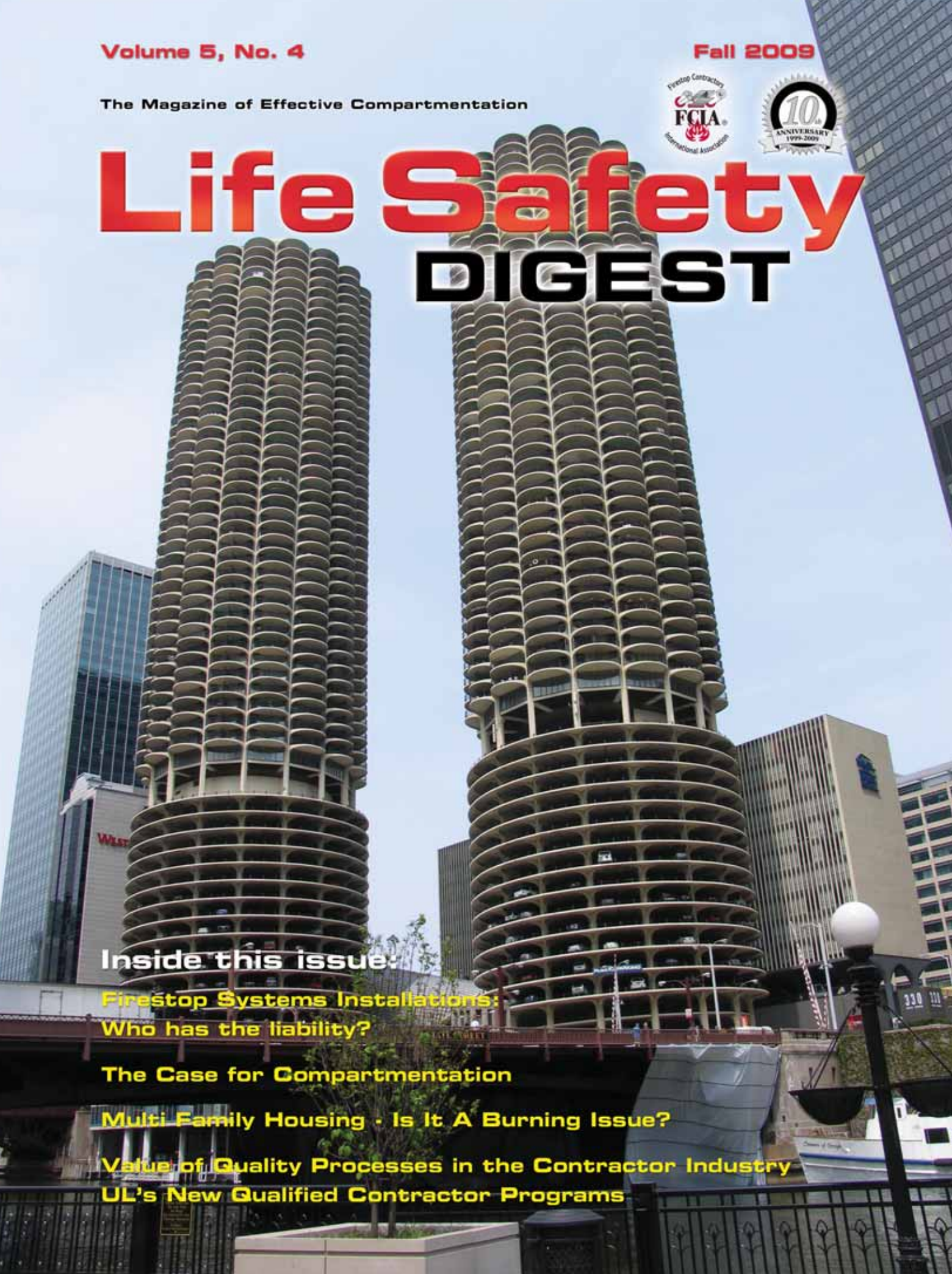
Volume 5, No. 4 Fall 2009

The Magazine of Effective Compartmentation

# Life Safety DIGEST



## Inside this issue:

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Life Safety DIGEST

**On the Cover:**
Chicago's Marina City Towers, a landmark Multi Family Housing Building, with style spanning decades.



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# Editor's Message

This Life Safety Digest issue celebrates FCIA's 10th Anniversary. Since inception, FCIA has worked to bring Firestop Systems, Effective Compartmentation and the "DIIM" Method (proper Design, Installation, Inspection and Maintenance) for the industry in codes and standards for reliability.

The FCIA Firestop Industry Manual of Practice (MOP) is the firestop industry body of knowledge, written for the firestopping industry and the FM and UL Firestop Exams to qualify DRI's Inspectors. FCIA's Education and Committee Action Conference and Firestop Industry Conference & Trade Show have educated FCIA's membership about fire and life safety through cutting edge sessions, while inviting the compartmentation industries to join the quest for better quality, and protection of people and property.

FM 4991, Standard for the Approval of Firestop Contractors, was the first industry quality management program introduced to the fire protection and resistance industries, with UL's Qualified Firestop Contractor Program following in 2007. FCIA has chaired the ASTM E 2174 and ASTM E2393 inspection standards development processes during development and improvement.

FCIA's Code and Standards committees continue work at ASTM, UL, ICC and NFPA Standards and Code Development Processes. The Apprenticeship Committee is at the U.S. Department of Labor advocating a 4-year Firestop/ Containment Worker Apprenticeship. The Legislative Committee is watching legislative issues. The Accreditation Committee is communicating with FM & UL, plus International Accreditation Services for firestop inspector qualifications. The Technical Committee is updating the MOP. The Membership and Education Committee is representing the industry nationally and internationally. The Membership Committee is reaching out to prospective and existing members. The Marketing Committee is working at trade shows to promote FCIA members. And of course, the Life Safety Digest Committee is working on this publication. All these activities have resulted in FCIA membership growth. With 39 initial member companies in 1999, membership is now 254 firms worldwide in 2009.

