

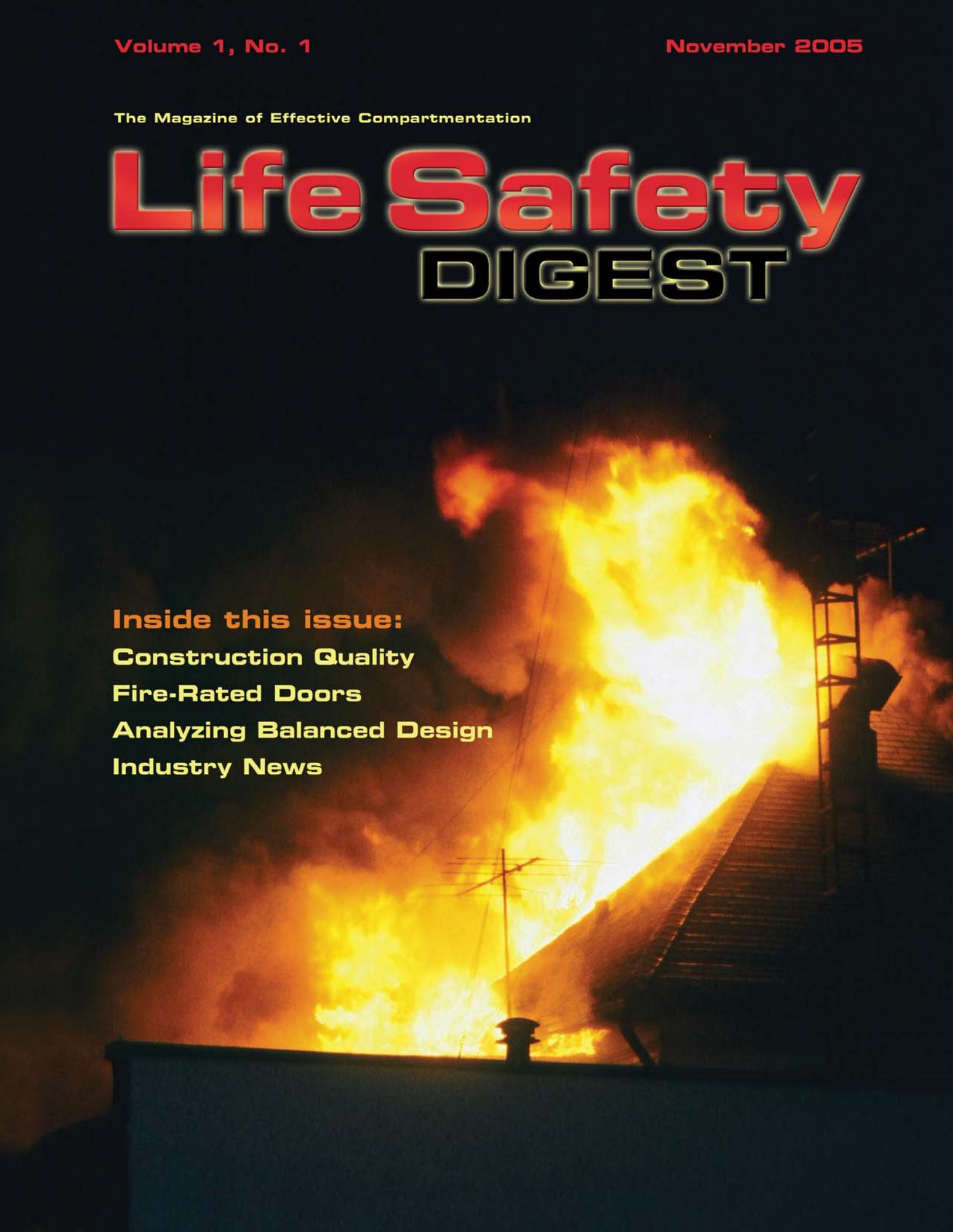
Volume 1, No. 1

November 2005

The Magazine of Effective Compartmentation

# Life Safety DIGEST

**Inside this issue:**  
**Construction Quality**  
**Fire-Rated Doors**  
**Analyzing Balanced Design**  
**Industry News**



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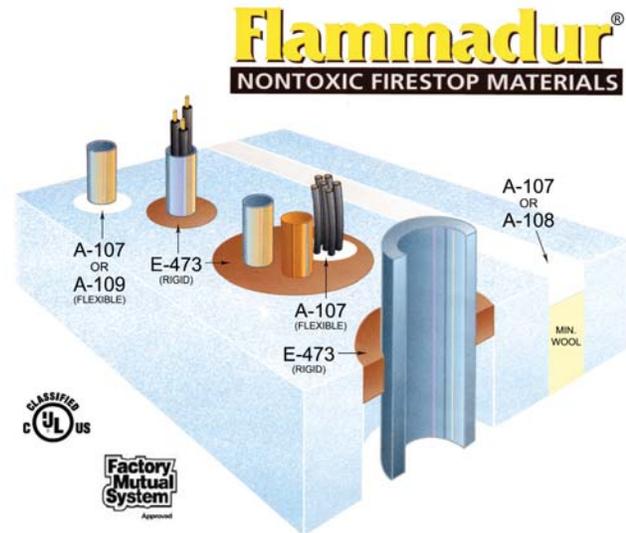
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## Contents

**Editors' Message** **5**

**Construction Quality  
Important for Compartmentation** **6**  
*by Aedan Gleeson & Bill McHugh, CSI*

**Annual Inspection of  
Fire-Rated Door Openings** **10**  
*by Keith Pardoe, DAHC/CDC*

**Learning from the "Bible"  
of Fire-Rated Door Standards** **14**  
*by Keith Pardoe, DAHC/CDC*

**A Methodology to Analyze  
Concept of Balanced Design** **18**  
*by William E. Koffel, P.E., FSFPE*

**Industry News** **23**

**Code Corner**

**Testing News**

**Door and Hardware Institute  
Addresses Compartmentation**



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## Editors' Message

The Firestop Contractors International Association (FCIA) is pleased to present this first edition of Life Safety Digest, the magazine of effective compartmentation.

Compartmentation is the centuries' old fire protection system for structures. It involves the division of buildings into sections to reduce the chance that fire can march into other building areas compounding disaster.

Compartmentation includes fire resistance-rated walls and floors, plus features that protect openings in these assemblies - rolling and swinging fire doors and hardware, fire and smoke dampers in air ducts, fire rated glazing and firestopping around piping, cabling, expansion joints, heads of walls and perimeter joints. Firestopping around these penetrations and in joints is an important part of effective compartmentation protecting first responders who must fight fires, and occupants trying to isolate themselves from threats in protected areas or trying to flee. Fire dampers, fire glass, swinging and rolling fire doors & hardware, firestopping, plus the fire resistance rated wall and floor assembly make compartmentation work.

