code compliance, the fire-resistance rated assemblies must be built properly. To build correctly, we need to define 'fire resistance', state the fire-resistance ratings, and communicate how they are determined properly to the contractors through the Construction Documents including project manual and drawings. Check out the article in this issue about language from the International Building Code (IBC), Chapter 7 on Fire Resistance.

MAINTENANCE OF FIRE RESISTANCE

Maintenance of Fire Resistance is required by the Fire Codes - The International Fire Code, NFPA 1, The Fire Code, and NFPA 101, The Life Safety Code. **NFPA 101, The Life Safety Code** has a requirement in Chapter 4 for maintaining fire resistance. The underline and italics are for emphasis only.

4.6.12 Maintenance, Inspection, and Testing.
4.6.12.1 Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, fire resistive construction, or any other feature is required for compliance with the provisions of this Code, such device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature *shall thereafter be continuously maintained...* in accordance with applicable NFPA requirements
[NFPA 101:4.6.12.1, emphasis added]

Continuous maintenance means something. It means that the Building Owner and Manager has a responsibility to assure that the fire resistance is continuously maintained to protect people in buildings. This ensures safe 'defend in place' and/or egress.

Then, NFPA 101 clearly directs the Building Owner and Manager to have the fire resistance inspected, maintained and tested under the supervision of a responsible person at specified intervals. The specified intervals are in NFPA 80 and NFPA 105 for fire and smoke dampers, NFPA 80 for fire doors and fire rated glazing.

NFPA 221 has requirements for the assemblies. Maintenance direction is also found in other documents such as Manufacturers' maintenance instructions. This is for all fire-resistance rated assemblies and the features of fire resistance including firestopping, fire dampers, fire rated glazing, rolling and swinging fire doors.

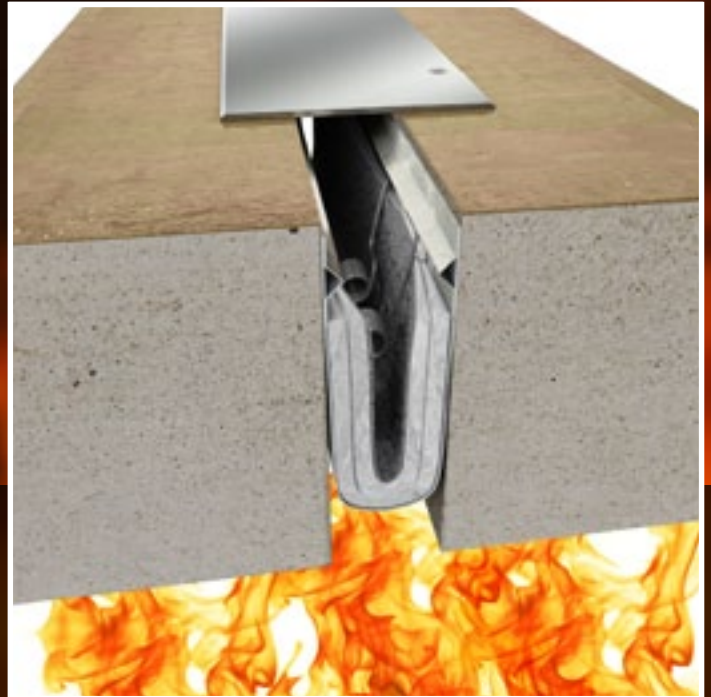


Fire doors keep areas safe. Door Security & Safety Foundation of the DHI Photo



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4.6.12.5 Maintenance, inspection, and testing shall be performed under the supervision of a responsible person who shall ensure that testing, inspection, and maintenance are made at specified intervals in accordance with applicable NFPA standards or as directed by the AHJ. [NFPA 101:4.6.12.5, emphasis added]

NFPA 1 - The Fire Code - has very specific language speaking to the Building Owner in many ways. NFPA 1 directs the Building Owner and Manager to care for the fire resistance in a very specific way. Maintain the fire resistance integrity all the time.

12.3.3.1 Required fire-resistive construction, including fire barriers, fire walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draftstop partitions, and roof coverings, shall be maintained and shall be properly repaired, restored, or replaced where damaged, altered, breached, penetrated, removed, or improperly installed. [NFPA 1, 12.3.1, emphasis added]

Take note that roof coverings, and improper installation - original and ongoing - are included in NFPA 1.

Why roof coverings? Roof coverings are part of a fire-resistance rated assembly. If a roof covering is replaced with materials that are not part of the listing for the roof assembly, it negates the fire resistance rating.



Roof Coverings matter when part of the fire-resistance rated assembly. Waukegan Roofing Photo

The Improper Installation puts responsibility on the Building Owner and Manager to know the building has been built correctly. This is speaking loudly that fire-resistance rated assemblies and their features of fire resistance all need to be installed to the listing and manufacturers installation instructions.

Continuing, the NFPA 1 adds that the Building Owner and Manager maintain the fire resistance using a listed repair system or materials and methods equaling the original permitted construction. The NFPA 1 even adds that when patching fire rated gypsum wallboard, it needs to be in a specific method:

12.3.3.2 Where required, fire-rated gypsum wallboard walls or ceilings that are damaged to the extent that through openings exist, the damaged gypsum wallboard shall be replaced or returned to the required level of fire resistance using a listed repair system or using materials and methods equivalent to the original construction.