FCIA and Life Safety Digest believe in The National Fire Protection Association's Total Fire Protection concept. Compartmentation, detection, alarm systems, sprinklers and education are key elements for optimum fire and life safety performance in buildings.

Life Safety Digest's purpose is to meet the demands of Total Fire Protection through education about compartmentation, while promoting all types of fire protection. By limiting fire to the room of origin with compartmentation, we believe life safety is improved. Simply put, *compartmentation saves lives.*

We invite you to read the magazine. Use it as a reference tool. Pass it on to others who need to know about compartmentation.

Most important, join the associations that support effective compartmentation and the Firestop

Contractors International Association. As individuals we promote our companies. As associations and a group, we support the concept of effective compartmentation because it saves lives.

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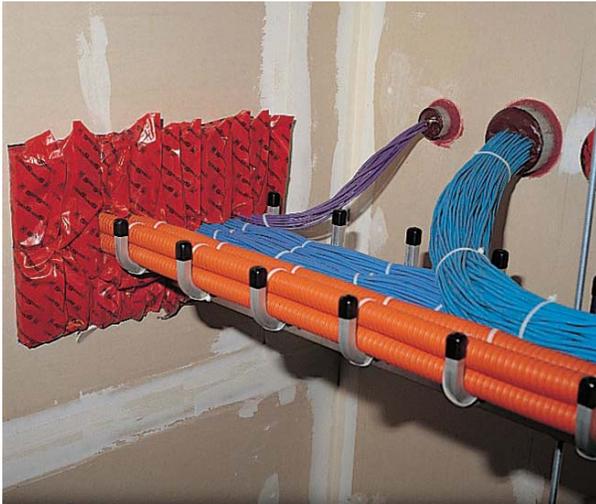
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**By limiting fire to the room of origin with compartmentation, we believe life safety is improved. Simply put, compartmentation saves lives.**

## Construction Quality Important for Compartmentation



Firestopping around phone and fiber optic cables.  
(Photo courtesy of Specified Technologies, Inc.)



ASTM E 2174 and ASTM E 2393 inspections require an independent party for objectivity.  
(Photo courtesy of Superl, Inc.)

by Aedan Gleeson & Bill McHugh, CSI

**C**ompartimentation techniques involve the design, specification, installation and maintenance of fire-resistance rated walls and floors sealed with firestop systems, rolling and swinging fire doors and hardware, fire and smoke

dampers and fire glass. The goal of compartmentation is to contain flames to the room of origin, limiting vertical and horizontal fire spread and resulting high-heat conditions - effective compartmentation helps create safe havens in buildings for those evacuating the facility or remaining in place for rescue, along with providing protection for inventory and business operations.

Fire-resistance rated construction creates these safe havens throughout buildings - in corridors, stairwells, elevator shafts, sleeping and patient rooms, apartment unit separations, mechanical rooms, service storage areas for inventory and hazardous chemicals, prison cells, operating and recovery rooms, intensive care units and other areas of safety designated by code and good business sense.

Along with detection/alarm systems, communications, sprinklers

and education, compartmentation is part of the "total fire protection" philosophy espoused by the National Fire Protection Association (NFPA) in the United States and throughout the world. The result is when properly designed, installed, inspected and maintained, these fire and life safety systems provide protection to keep occupants safe in buildings.

This article addresses compartmentation through discussing one aspect of compartmentation, the firestopping of penetrations and joints at perimeter, head of wall and construction joints (such as building floor or wall expansion or seismic joints, wall-to-wall joints and bottom-of-wall joints). In basic terms, firestopping involves returning the wall and/or floor to its original fire and smoke rating before a penetration (for piping, tubing, electrical wires or cables) or joint/gap was made during construction using tested and listed systems published in directories from Underwriters Laboratories, (US and Canada), FM Approvals, Omega Point/Intertek Testing, and other laboratories.

While construction quality has been under close scrutiny for several years, the industry continues to allow "construction tolerances" due to variability in field conditions. The debate has been a topic of heated discussion in the industry the past few years, with many comparisons made between the construction and manufacturing environments. When the state of Georgia writes an editorial in *Engineering News-Record* stating that "Construction Quality Stinks," our industry should take notice and focus

on improving. The Construction Specifications Institute's annual convention in 2004 featured a panel on construction quality and the issues surrounding the concept as well.

Manufacturers of products have instituted quality programs based on the ISO 9000 Protocol, where quality processes in the manufacturing environment are audited by a third-party firm. FCIA, the Firestop Contractors International Association, developed with FM Approvals, FM 4991, "Standard for the Approval of Firestop Contractors." This is the first step towards an ISO 9000 like-program for the construction subcontracting industry.

FM Approvals is a division of Factory Mutual Global, a worldwide insurer of industrial and other buildings. FM Approvals is the testing and loss control engineering group of FM Global, writing standards and approving products and firms for use on FM Insured and other buildings. The standards have been set to increase quality and reduce loss of life and property.

Firestopping, unlike other construction disciplines, is a zero-tolerance application that does not allow variations to be made in the field, unless they fall within the specific ranges set forth in the tested and listed systems referenced above.

Firestopping is currently installed via the following methods:

- Specialty firestop contractor - a single source firestop contractor can have contract and inspection/administration advantages, as there is only one submittal, one contractor's work to find and one responsible party.
- Combination specialist or trades perform own work - trade contractors perform their own firestopping - as

long as the firm understands the zero-tolerance requirements, plus a specialty firestop contractor may perform part of the work on the same project.

- The "he or she who pokes holes, fills them" method - each trade who made a penetration through a fire-rated assembly is responsible for choosing systems, products and

**Manufacturers of products have instituted quality programs based on the ISO 9000 Protocol, where quality processes are audited by a third-party firm. FM 4991 is the ISO 9000 for Specialty Firestop Contractors.**

installation individually. While a large percentage of projects are managed this way, it may not be the most efficient technique - inspection and administration costs can increase dramatically due to lack of knowledge of tested systems quality protocol.

To provide a firestopping installation quality protocol, FCIA worked with several groups, volunteers and industry to create three standards in an attempt to bring the International Organization for Standardization (ISO) 9000, Quality management systems - *Fundamentals and Vocabulary*, manufacturing quality process to the construction subcontracting industry. The international standards developed were FM Approvals' FM 4991, *Standard for the Approval of Firestopping Contractors*, and ASTM International E 2174 *Standard Practice for On-Site Inspection of Installed Fire-Stops* and ASTM E 2393, *Standard Practice of On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers*.

FM 4991 measurably qualifies a specialty firestop contractors' quality

process through an independent audit verification program. The firestop contracting firm controls training, education, installation, submittal and the complete firestopping process while retaining responsibility for initial and continued FM 4991 approval. The standard requires a firm to have a designated responsible

individual (DRI) who has successfully passed an industry test based on the FCIA's *Firestop Industry Manual of Practice*, rigorous tested systems selection from Underwriters Laboratories Inc., Underwriter's Laboratories of Canada, Omega Point/Intertek Testing, FM and other directories and the FM 4991 standard. This designation quantifiably measures an individual's knowledge of industry quality procedures. The FM 4991 DRI manages the firestop firms' policies and procedures to ensure processes result in installed firestop systems meeting the tested and listed system zero-tolerance requirements.

During the FM 4991 contractor firm approval process, an auditor visits the firm, inspecting the client's quality manual and audits installed firestop systems in the field. FM Approvals performs annual follow-up audits with the same process. While modeled after manufacturing firms' ISO 9000 process, this program is customized for the construction industry and is affordable for contracting firms - the cost is about \$4,000US to

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\$7,500US, for the initial audit and approximately \$1,500US for the annual follow-ups.

Effective manufacturing quality programs have a procedure for production sampling to ensure that the quality process works. Independent firestopping inspections to ASTM E 2174 and ASTM E 2393 are the controls sampling the production process for firestop installation. These inspection standards incorporate the following important points as part of the inspection protocol:

- Independence: The inspection firm must not be related to the installing firm or be its competitor, distributor or supplier.

- Pre-project meeting: A pre-job meeting for those installing firestopping to review the protocol and discover potential difficulties before project commencement.

- Mock-ups: These are constructed to give a benchmark to install to and inspect against.

**Properly designed, installed, inspected and maintained, firestopping and effective compartmentation are reliable at containing fire to the room of origin.**

- Sampling: The protocol calls for either ongoing inspection of 10 percent of each type of each firestop assembly or 2 percent destructive testing; both types require one of each type of firestop be reviewed - should variances occur at a rate greater than the 10 percent allowed, the inspector is to stop work, notify the contractor and return at a later date after the work has been corrected.

- Reports: The inspection firms describe the variances and successes

based on forms in ASTM E 2174 and ASTM E 2393 - in addition to the as-built firestop system detailed drawings (from either testing laboratories, engineering judgment or equivalent fire-rated assemblies), this becomes the completed documentation for the life-cycle, including maintenance and alterations.

ASTM E 2174 and ASTM E 2393 can be used with or without a specialty firestop contractor or an FM 4991-approved firestop contractor on projects that use the "he or she who pokes the holes, fills them" method of contracting firestop systems installation. However, the inspection can cost much more when the multiple-trade method is used, as it is difficult to manage anywhere from two to 40 subcontractor firms installing firestopping in compartmentation with their service penetrations such as pipes, ducts and cables, head of wall and construction joints or perimeter fire protection systems.

Combined, FM 4991 and ASTM E 2174 & ASTM E 2393, plus maintenance by professional firestopping contractors complete the circle of quality. These give the firestopping community the opportunity to say, "Properly designed, installed, inspected and maintained, firestopping and effective compartmentation are reliable at containing fire to the room of origin."

Look for an in-depth report about quality process programs for contrac-

tors and maintenance from firestopping and other compartmentation industries in the next issue. 

*Aedan Gleeson, President, Gleeson Powers, Inc., FCIA Director & Accreditation Chair, is an FM 4991 Approved Specialty Firestop Contractor in Franklin, MA.*

*Bill McHugh is the FCIA Executive Director.*



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## Annual Inspection of Fire-Rated Door Openings: Why is it necessary?



Fire resistance rated doors and hardware provide continuity to compartmentation. (Photo courtesy of Door & Hardware Institute)

by Keith Pardoe, DAHC/CDC

**T**he important role that fire-resistance rated swinging doors and hardware play in protecting occupants in all types of buildings is critical to the concept of compartmentation in all occupancies. Schools, office buildings, shopping malls, theaters, sports arenas, apartment buildings, industrial shops, strip malls, churches, hospitals and many others all need to protect occupants from fire and smoke during egress or while remaining in place.

The Door & Hardware Institute has developed programs to raise the level of knowledge in the industry. The Architectural Hardware Consultants (AHCs) or Certified Door Consultants (CDCs) have spent a great deal of time learning how to interpret the myriad of code requirements that affect commercial door openings. Balancing requirements for life-safety and accessibility with requirements for fire-rated openings can be a tedious process for those not as “into our trade” as we are. We enjoy looking at doors and hardware! However, periodic inspection of installed fire-rated door openings is needed to protect openings, and people.

When you think about it, doors, frames and hardware have provided many years of functional service and

quietly stood at the ready to perform their ultimate task should the need arise. All the while, these door openings are subjected to normal wear and tear from typical usage. Many openings are subjected to abuse, whether from excessive wear in high-frequency occupancies, from vandalism, from poor maintenance or from environmental conditions that accelerate the erosion of the materials used to form the doors, frames and hardware.

Fortunately, the majority of fire-rated door openings will never be exposed to fire, but need to be ready in the event a fire or other life-threatening emergency occurs and the occupants need to be protected.

Fire-rated door openings face threats on several fronts. As industry experts, we need to pay strict attention to the specification, detailing, scheduling, ordering, modification, shipping and installation of all the components used on fire-rated openings.

Secondly, Fire Door and Hardware is a no-tolerance application, as components of the installation must be installed to the tested and listed system

Maintenance is key to success of any door management program. All moving parts, hinges, pivots, door closers, latchbolts and so on are susceptible to wear and tear and will eventually wear out over the life of the installation. Hollow metal doors and frames may rust-out and begin to fail. Wood fire-rated doors may become damaged by moving equipment or furniture through the openings and may begin to delaminate. Changes in the occupancy use of a building may also contribute to



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the poor maintenance of fire-rated openings. Building maintenance personnel may not understand the complexity of fire rated doors and hardware, due to lack of education in the discipline.

Occupants, building owners, property management and maintenance personnel can be the greatest threat of all to fire-rated open-

When the building owner hires a security contractor or monitoring company to upgrade the building's security, an uneducated contractor may inadvertently void the labeling and even life-safety requirements of the fire-rated openings.

Fire doors and hardware, like any other technical item like detection systems, alarms and sprinklers, must be

## Recent concerns for heightened security and access control for many buildings have created the newest threat to fire-rated doors and hardware.

ings...but they are also part of the solution to effective fire resistance rated compartmentation assemblies. How many times have you noticed a fire-rated opening that has been compromised in one way or another in deference to the convenience of the occupants (e.g., blocking open of fire-rated doors)? Why is it that the last time fire protection education took place is in elementary or high school? A short luncheon on the usage, care and maintenance of fire-rated openings by the users, can have the most profound effect on fire and life safety, more than any other group. If we know that a fire resistance rated door assembly is going to save our life, we might just demand that doors not be propped open, nor badly maintained.