The NFPA 1 does give guidance on intervals for inspecting fire-resistance rated assemblies. While it says three years, the language above states that the fire-resistance ratings need to be maintained continuously.

12.3.3.3 Where readily accessible, required fire-resistance rated assemblies in high-rise buildings shall be visually inspected for integrity at least once every 3 years. [NFPA 1, 12.3.2, 12.3.3, emphasis added]

This section below assigns more responsibility for training for those who inspect the fire-resistance rated assemblies to the Building Owner. It means that they can't send just anyone to inspect their fire resistance. The document requires people with technical knowledge and experience in fire resistance-rated design AND construction.

12.3.3.3.1 The person responsible for conducting the visual inspection shall demonstrate appropriate technical knowledge and experience in fire-resistance-rated design and construction acceptable to the AHJ.

In the section below, reporting and documentation is mentioned. The report is what the Building Owner and Manager will show to the Fire Marshal who is inspecting for code compliance and to the Insurance Company for risk reduction.

12.3.3.3.2 A written report prepared by the person responsible for conducting the visual inspection shall be submitted to the AHJ documenting the results of the visual inspection. [NFPA 1, 12.3.3.1, 12.3.3.2, emphasis added]

The International Fire Code has very specific language that has existed for quite some time about maintaining fire resistance in buildings.

The 2015 version of the International Fire Code requires similar language to that which we saw in the NFPA 1, Chapter 12 in 703.1. Here's what the 2015 International Fire Code says:

703.1 Maintenance. The required fire-resistance rating of fire-resistance-rated construction, including, but not limited to, walls, firestops, shaft

enclosures, partitions, *smoke barriers*, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems, shall be maintained. Such elements **shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated**. Records of inspections and repairs shall be maintained...

[2015 International Fire Code, 703.1, emphasis added]

Note that there needs to be a visual inspection performed annually on the fire-resistance rated assemblies and the features of fire resistance - firestopping, fire doors, fire dampers, fire rated glazing. That's more frequent than is required by NFPA 1, The Fire Code. Then, the bolded words in the 2015 International Fire Code are very similar to the NFPA 1 Chapter 12's direction to the Building Owner.

The fire resistance shall be "...restored or replaced where damaged, altered, breached or penetrated..."; and records are required. Further, 703.1 continues that the assemblies do not need to be visually inspected if there is no access, such as a hatch, access door, or ceiling tile. For those assemblies hidden by hard ceilings without access through a panel, it assumes that the installation was correct originally and that the assembly has not been altered, breached, or penetrated.

In the International Code Council's code development process for the 2018 version of the International Fire Code, there was a reorganization that was debated and APPROVED.

The International Code Council's Fire Code Action Committee (FCAC), led by Michael O'Brian, Brighton (MI) Fire Department with task group leader Howard Hopper from UL and a team of interested parties, had numerous meetings about the reorganization.

The task group effort separated the fire resistance section of the Fire Code into specific sections for each fire resistance discipline. This brings attention to them both individually and as a complete package to clarify the requirements for Building Owners and Managers.

2018 INTERNATIONAL FIRE CODE

The Scope of the new 2018 International Fire Code 701.1 and 701.2, says it well.

701.1 Scope. The provisions of this chapter shall govern the **inspection and maintenance of the materials, systems and assemblies used for structural fire resistance, fire-resistance rated construction separation of adjacent spaces** and construction installed to resist the passage of smoke to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings. New buildings shall comply

with the *International Building Code*.

[IFC 701.1 2018, emphasis added]

Then, section 701.2 then describes the barriers and structural members to be protected.

701.2 Fire-Resistance Rated Construction

Structural Members

Exterior Walls

Fire Walls, Fire Barriers, Fire Partitions

Horizontal Assemblies

Shaft Enclosures

The rest of the section 701 - the charging language for the section - keeps the requirements stated in 703.1 of the 2015 edition and adds one important concept. It adds that there needs to be an 'inventory' kept of the fire resistance.

701.6 Owner's responsibility. The owner shall maintain an inventory of all required fire-resistance-rated and smoke resistant construction, and the construction included in Sections 703 through 707 and such construction shall be visually inspected by the **owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated**. [IFC 701.1 2018, emphasis added]

NOTE: The underlined text is the new additional language about the inventory of fire-resistance required that became part of the 2018 IFC.

WHAT'S AN "INVENTORY" OF FIRE RESISTANCE?

The fire resistance Inventory can be defined as key elements needed to maintain the fire-resistance rated assemblies and its features. The 'inventory' of fire resistance term came about due the term used in facilities already. Inventories are kept by Building Owners and Managers for everything from power cords to power taps, and more. It seemed to be a concept that would communicate well to Building Owners of all types.

WHAT DOES THE INVENTORY CONSIST OF?

The first inventory item is the **Life Safety Drawings**. These drawings are required to know where the fire-resistance rated horizontal assemblies and fire-resistance rated or smoke resistant walls are located. It can be assumed that the supporting construction for fire barriers, smoke barriers and fire-walls is also fire-resistance rated, meaning the structural protection needs to be maintained. That's the Sprayed Fire Resistant Materials (SFRM), Intumescent Fire Resistant Materials (IFRM), wrap systems, wallboard enclosures, and Horizontal Assemblies.



**SFRM's Maintenance Patching is required for continuous fire-resistance maintenance.
GCP Applied Technologies, Inc. Photo**

These items need to be visually inspected, repaired or replaced when damaged, in addition to the barriers and their features of fire resistance - firestops, fire dampers, fire rated glazing, fire doors.

The second inventory item is the Manufacturers' installation instructions. The Manufacturers' installation instructions are required for the Building Owner and Manager to know what materials were used to build the fire-resistance rated assembly, as well as the protection of breaches. For fire dampers, the listings are incorporated into the Manufacturers' installation instructions. The manufacturers maintenance and repair instructions also need to be part of this inventory item.

The third key inventory element is the Listings. This is stated in many of the sections of the International Building Code. The listings are also stated as required to install the products to become systems - in the code. What are the listings?

There are listings for fire-resistance rated wall and floor assemblies, fire rated glazing, firestopping, fire dampers, and much more. Listings can be found at www.UL.com; www.ApprovalGuide.com; www.Intertek.com. For those in the Middle East, listings can be found at www.bell-wright.com in addition to the UL, FM and Intertek sites.

The components list the inventory of fire resistance assemblies and the features of fire resistance required for the Building Owner and Manager to maintain the passive fire protection package. The Building Owner and Manager needs the life safety drawings, Manufacturers' installation and maintenance instructions, and the listings to comply with the NFPA 1, NFPA 101, and International Fire Codes.

Therefore, the Specifier needs to communicate through the construction documents that the inventory be gathered by the General Contractor and passed on to the Building Owner and Manager. Watch for an article in the next issue of Life Safety Digest focusing on how the specifier can communicate to the building owner

and manager through the contractors using Division 1 - 01-78-39, Project Record Documents and the individual sections.

That's how these important inventory items are communicated to the building owner and manager. This inventory sets up the maintenance activities that need to comply with the Fire Codes.

WHY IS FIRE-RESISTANCE MAINTENANCE IMPORTANT?

The safety record for buildings is related to the performance of the fire resistance, sprinkler, detection and alarm, egress systems, as well as the education of the occupants.

Fire resistance - and sprinklers, detection and alarms, egress systems - need to work when called upon by fire. Holes can be made in the assemblies and fire resistive material scraped off structural elements. Sprinkler or detection and alarm systems can be turned off too. While sprinklers might extinguish fires, they are designed to control them and limit size development in one area. Should two areas have fires, and put demand on the system, what happens? The alarm system needs to activate. If it doesn't, the building is now defending people in the place they are using fire-resistance features that make an egress system -- to protect them.

Thankfully, fires occur very infrequently in buildings. But when they do, we want everything to work. That's why the NFPA 1, The Fire Code, NFPA 101, the Life Safety Code, and the International Fire Code have a lot of direction to the Building Owner and Manager on the subject, and the message is clear: Maintain continuous fire-resistance.

We at FCIA - and with others - hope to help Building Owners and Managers through education about this critical component of the Total Fire Protection Package - fire resistance.

Staying on top of maintaining the fire resistance inventory, egress education, sprinklers, alarm/detection systems - means the Building Owner and Manager might just save a life - or many lives. 🔥

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CODES AND STANDARDS NEWS

FCIA @ ICC'S PUBLIC COMMENT HEARING

FCIA's Code Consultant Bill Koffel and Executive Director Bill McHugh attended the ICC Public Comment Hearings in Richmond, VA the week of Oct.22. In addition to a presentation on the 2018 International Fire Code requirements that requires the building owner to build an 'Inventory' of fire-resistance, FCIA displayed at the ICC Expo. We also had a quick trip to Washington DC and back for an ASTM E06 Meeting while at the ICC Conference.

The ICC's Code Development Hearings were open to the public and broadcast live from the Richmond, VA hearings. While there were items that passed or were defeated at the hearings, there is one more step in the process - the Online Governmental Consensus Vote (OGCV), which wraps up in early December. Final results will be known shortly thereafter and found at ICC's Code Development Website, www.CDPAccess.com.

The process for hearing the proposals is quite amazing. Testimony on each individual item is provided

in a 2-minute proponent presentation, 2-minutes then provided for the opponents, then a 1-minute rebuttal and a 1-minute re-rebuttal to what was said. No new information can be introduced during the proposal debate after the initial presentations, keeping things moving productively.

The moderator, (on the right at the red podium in the image below), keeps the hearing on track and calls each code change to the hearing 'floor'. The moderator keeps order and declares the results of the voting. Voting is limited to ICC's Governmental Members and Honorary Members in attendance, as APPROVED, APPROVED AS MODIFIED, and DISAPPROVED. ICC's CDPAccess system voting is what keeps the process moving.

To see the ICC Code Development Hearing broadcast archive, visit www.CDPAccess.com and sign up for free access. Below is a short summary of highlights of the hearing:

TALL WOOD BUILDINGS PROPOSALS

Attendance was strong during the complete process, for most all code proposals. There was especially amazing attendance with much debate on the issue of Tall Wood Buildings.

In this picture, Stephen DiGiovanni, Chair of ICC Adhoc Committee on Tall Wood Buildings presents a proposal on Tall Wood Buildings. His committee was where the series of proposals for Tall Wood Buildings were researched and developed. Stephen also



Stephen DiGiovanni presents TWB Proposals, while moderator Wayne Jewel keeps watch at ICC's Public Comment Hearings.
ICC Photo

presented at FCIA's Firestop Industry Conference and Trade Show this November.

During the hearings, just about all the proposals related to tall wood buildings were APPROVED.