Another group that needs to be involved in fire door effectiveness is the security industry. Recent concerns for heightened security and access control for many buildings have created the newest threat to fire-rated doors and hardware.

inspected periodically to assure proper operation when called upon to protect building occupants, property and business operations...whether it is in a home office, office building, hospital school or industrial facility. Periodic, systematic, inspection programs by educated individuals means protection is optimized and ready to perform. 🔥

*Keith Pardoe, DAHC/CDC, is Director of Education and Technical Services for the Door & Hardware Institute.*

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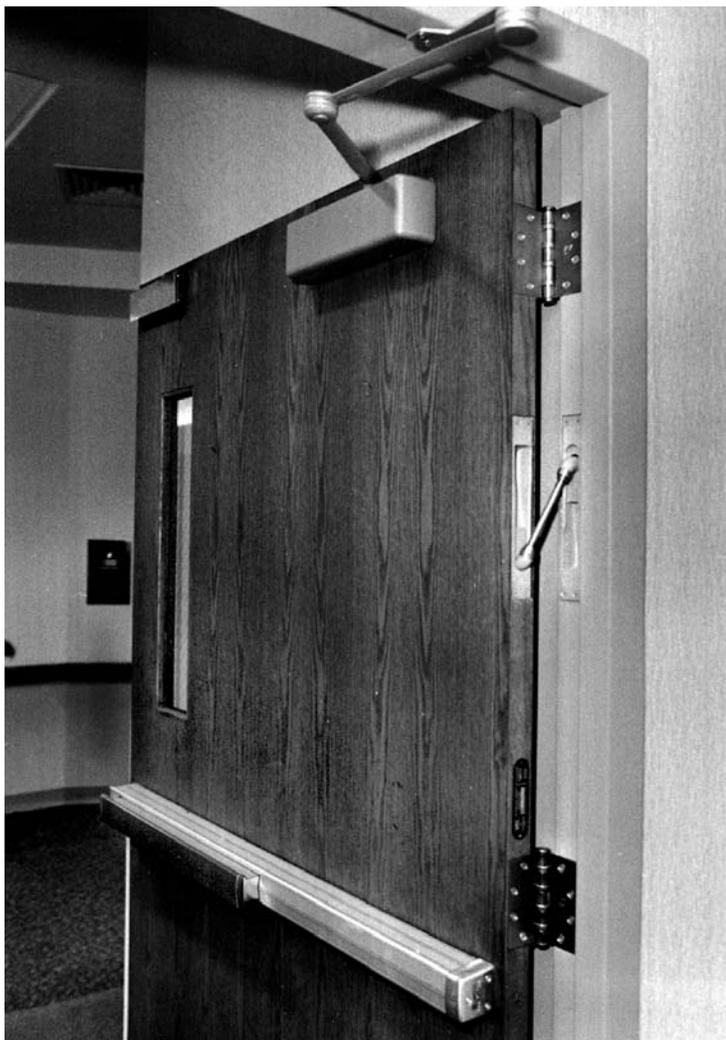
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## Learning from the 'Bible' of Fire-Rated Door Standards

by Keith Pardoe, DAHC/CDC



Fire doors are necessary for egress and compartmentation.  
(Photo courtesy of Door & Hardware Institute)

The National Fire Protection Agency's standard NFPA 80, Standard for Fire Doors and Fire Windows, is the door and hardware industry *bible* for fire-rated door openings.

Chapter 15, Care and Maintenance, has required the hardware on fire-rated openings to be inspected *frequently* and repaired *immediately* if any defects are discovered. Unfortunately, *frequently* is one of those terms that sounds good, but is impossible to quantify.

For many years, the leadership of the Door & Hardware Institute has been working toward the day when all fire-rated door openings would be periodically inspected to ensure they are ready to perform their all-important task when the need arises. We intrinsically knew what the issues were and that these situations existed, but we needed to build a case to prove to others just how potentially serious a problem this really was.

Language has been added to the proposed next edition of NFPA 80, which specifically outlines the criteria for annual inspection of ALL fire-rated door openings.

Perhaps the most difficult task was identifying the characteristics that are common to ALL fire-rated door openings. The NFPA national technical committee on Fire Doors and Windows (FDW-AAA) used the requirements of NFPA 80 to create the proposed language requiring the annual inspection of fire-rated openings. The following is a list of the cri-



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teria for the inspection of fire-rated openings for swinging doors with builders' hardware:

- No open holes or breaks exist in surfaces of either the door or frame.
- Glazing, vision light frames and glazing beads are intact and securely attached, if so equipped.
- The door, frame, hinges, hardware and non-combustible threshold, are secured, aligned and in proper working order with no visible signs of damage.
- No parts are missing or broken.
- Door clearances at the door edge to the frame, on the pull side, do not exceed clearances listed in 4.8.4 and 6.3.1.
- The self-closing device is operating properly by verifying that the active door will completely close when operated from the full open position.
- If a coordinator is installed, verify the inactive leaf closes before the active leaf.
- Latching hardware operates properly and secures the door when it is in the closed position.
- Auxiliary hardware items, which interfere or prohibit proper operation, are not installed on door or frame.
- No field modifications to the door assembly have been performed that void the label.
- Gasketing and edge seals, where required shall be inspected to verify their presence and integrity.

The proposed language requires inspections to be performed "by individuals with knowledge and understanding of the operating components of the type being subjected to testing." And, "before the operational testing of the fire-rated openings, the openings are required to be visually inspected for any damage or missing

parts that can create a hazard during testing or affect proper operation or resetting."

Who is going to be performing these inspections... and, how is anyone

### **In addition to the written log, a requirement under the new NFPA 80, auxiliary labels may be used that would bear the company name of the inspector and the date of the inspection.**

going to prove these inspections took place? Good questions, you have been paying attention. The total number of installed fire-rated door openings is nearly huge and growing exponentially each year. The proposed language in NFPA 80 requires building owners and managers to maintain a written record of these inspections, which must be produced when requested by the local Authority Having Jurisdiction (AHJ). The AHJ may also perform a few checks of the doors to understand the effectiveness of the inspection program.

Building owners and managers and AHJs will need training in door and hardware inspections. Most important, building occupants and stakeholders in safety need education about what a problem looks like, and a mechanism to report it to building management for inspection and repair.

Building owners and facility management personnel of large buildings, campuses and institutions may initially view this new inspection requirement as a huge burden, which would create a never-ending cycle of inspections. While this is a valid concern, and understandably so, the proposed language in NFPA 80 addresses these concerns and has created an alternate inspection cycle that is performance based.

The performance-based system, which is subject to the approval of the AHJ, allows the inspection cycle to be extended once the owner has demonstrated (and documented)

that the majority of the fire-rated door openings are well maintained and have very few instances of problems. Conversely, a building operating under this performance-based system could have its inspection cycle shortened to less than annually if they were found to have high instances of problems until such time they could demonstrate the deficiencies have been corrected.

In practice, regardless of which inspection cycle the building is operating under, AHJs will request the inspection logs for the fire-rated door openings. They will scan these logs to see how many openings were inspected, their locations in the building and, if they had deficiencies, when and how these deficiencies were corrected. In essence, the inspection logs will alert the fire marshals to potential problems and help them assess the overall safety of the buildings.