Opposition to Tall Wood Buildings came from the fire-service, who must fight fires in these buildings. The fire service's concern is that they are fighting a fire while the building structural elements are on fire. The Concrete and Steel industries also objected stating that test standards were modified, and a lack of history exists for unprecedented heights allowed for Tall Wood Buildings.

Based on the proposals that were APPROVED, it is now allowed to construct an 18-story Tall Wood Building. Canada's current code only allows about 12 stories of tall wood structure.

In some designs, gypsum board is required to protect the structural wood - Cross Laminated Timber - from fire. In some cases, the wood can be exposed. Where the wood is not protected, it was stated that a 'char' builds on the outside layers providing the structural capability to the rest of the uncharred wood.

The debate on one proposal for Tall Wood Buildings, G108-18, lasted about 2.5 hours, in 2-minute and 1-minute soundbites. The G108-18 proposal dealt with the height of the Tall Wood Buildings. With about 100 Public Comments to process on this proposal alone, there was a lot of debate.



ICC's Public Comment Hearing Audience, Richmond VA. ICC Photo

The testimony on G108-18 centered upon the fact that there are no regulations for this type of structure. Currently, the building code official must approve

these designs under 104.11, Alternative Methods and Materials section of the International Building Code. That can cause inconsistencies nationally and internationally because there are no current national requirements.

The code proposals by the Adhoc Committee on Tall Wood Buildings do give a benchmark level of regulation to these structures that can be applied wherever the tall wood buildings are located.

It seemed a key point made against the tall wood structure was the nature of the fire-testing. While the assemblies were burned, they were not tested under the standard time temperature curve, established by test standards ASTM E119 and UL 263 - the two standards used to determine fire-resistance ratings. This is because at some point in the test, the wood structural elements contribute to the test furnace fire adding heat. As a result, the test furnace heat is reduced to accommodate the burning structural elements. Regardless of the modified test standards, the proposals still were **APPROVED**. For more on ASTM E 119/UL 263's Time Temperature Curve, see article on Fire-Resistance, this issue.

FCIA'S TWO CODE PROPOSALS F91-18 AND S21-18, WERE BOTH APPROVED

These proposals added two key concepts into the International Building and Fire Codes.

In the Building Code, FCIA's Code Proposal **S21-18**, mandates firestop special inspection for residential structures with occupancies greater than 250 people. That's a facility that is about 50,000 SF in size. The 250 person occupant load was taken from the Table 1604.5

section of the IBC and used as a benchmark occupant load. This FCIA proposal to have special inspection for firestop installations in residential occupancies .250 occupants was **APPROVED AS SUBMITTED** overwhelmingly at the Committee Action Hearings, and also by the assembly at Richmond, VA. Opposition came from the National Multifamily Housing Council.

FCIA'S PROPOSAL F90-18, APPROVED AS MODIFIED

In the International Fire Code, adding that when maintaining firestopping joint installations in existing buildings, the firestop joint systems need to be maintained to the listing and manufacturers installation instructions, where known. This is to make the joints section consistent with the penetration section of the code which FCIA updated in the 2018 Fire Code.

The current 2018 International Fire Code due to a FCIA Proposal in the last code development cycle also states that the building owner and manager maintain an **inventory of fire-resistance elements**. The inventory as stated in the 2018 International Fire Code refers to the building owner and managers records - the listings and manufacturers' installation and maintenance instructions. Based on this requirement for an 'inventory' of fire-resistance, building owners and managers are required to gather documentation to identify and record inspections and repairs to these assemblies.

While the FCIA's **F90-18** and **S21-18** were **APPROVED**, a proposal by FCIA to add that firestop contractors be either UL Qualified Firestop Contractor or FM 4991 Approved was **DISAPPROVED**. Another

FCIA Proposal to add identification systems - paper or plastic labels, metal or ceramic fiber tags - on walls or floors with the firestop system number written on it, was **DISAPPROVED**. FCIA will continue to pursue these initiatives which both help result in a better installation, inspection and maintenance of firestopping to the listing and the manufacturers' installation instructions.

There were also a series of proposals about the exterior skin of buildings that dealt with **Metal Composite Material panels (MCM)**, similar to those used on the Grenfell Tower in London, Address Hotel in Dubai and many buildings in North America.

The MCM panel industry submitted a code proposal to remove the unlimited height allowance, when the building is fully sprinklered, for these products that have plastics in between the metal panels. The proposal was **APPROVED** at the ICC Committee Action Hearings and was not challenged at the Public Comment Hearings in October. FM Approvals submitted a proposal to add their FM 4880 Standard to the IBC, which was **DISAPPROVED**.

In the Fireproofing Industry, there were several proposals **APPROVED**. In **FS8-18**, **secondary attachments** were dealt with by proponent Crystal Sujeski, of California.

The proposal added language in Section 704 to resolve how far from structural members that fire-resistant materials are required to be applied on secondary attachments.

704.6.1 Secondary attachments to structural members. Where primary and secondary structural members require fire protection, secondary **tubular steel attachments** to those structural members shall be protected with the same fire resistive material and thickness as required for the structural member. The protection shall extend away from the structural member a distance of not less than 12 inches, or shall be applied to the entire length when the attachment is less than 12 inches long. When an attachment is hollow and the ends are open, the fire resistive material and thickness shall be applied to both the exterior and interior of the tubular hollow steel attachment.

The National Fireproofing Contractors Association had several successful **APPROVED** Proposals as well. In a series of proposals, the NFCA resolved that special inspection of fireproofing in Chapter 17 of the IBC takes place during construction, before mechanical, electrical and plumbing is installed and before ceiling grid is installed, with an additional visual inspection before concealment to catch areas where fireproofing might have been removed for an attachment of some kind.

The section now reads;

[BF] 1705.14 Sprayed fire-resistant materials.

Special inspections and tests of sprayed fire-resistant materials applied to floor, roof and wall assemblies and structural members shall be performed in accordance with Sections 1705.14.1 through 1705.14.6. *Special inspections* shall be based on the fire-resistance design as designated in the *approved construction documents*. The tests set forth in this section shall be based on samplings from specific floor, roof and wall assemblies and structural members. *Special inspections* and tests shall be performed during construction with an additional visual inspection after the rough installation of electrical, automatic sprinkler, mechanical and plumbing systems and suspension systems for ceilings, and before concealed, where applicable. The required sample size shall not exceed 110% of that specified by the referenced standards in Sections 1705.14.4.1 through 1704.14.4.9. [IBC 2021]

NFCA's proposal **S16-18** was **APPROVED** at the ICC's Committee Action Hearings in April, and not contested in October. This means there is now a limit on SFRM Inspections to 110% of what's in IBC Chapter 17. This provides an upper limit on inspection that's been found reasonable by the ICC Consensus.

In proposal **S19-18**, the NFCA clarified that inspection for Intumescent Fire-Resistant Materials including mastics and coatings, also take place before the mechanical, electrical, plumbing, piping and ceiling grid is installed, reflecting how the inspection takes place now, as shown below:

[BF] 1705.15 Mastic and intumescent fire-resistant coatings. *Special inspections* and tests for mastic and intumescent fire-resistant coatings applied to structural elements and decks shall be performed in accordance with AWCI 12-B. *Special inspections* and tests shall be based on the fire resistance design as designated in the *approved construction documents*. Special Inspections and tests shall be performed before the rough installation of electrical, automatic sprinkler, mechanical and plumbing systems and suspension systems for ceilings, and before concealed, where applicable.

In the **Fire Damper Industry**, a proposal from the Air Movement and Control Association built requirements for fire dampers that can be tested for operation remotely in place where the assembly is located. It too was **APPROVED AS SUBMITTED**.

As of this writing, none of these proposals are part of the ICC's International Building Code or International Fire Code yet. They will be after the Online Governmental Consensus Vote (OGCV) wraps up.

At the NFPA 101 and 5000 Code development process, FCIA's Executive Director Bill McHugh and Code Consultant Bill Koffel both are members of the Fire Protection Features Committee, which deals with Chapter 8, where most of the fire-resistance is located. They worked on the 'dissimilar materials' section for penetrations when they pass through fire-resistance rated assemblies. More on this in future issues of Life Safety Digest.

More on the ICC and NFPA code development processes in the next issue of Life Safety Digest. 🔥

INDUSTRY NEWS

ASHE & FIRE DOOR INSPECTIONS

The American Society for Healthcare Engineering (ASHE) has published a new book with author Keith Pardoe. Keith's Inspecting and Maintaining Swinging Doors Handbook translates technical information into layman's terms, including

how to keep doors in safe working condition and rules for maintaining the assemblies. Visit www.ASHE.org for info.

FCIA.ORG ANNOUNCES BARRIER MANAGEMENT SERVICES SECTION

Many FCIA Member Firestop Contractors offer Barrier Management Services for keeping buildings safe throughout the building life cycle. Check out the FCIA.org, Barrier Management Services section to find contractors, inspection agencies and manufacturers that specialize in this important activity. The Barrier Management Services Section at FCIA.

org exists to provide services required to comply with the International Fire Code, NFPA 101 and NFPA 1 requirements for fire and smoke resistance records. Check out the article on Fire-Code and Division 1 in this issue of Life Safety Digest.

ICC ANNUAL CONFERENCE

The International Code Council's Annual Conference and Building Safety & Design Expo (BSD) opened this October in Richmond, VA with huge success. Over 1,600 attendees registered for the Annual Conference in Richmond, VA – that's a 7% increase from 2016 in Kansas City and 75% greater than Columbus, OH.

Newly elected ICC Board of Directors President, William Bryant, spoke on the importance of preparing for the construction industry of the future. After being elected president, he then opened the code development public comment hearings with great humor. "Let's make sausage", he said, referring to the process

of debate at the code development hearings.

FCIA was present again at the BSD Expo with our tradeshow booth – and FCIA Marketing Committee Members. FCIA's booth was active with friends old and new visiting to hear about FCIA's 'DIIM' message and the FCIA Members' role in safe buildings.



ICC's new president, Bill Bryant. ICC Photo

ICC GLOBAL FORM

During the ICC Annual Convention, delegates from around the world have a chance to meet and discuss issues on a global scale. We spent time with friends from Abu Dhabi, (Imad Eldurubi, taking notes in the background), Australia, Canada, Japan, and many other countries. We also got to participate in the meetings and share how important the ICC

and ASTM have been in the development of codes and standards worldwide.



FCIA's Bill McHugh at ICC's Global Forum. ICC Photo

DHI'S FIRE AND EGRESS DOOR INSPECTION

The Door Security & Safety Foundation of the Door and Hardware Institute supports the annual fire/egress door inspection initiative. They've been working since 2005 to create awareness of important updates to NFPA 80 and 101 and the inclusion in the International Building Code and International Fire Code. Through DHI's educational efforts to help

stakeholders understand the code implications and complexity of the products and applications, we at FCIA commend DHI for pursuing fire and life safety through education. Visit www.DoorSecuritySafety.org for info.