In addition to the written log, a requirement under the new NFPA 80, auxiliary labels may be used that would bear the company name of the inspector and the date of the inspection. These labels would be placed adjacent to the permanent fire label for the fire marshals' examination when they spot-check individual openings.

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tors, overhead rolling fire doors, high-energy automatic doors and fire extinguishers have been commonplace for years. These inspectors help to alleviate the burden on the AHJs to perform inspections for these systems and products. On one hand, one wonders why fire-rated door openings, since they provide a first line of defense and physical protection from fire and smoke, were never required to have a formal inspection program. On the other hand, the successful track record of fire-rated door openings is a testament to their ability to quietly perform their task, year after year.

When will all of this come to pass? Tentatively, the FDW-AAA committee

will complete its work later this fall. After that, the proposed new edition will be circulated for public review and comment sometime in spring 2006. Supposing it survives the public review process and formal NFPA hearings next year, the proposed new edition will be released late in 2006. Once the new NFPA 80 is printed, it will take some time until it is adopted into the next edition of the ICC's International Building Code (IBC) and NFPA's The Life Safety Code (NFPA 101) and the Building Construction and Safety Code (NFPA 5000).

What's next? Who knows? Maybe we will soon see warning labels or other instructional labels conspicuous-

ly applied to all fire-rated openings - much like the ubiquitous airbag warning labels in all of late-model cars.

Now if you are asked, "Why is annual inspection of fire-rated door openings necessary?" You will be able to answer with just one word: safety. Safety is why annual inspection of fire-rated door openings is necessary. And, we all may someday be in a position where we really need that safety to protect our lives. 

*Keith Pardoe, DAHC/CDC, is Director of Education and Technical Services for the Door & Hardware Institute.*

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## A Methodology to Analyze Concept of Balanced Design



Compartmentation is completed when holes for conduits are sealed effectively to maintain the fire resistance rating of the wall. (Photos courtesy of Specialty Firestop Systems, Inc.)



Compartmentation and structural protection make up part of balanced design with detection and alarms, sprinklers and occupant education. (Photos courtesy of Specialty Firestop Systems Inc.)

by William E. Koffel,  
P.E., FSFPE

**S**ince its first publication, the International Building Code and NFPA 5000 have been received by industry and code officials/fire marshals in different ways. There are some who truly believe that the document is the best national code possible and others who feel differently.

The building-code area that has been debated over several code change cycles since is the issue of which technology, or combination thereof, is used for fire and life safety protection, compartmentation, detection and alarms, suppression systems and occupant education. Just what balance between the four fire protection strategies is acceptable for our society?

The issue of what constitutes a balanced design approach to fire protection has been the subject of ongoing discussions within the processes used to develop prescriptive code requirements. Unfortunately, the issue has not been easy to debate. The difficulty is often compounded by the fact that the concept of balanced design has not been well defined and there is no consensus on how to evaluate when “balance” has been achieved. The purpose of this article is to propose a methodology that may be used when considering the concept of balanced design.

### Definition

It is difficult to discuss a concept when all parties involved may not be using the same definition. For exam-



ple, one of the items for discussion that has been proposed to the ICC Code Technology Committee is the definition of balanced design. Balance can be defined as a harmonious arrangement or relation of parts or elements within a whole. Fire protection engineers understand that a relationship exists between the various

design approach to fire protection rests solely on the concept of a harmonious arrangement. For some, a harmonious arrangement involves including all possible fire protection features and systems. Obviously this can lead to unnecessary redundancies in protection.

Alternatively, the approach to

Compartmentation is installed efficiently during the construction process. (Photo courtesy of Specialty Firestop Systems, Inc.)

**Therefore, the difficulty in achieving a consensus regarding a balanced design approach to fire protection rests solely on the concept of a harmonious arrangement.**

fire protection design features and that they impact the overall level of safety provided within a building. Therefore, the difficulty in achieving a consensus regarding a balanced

defining balanced design should involve an arrangement or relation of the various fire protection features and systems to achieve an acceptable level of safety. The concept of consid-

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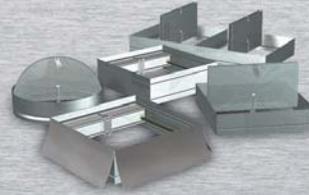
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ering multiple safeguards is contained in NFPA 101®, *Life Safety Code*®<sup>1</sup> as follows:

*4.5.1 Multiple Safeguards. The design of every building or structure intended for human occupancy shall be such that reliance for safety to life does not depend solely on any single safeguard. An additional safeguard(s) shall be provided for life safety in case any single safeguard is ineffective due to inappropriate human actions or system failure.*

With this concept as a basis, various methodologies can be explored to evaluate whether a design or a code results in an arrangement or relation of the various fire protection features and systems to achieve an acceptable level of safety.

### EXAMPLE SCENARIO Balanced Fire Protection Design

An example of the methodology proposed would involve the failure of an automatic sprinkler system during a fire incident in an office building. Based upon typical prescriptive code requirements in the USA, corridor walls need not have a fire-resistance rating, travel distance may be increased, minimum performance of interior finish materials may be decreased, structural fire-resistance ratings may be decreased, egress capacity and remoteness may be decreased, and a manual fire alarm system need not be provided. The analysis of this

scenario might indicate that evacuation time would be longer and that since the fire will not be controlled by the sprinkler system, the production of heat and products of combustion will be greater. The purpose of the analysis would be to determine that the outcome of the event is still acceptable given consideration to the probability that the automatic sprinkler system might fail. This approach can be used to evaluate the reliability of any specific trial design as well as the adequacy of specific code provisions or proposed changes to prescriptive codes.

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### Using Design Fire Scenarios

Absent sufficient data to quantify the reliability of various fire protection features and systems, an alternative approach would be to perform a “what-if” analysis. With the “what-if” analysis, various failure scenarios can be used to determine the consequence of the failure.<sup>2</sup> One would not expect the level of protection to be the same as if the protection feature performed as expected. The purpose of this analysis would be to ensure that the outcome resulting from the failure would not be unacceptable.

This concept is supported in the various performance codes in the USA. The ICC Performance Code for Buildings and Facilities™ contains a matrix indicating the maximum level of damage to be tolerated as a function of the performance group and the magnitude of the design event.<sup>3</sup> One would expect the magnitude of the design event to be greater when assuming a failure event and furthermore one would expect the probability of the event to be less than the probability of successful per-

formance of the fire protection feature. As such, Table 303.3 permits a greater level of tolerable damage.

Likewise, the design fire scenarios that involve failure events contained in NFPA 5000™ will most likely not result in the same level of safety as one would expect to be achieved in the other design fire scenarios and as defined by the stakeholders goals and objectives. The associated Annex note indicates that acceptable performance should not be defined as meeting all of the stated fire safety goals and objectives.<sup>4</sup> When determining if the resulting performance is acceptable, the Annex note further states that consideration can be given to the level of safety provided and the probability of the failure event occurring.