NIBS BUILDING INNOVATION 2019

Sixty expert speakers will make 38 presentations in 18 different sessions over two days covering a wide-range of topics that will engage the entire team of building professionals in exploring strategies aimed at *Optimizing for Tomorrow*. The National Institute of Building Sciences

Conference and Expo is a great opportunity to meet with key regulatory and industry decisionmakers. Don't miss out on the program, heading to Washington, DC, January 7-10, 2019.

NIST REPORT ON THE NEED FOR BUILDINGS TO BE OCCUPIABLE POST-DISASTER

Today's building codes provide significant life-safety protection. However, a community's ability to quickly and fully recover from a disaster requires the ongoing functioning and operations of its buildings. In 2017, Congress tasked the National Institute of Standards and Technology (NIST) with defining what it would take to achieve immediate occupancy performance codes and standards for all buildings in all types of natural hazards, specifically in terms of fundamental research needs and possible technological applications. Based on that research key strategies could be used to implement any resulting regulations.

The result of that effort is the new NIST report, Research Needs to Support Immediate Occupancy Building Performance Objective Following Natural Hazard Events. The publication identifies a large portfolio of research and implementation activities that target enhanced performance objectives for residential and commercial buildings. For more information, visit <https://www.nist.gov/news-events/news/2018/08/nist-details-steps-keep-buildings-functioning-after-natural-hazards>.

FCIA FIRESTOP INDUSTRY CONFERENCE



FCIA Photo

The FCIA Firestop Industry Conference & Trade Show - FIC 2018 - opened recently at the Hyatt Regency Lost Pines Resort in Austin, TX to its highest attendance in the event's history. Attendees participated in various networking events, such as the FCIA Memorial Ray

Usher Golf Outing, FCIA Awards Luncheon, and Annual FCIA Dinner, as well as heard from several industry experts on a variety of timely technical presentations.

Some highlights include presentations by Jose Torero on "Fire Resistance History & Building Resilience", Stephen DiGiovanni on "Tall Wood Buildings & Cross-Laminated Timber Structures", Michael O'Brian on "New ICC International Fire Code Requirements & Building Owner and Manager Compliance", Mark Lund on "Electrical Circuit Protection Fire Resistance", David Nicastro on "Firestop Caulk Durability"

and so many more. By the end of the week, attendees were raving about the content and looking forward to upcoming FCIA Conference lineups.

Thank you to all who attended, to those who partnered to deliver blockbuster presentations and to those who continue to support FCIA programs and initiatives worldwide.



FCIA Photo

FCIA FIRESTOP SYMPOSIUM IN WINNIPEG

This September, FCIA headed to Winnipeg, MB with the FCIA Firestop & Effective Compartmentation 'DIIM' Symposium Canada and FCIA Education for the Firestop Exams. FCIA provided a ULC Qualified Firestop Contractor Program education session. ULC representatives were also present to educate on the ULC Qualified Firestop Contractor Program and to administer ULC Firestop Exams to those interested in pursuing third-party accreditation with the organization.

Attendees at the full-day program included Firestop Contractors, Special Inspection Agency personnel, Firestop Manufacturer representatives, Architects and Specifiers and local building officials and fire marshals, along with other AHJs.

Sessions focused on such topics as "NBC/NFC Fire Resistance & Fire Separations Code Requirements", "Fire Dampers 101 - Back to Basics", "Swinging Fire Doors 101", "Perimeter Fire-Containment Systems - Today and Tomorrow" and more. Content and participation were top notch. In fact, there were many requests from attendees while still on-site for copies of the presentations.

A special thank you to all who attended and participated to provide such an exceptional event, as well as FCIA Member Sponsors: Specified Technologies, HILTI, Thermafiber and Falconer Engineering. Look for more information on future Canadian programs online at www.FCIA.org/articles/events.htm.

NFCA'S FIREPROOFING SYMPOSIUM

National Fireproofing Contractors Association (NFCA) hosted just over 100 people at the Denver Fire Resistance in Buildings Seminar in September. NFCA invited local building code officials, fire marshals, architects, specifiers and others to learn about the International Building Code and Fire Code, fire resistance testing, IFRM & SFRM Fireproofing Material, all related to fireproofing and fire resistance in buildings. Special Thanks to NFCA Manufacturer Supplier Member Sponsors: Albi Protective Coatings, Carboline, GCP Applied Technologies, Hilti, Isolatak International and Sherwin Williams.

The National Fireproofing Contractors Association (NFCA) 2019 Fireproofing Educational Conference will be held March 20-22 at the Hilton Orlando Lake Buena Vista at Disney Springs. This is the fireproofing industry's must attend event! Attendees will hear about important issues and topics important to the industry.

NFCA's Contractor Accreditation Program Trainings for IFRM and SFRM will be held prior to the conference, March 18-20, 2019. Attending the training is the first step to become a NFCA Accredited Contractor. For more information, visit www.nfca-online.org

CAVITY WALL STANDARD BEING REVISED

FM Approvals is reviewing the Following disastrous fires related to ACM wall assemblies, such as the Torch Tower in Dubai, the Grenfell Tower in the U.K., and the Lacrosse Tower in Melbourne, Australia. FM Approvals has added a 16-ft. PPT to FM 4411, Approval Standard for Cavity Walls

and Rainscreens and will change the name to **Approval Standard for Cavity Wall Systems**. Check out the changes in FM's full article in its Approved Product News, October issue. www.FMApprovals.com.

FM PROMOTES PHIL SMITH



FCIA has enjoyed a great relationship with FM Approvals Jeff Gould and Jill Norcott and many others over the 20 years we've worked with FM. Jeff is the developer of the FM 4991 Standard for the Approval of Firestop Contractors. While Jeff was developing the standard, Phil Smith worked in the same office area,

but in some different capacities. Phil joined FM Approvals in 1984, when FM Approvals was still Factory Mutual Research Corporation (FMRC).

Smith, an FM Approvals Vice President, took over as the manager of the Building Materials Group recently. This is the business unit that manages the FM 4991 Approved Firestop Contractor program. We look forward to working with Phil. Phil's previous position was Assistant Vice President and Principal Engineer. He also served as a Technical Team Manager (TTM) for the Building Materials Group.

NFPA TAKING FIRE AND LIFE SAFETY TO 'ECOSYSTEM'

At the NFPA Expo, NFPA CEO, Jim Pauley, introduced this new concept. A functioning safety ecosystem is made up of eight key elements that play critical roles in fire-, life- and electrical safety. When these elements work together, we see a positive influence on safety best practices. When one of the components fails, the system breaks down and tragedies result. NFPA is committed to promoting the safety ecosystem to protect people and property against evolving safety threats and wants to work with others who are part of this critical system. According to FCIA, effective fire and smoke compartmentation and structural fire resistance are critical system parts.



AMCA PAPER ON TRADE-OFFS



According to the National Association of State Fire Marshals Fire Research and Education Foundation, since the creation of the International Codes in 2000, building fire-safety scores have decreased measurably. Though more data are needed, the early indications are that

an overreliance on sprinklers at the expense of passive fire-safety systems is to blame. This is from the Air Movement and Control Association white paper titled, "Impact of Fire-Sprinkler Trade-offs on Occupant and Building Safety". Visit www.AMCA.org's home page to check out the document. While there, download their "Fire and Smoke Dampers: Best Practice Design Tips", under Resources, White Papers.

GYP SUM ASSOCIATION UPDATES

GA-253 - The GA-253, Application of Gypsum Sheathing, updated in 2018, is available free. This document, recently updated, is focused on recommendations for handling, storing, and installing gypsum sheathing under a variety of conditions. The GA-254, updated in 2017, Fire-Resistant Gypsum Sheathing, is available free at www.Gypsum.org's Online Bookstore. The document really focuses on fire resistance and

gypsum sheathing in exterior walls. While there, check out the GA-225, Repair of Fire-Rated Gypsum Panel Product Systems, last updated in 2015.



NEW UL FIRESTOP PROGRAM

FCIA Announced that UL has recently assembled an optional program for Building Owners and Managers called the Master Audit Certificate of Compliance. This program is only available through UL Qualified Firestop Contractors.

The audit by UL of the Firestop Contractors Management System on-site verifies that the UL Qualified Firestop Contractor used their processes correctly to get firestopping installed to the listing and the Manufacturers' installation instructions. The certificate is annually renewable and can be

used to show the AHJ that the facility is meeting the intent of the International Fire Code for Annual Visual Inspection of the firestopping and fire resistance.

The FCIA's Accreditation Committee, chaired by Aedan Gleeson and Ben Urcavich, worked with UL's Ruben Sandoval starting at FCIA's Education and Committee Action Conference on this new initiative. There already have been several certificates issued. 🔥



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SKU: 280297 20 Oz Sausage



3M Fire Barrier Sealant IC 15WB+ economical, general-purpose latex based intumescent firestop sealant. Up to 3hrs firestop tested, applied with conventional caulking equipment, halogen-free, sag-resistant.

SKU: 280298 10.1 Oz Cartridge
SKU: 280299 20 Oz Sausage
SKU: 280300 4.5G Pail



3M Fire Barrier Sealant FD 150+. Ready-to-use, gun-grade latex-based elastomeric sealant that cures upon exposure to the atmosphere to form a monolithic flexible firestop seal up to 4hrs. Available in blue, red, or limestone.

SKU: 280288 20 Oz Limestone
SKU: 280289 4.5 Gallon Pail Limestone
SKU: 280290 4.5 Gallon Pail Red
SKU: 280291 10 Oz Red Cart
SKU: 280292 20 Oz Red Cart

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FCIA INDUSTRY CALENDAR

JANUARY

January 7-10

Building Innovation
Conference & Expo
Washington, DC
www.NIBS.org

January 20-22

Intersec
Dubai, UAE
www.intersecexpo.com

January 22-25

World of Concrete
Las Vegas, NV
www.worldofconcrete.com

FEBRUARY

w/o February 25 (tentative)

FCIA FSB Firestop & Effective
Compartmentation 'DIIM'
Symposium and FM/UL Testing
Doha, Qatar
www.fcia.org/articles/events.htm

MARCH

w/o March 4 (tentative)

FCIA IBC Firestop & Effective
Compartmentation 'DIIM'
Symposium and FM/UL Testing
Dubai, UAE
www.fcia.org/articles/events.htm

March 17-20

ASHE Planning Design &
Construction Summit and Exhibition
Phoenix, AZ
www.ASHE.org