It should also be noted that a design fire scenario involving a failure need not be analyzed when the reliability of the fire protection feature or system is acceptable and when the level of safety provided assuming the fire protection feature or system is not provided are acceptable. In other words, the only time the failure of the fire protection feature or system need not be considered is if the other fire scenarios considered are evaluated assuming the fire protection system is not present and the outcome is still consistent with the stated fire safety goals and objectives.

### Summary

A true risk analysis would involve the use of accurate probability data including the reliability of the various fire protection features and systems. Although attempts have been made to quantify the reliability of various fire protection features and systems, validated reliability data is not available for most fire protection features and systems. Until the time when valid reliability data becomes available for all fire protection features and systems, the use of “what-if” design fire scenarios may be the best method available to deal with the concept of a balanced design approach to fire protection. 🔥

*William E. Koffel is President, Koffel Associates, Inc., a fire protection engineering firm in Ellicott City, MD. Mr. Koffel is a past-president of the Society of Fire Protection Engineers.*

<sup>1</sup> NFPA 101®, *Life Safety Code*®, Quincy, MA: National Fire Protection Association, 2003.

<sup>2</sup> For additional information regarding design fire scenarios the reader is referred to the *SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings*, Quincy, MA: National Fire Protection Association, 2000.

<sup>3</sup> Table 303.3, *ICC Performance Code for Buildings and Facilities*™, Country Club Hills, IL: International Code Council, 2003.

<sup>4</sup> Section A.5.5.2.8, NFPA 5000™, *Building Construction and Safety Code*™, Quincy, MA: National Fire Protection Association, 2003.

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## Industry News

### Code Corner

#### ICC Code Technology Committee Meetings

The International Code Council Code Technology Committee (CTC) Hearings in Detroit Sept. 22 and 23, 2005, were well attended, with more than 100 people at this important meeting. FCIA, along with the Door & Hardware Institute (DHI), & Alliance for Fire and Smoke Containment and Control, (AFSCC) and several other associations and interested parties participated. The CTC Committee debated the method that will be used to evaluate effective compartmentation and structural protection (passive fire protection) and active suppression (sprinkler) trade offs in codes to determine a "balance." There will be several more hearings in the next year to discuss the issue, with the next to be held Dec. 1 and 2, 2005.

The Committee Chair is Paul Heilstedt, former President of BOCA, with co-chair, Carl Baldasarra, President, Schirmer Engineering. FCIA, DHI and AFSCC visited with several committee members and participants. ICC CTC Committee members list & minutes to meetings are available at the following web location: <http://www.iccsafe.org/cs/cc/ctc/roster041208.pdf>.

Koffel Associates, the FCIA's code consultant, assembled a matrix funded by the AFSCC, for the ICC CTC Committee to consider as a debating foundation for the argument of "passive vs.

active" fire protection.

Although ICC is debating the merits of active vs. passive protection, FCIA's position is that total fire protection is needed to protect first responders and building occupants. Bill Koffel, President, Koffel Associates, a fire protection engineering firm, continues to work with the industry to provide data for the debate.

Additionally, the National Institute of Standards and Technology (NIST), report author for the WTC Collapse study, has published a 2,000-plus page report stating there are lessons learned that can be applied to everyday, regular structures. According to industry observers, the WTC Reports will be a big part of the ICC board's review through the Code Technology Committee debate about compartmentation and structural protection, sprinkler systems, or both technologies in future ICC Codes. The NIST WTC reports can be found at the following website location, downloadable for free: <http://wtc.nist.gov/pubs/Recommendations.pdf>.

In many building occupancies, the 2006 IBC Code allows large building height and areas, and less compartmentation. FCIA believes TOTAL FIRE PROTECTION is needed in codes, including compartmentation, structural protection, detection and alarms, sprinklers, and education of occupants who demand safe buildings.

#### International Family of Codes Hearings

ICC's 2006 International Building Code document was debated at the ICC Final Action Hearings in Detroit, Mich., Sept. 28 - Oct. 1, 2005. Although there were several code change proposals for effective compartmentation in the past several cycles, no proposals of significance passed other than creation of a haven for safety in high rise buildings for handicapped individuals.

The compartmentation industries are participating in the International Code Council (ICC) and the National Fire Protection Association (NFPA) code development processes. The Firestop Contractors International Association (FCIA), Door & Hardware Institute, (DHI) Rolling Door Associations, Building Hardware Manufacturers Association (BHMA), International Firestop Council (IFC) and Alliance for Fire and Smoke Containment and Control (AFSCC), the fire glass and glazing industries attend code hear-



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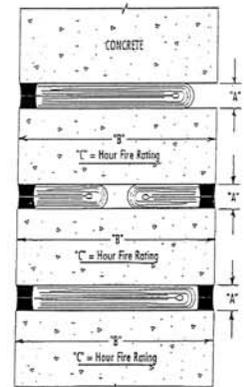


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- UL 263-92 – UL Standard for Safety Fire Tests of Building Construction and Materials
- UL 1479 – UL Standard for Safety Fire Test of Through Penetration Firestops
- UL 723 – UL Standard for Safety Test for Surface Burning Characteristics of Building Materials
- ASTM E119 – Method for Fire Tests of Building Construction and Materials
- ASTM E814 – Methods of Fire Tests of Through Penetration Fire Stops

- ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials
- ASTM E136 – Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
- ASTM E90 – Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- ASTM E1399 – Test Method of Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint System
- ASTM C719 – Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement
- ASTM C920 – Specification for Elastomeric Joint Sealants
- NFPA 251 – Fire Test of Building Construction Materials
- NFPA 255 – Burning Character of Building Materials

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## Industry News

### Code Corner

ings regularly on behalf of the compartmentation and structural protection industry. Additional participants at code hearings include the National Fire Sprinkler Association, American Forest and Paper Association, Multi-Family Housing Council, Portland Cement Institute, Masonry Alliance for Codes & Standards, Reid Middleton, Inc., Schirmer Engineering, American Institute of Architects, (AIA) and many others.

#### ICC takes notice of WTC Reports

Recently, the ICC took notice of World Trade Center (WTC) Reports. In a press release, ICC mentioned that in High Rise Construction, fire resistance ratings have increased from 2 hrs to 3 hrs, making tall buildings safer. To see ICC's Press Release, visit their website: <http://www.icc-safe.org/news/nr/2005/0406WTC.html>.

Dick Bukowski, from NIST, a leader in the report writing, will speak to FCIA's Membership at the Firestop Industry Conference, San Diego, Nov. 9, 2005.

Visit the FCIA Website at <http://www.fcia.org> for info, or call 630-690-0682.