March 18-22

NFCA Annual Conference &
CAP Training
Orlando, FL
www.nfca-online.org/events/index.asp

APRIL

April 1-4

Association of General Contractors
Denver, CO
www.AGC.org

April 8-10

International Facility Managers
Association (IFMA) Facility Fusion US
Atlanta, GA
www.facilityfusion.ifma.org

April 22-26

AWCI Annual Convention
& INTEX Expo
National Harbor, MD
www.AWCI.org

April 23-26

FCIA Education and Committee
Action Conference
Chicago, IL
fcia.org/articles/events.htm

April 29-May 8

ICC Committee Action Hearings
Albuquerque, NM
www.iccsafe.org

MAY

May 22-26

Construction Specifications
Canada Conference
Regina, SK
www.CSC-DCC.ca

JUNE

June 6-8

AIA Conference on Architecture
Las Vegas, NV
www.conferenceonarchitecture.com

June 7-20

NFPA Conference & Expo
San Antonio, TX
www.NFPA.org

June 22-25

BOMA International Conference &
Expo
Salt Lake City, UT
www.BOMA.org

JULY

July 14-17

ASHE Annual Conference
and Technical Exhibition
Baltimore, MD
www.ASHE.org

July 15-17

APPA Conference and Exhibition
Denver, CO
www.appa.org

SEPTEMBER

September 18-20 (tentative)

FCIA Canadian Symposium
TBD location
www.fcia.org

September 22-24

Canadian Healthcare Engineering
Society (CHES) Annual Conference
Saskatoon, SK
www.ches.org

OCTOBER

October 9-11

CSI CONSTRUCT
National Harbor, MD
www.constructshow.com

October 16-18

International Facility Managers
Association (IFMA) World Workplace
Phoenix, AZ
www.worldworkplace.ifma.org

October 20-30

ICC Annual Conference
and Public Comment Hearings
Clark County, NV
www.ICCSAFE.org

October 26-30

RAIC 2018 Festival of Architecture
Toronto, ON
www.raic.org

NOVEMBER

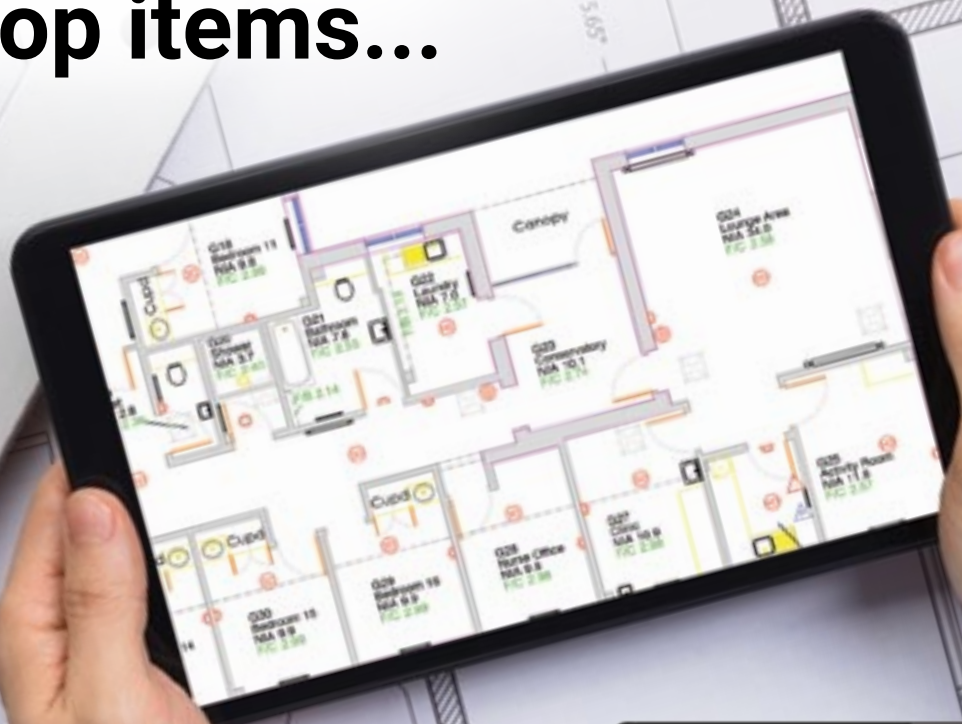
November 5-8

FCIA Firestop Industry Conference
& Trade Show
Miami, FL
www.fcia.org

November 6-8

DHI's conNextions
Cleveland, OH
www.DHI.org

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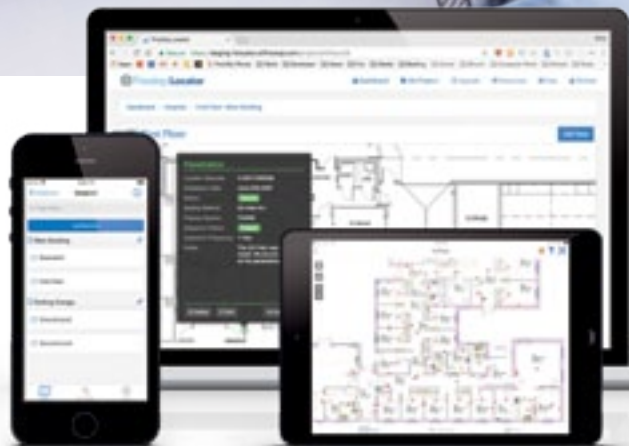


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