#### NASFM speaks on Code Changes

Jim Burns, State of New York Fire Marshal/NASFM President, and Bert Polk, a former State Fire Marshal, both of the National Association of State Fire Marshals

(NASFM), gave testimony for the use of total fire protection at the ICC Committee Final Action Hearings during the 2006 Code Cycle. California State Fire Marshal Ruben Grijalva and about 15 other state fire marshals from around the U.S., also testified at the ICC Final Action Hearings for total fire protection.

NASFM's passion for fire and life safety has been second to none at the hearings. The organization's objective approach to fire protection, based on the "Partnership for Safer Buildings," includes detection and alarm systems, sprinklers, education and compartmentation...all aimed at saving lives.

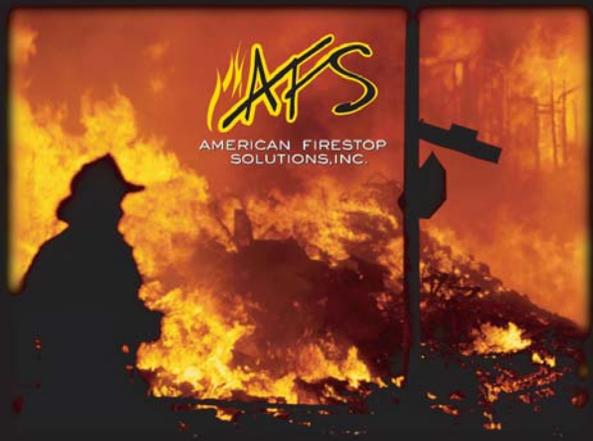
Code changes on the requirement for fire resistance rated corridors in schools and compartmentation in high-rise structures were submitted and debated at the hearings, without much success. Further debate is to take place at the Code Technology Committee Hearings. During the IBC 2003 and 2006 Code debates, it was believed that there were not enough statistics to support the need for compartmentation in a building where sprinklers were already present or being installed.

#### FCIA's Compartmentation Position

The Firestop Contractors International Association's position recognizes past history. Sprinklers in compartmented buildings produce a truly reli-

able, hand-in-glove approach for little incremental cost.

The added cost of completing walls to the floor assembly above is miniscule during the construction phase. Since many owners change occupancy types frequently in different units in buildings, the need for fire and life safety protection through fire and smoke barriers may appear after a building is constructed. It's very difficult and costly to complete compartmentation after construction, as wall framing and extension to floor/ceilings are tough to complete after the fact. Some owners request that separation walls be built floor to ceiling at original construction to allow flexibility in building occupancy uses later in the building life cycle.



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## Industry News

### Testing News

#### **New Firestopping “L & W” Ratings**

Underwriters Laboratories and Omega Point/Intertek Testing lead the way with new ratings in firestopping - “L & W.”

UL 1479, the test for through penetration firestop systems, added optional evaluation of firestopping performance to resist smoke through “L” Ratings. “L” Ratings provide air leakage data for air movement at ambient temperatures and to 400F simulating hot and cold smoke movement in buildings. Omega Point Laboratories/Intertek Testing also reportedly tests firestops for air leakage as well. Unless a firestop system has an “L” Rating, it's not suitable for use in smoke-resistance-rated construction.

UL's new “W” Rating also brings an innovation to the firestopping industry where penetration seals resist water in a tested and listed system. See UL and FCIA's website for more information about “W” Ratings. <http://fcia.org/articles/newsletter.htm>

#### **ASTM develops standards for perimeter fire protection**

John Nicholas, Omega Point Laboratories/Intertek Testing, Chair of Committee E-06, The American Society of Testing Materials (ASTM), assembled committee E06.21 that developed a testing protocol for perimeter fire protection sys-

tems, introduced in late 2004.

The test standard, ASTM E 2307, is used to measure performance of the firestopping system at the edge of a fire resistance rated floor assembly, where it abuts the curtainwall assembly, also known as the “safing slot”. The purpose of a system is to extend the floor to the curtain wall area, maintaining code requirements for continuity. There have been tests conducted to protect against fire from leapfrog to higher floors by many manufacturers. However, the language for leapfrog effect fire testing has not yet been completed. It will be important for ASTM to complete the standardization of testing for leapfrog testing for uniformity in this critical area

#### **ASTM initiates new standard for inspector qualification**

ASTM has also initiated a standard to compliment the ASTM E 2174 & ASTM E 2393 Inspection Standards. These inspection standards include limited language about the qualification of the inspector that's reviewing firestopping. Important qualifications include industry experience and acceptable to the Authority Having Jurisdiction (AHJ). Most important, the inspector is to be completely independent of the installing contractor. This means the inspector cannot be an employee of the contractor, com-

petitor, supplier, manufacturer who sells to the contractor.

However, the ASTM E 2174 & 2393 standard mainly focuses on the process of inspection, and not the qualifications that this person should possess. The new ASTM inspector qualification standard (ASTM Committee E06.21.17) aims to assure that people and firms in the inspection service business are as qualified as the firms who install Firestop Systems. Inspectors must understand the systems protocol, how to dissect a firestop system, and what to look for when inspecting. This standard hopes to provide a clear process for inspectors to become qualified for this important work. Watch ASTM's website for meetings and standard review sessions.

#### **DHI reports on NFPA 80**

The Door & Hardware Institute reports that there are new inspection requirements in the National Fire Protection Association Document, NFPA 80 for Fire Doors. See full article, in this magazine for complete details.

## Industry News

### Door and Hardware Institute Addresses Compartmentation

#### Forum for the Future

The Door and Hardware Institute's (DHI) Forum the Future, sponsored by the organization's education foundation, hosted a Compartmentation industry report at the DHI Conference and Convention in St. Louis, Sept. 15, 2005.

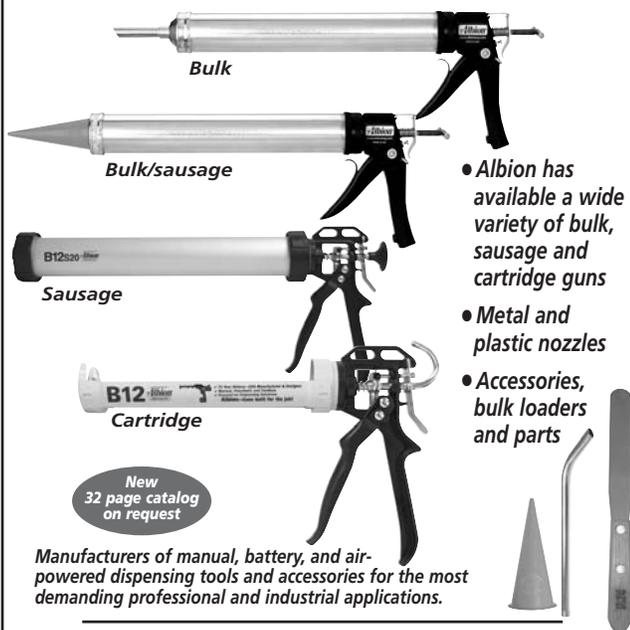
The Firestop Contractors International Association and DHI assembled a panel that included Bill McHugh, FCIA executive director; Jerry Heppes, DHI executive director; Mark Hallgren, president of DHI and Hallgren Cos.; Ralph Vasami, Building Hardware Manufacturers Association (BHMA), Dan Kaiser of Underwriters

Laboratories Inc.'s Northbrook, Ill., office; and V.J. Bella, the retired state fire marshal of Louisiana.

"The industries need to communicate first, our elevator pitch and second, the benefits of effective compartmentation to the public so we become a household word," said FCIA President Bob LeClair. Mark Hallgren, Hallgren Companies, DHI's President, said, "And doors are the front door to this compartmentation."

DHI and FCIA will be working together to complete maintenance requirements of fire resistance-rated doors, plus other openings in compartmentation-like firestopping.

#### Efficient Design and Quality Construction makes Albion the only choice for Professional Firestop Tools.



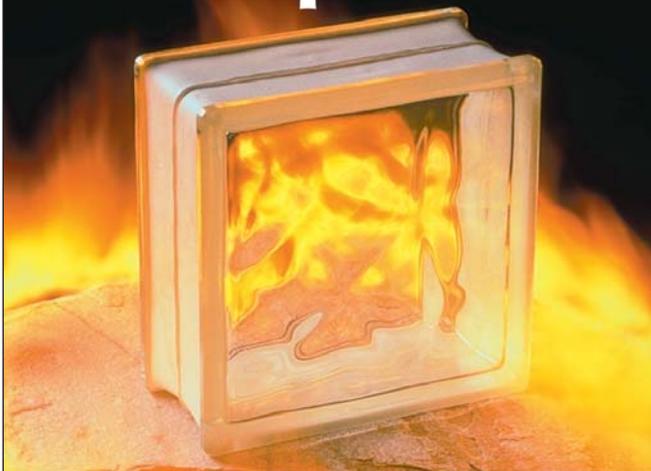
- Albion has available a wide variety of bulk, sausage and cartridge guns
- Metal and plastic nozzles
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Manufacturers of manual, battery, and air-powered dispensing tools and accessories for the most demanding professional and industrial applications.

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## Firestop Blocks



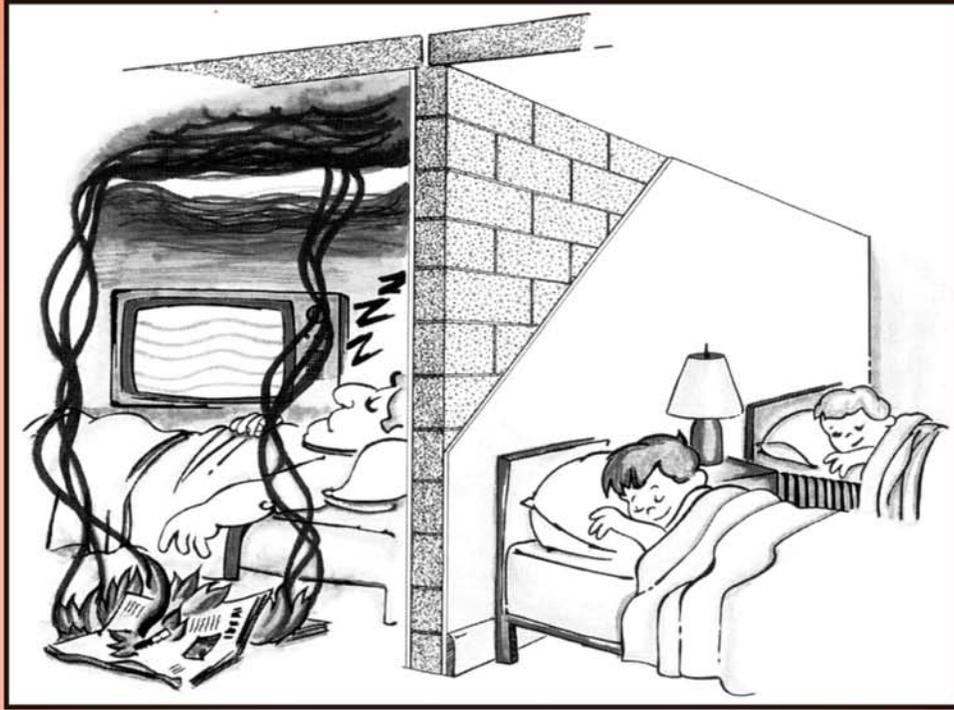
Fire-rated installations are no barrier for Weck firestop blocks. Weck offers many options for fire-rated applications.

Both thinline and standard thickness blocks are 45 minute fire-rated as protected openings in masonry or gypsumboard fire-rated walls.

Blocks may be connected to walls by channels or panel anchors. Weck 8x8 Nubio 60 block is rated with channel and panel anchor in 60 minute openings.

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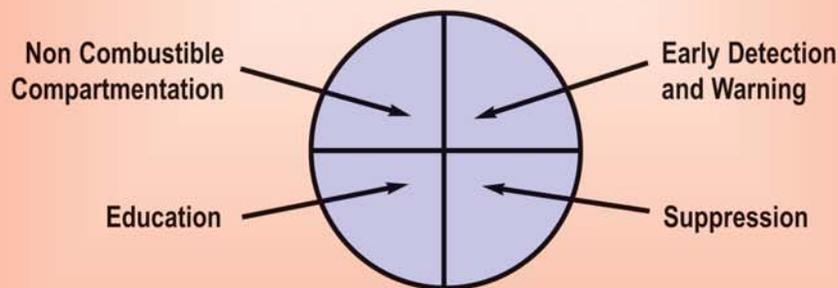


## If your neighbor fell asleep while smoking . . .

in his or her apartment or townhouse, what separates you from their actions . . . a wood frame wall with drywall, or a masonry wall?

What's the difference? Well, a masonry wall or concrete floor will never burn! This type of quality is built right into the building's structure and makes for peace of mind.

Masonry and precast planks - a system you can bet your life on.



## Balanced Design for Lifesafety

The solution is clear - adequate firesafe buildings depend upon noncombustible construction and containment of fire; early detection, warning and suppression of fires; and the education of the general public and occupants of these buildings, provided by the fire department and/or building owners, as to the hazards of fire and the procedures to follow in case of fire.



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# Concrete Masonry Blocks Fire!

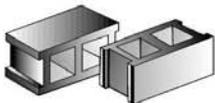
Walls are NOT created equal, even if they have the same fire rating. Concrete masonry walls can prevent fire from spreading.

That's just one of the many advantages of using concrete masonry in construction projects of all types.

More information on fire safety available from:  
[www.ncma.org](http://www.ncma.org)



## Illinois Concrete Products Association



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