FCIA has done a lot in 10 years. The hard work of the Steering Committee, FCIA Boards and Committees working together has made the association unique and set the stage for growth. FCIA has brought people together on fire and life safety, total fire protection and built positive results through quality and a postitive approach. The challenge ahead is to take these 10 years of experience and make FCIA and effective compartmentation better in the future.

Join FCIA and other associations that support fire-resistance-rated and smoke-resistant compartmentation – Fire Rated Swinging and Rolling Doors, Fire Rated Glazing, Fire Dampers, Fire Rated Walls and Floors, as we work together to build and maintain safer buildings for all.

FCIA Board Celebrates FCIA 10 Year Anniversary

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# Firestop Systems Installations: Who has the liability?


**By Jay McGuire**

As a firestop specialty contractor since 1994, we have been interested in reducing our liability and that of our customers for years. As a result, we have developed an in- house documentation program that provides ways to minimize liability for all parties involved in the firestop industry.

The parties involved in firestop installation may include the firestop system installer, the trades (i.e., mechanical, electrical, plumber, drywaller, curtain wall, etc.), general contractor, construction manager, fire marshal and building official/inspector, architect and even the building owner. Each has a responsibility for successful installation of firestop systems and the firestop system performance endurance for the life of the building. Therefore, all parties share in firestopping liability.

There have been countless articles written about the difference between using a trained, qualified and experienced specialty firestop contractor and using an untrained installer or "caulker" who is uneducated in firestop industry installation protocol. At the end of the project, in most cases the "red caulk" around the pipe, cable, ductwork or joint looks similar on the surface, no matter who installed it- whether it was installed correctly or not. Until there is a fire that destroys the firestop product that was installed incorrectly and allows fire to spread, many continue to state that they see little difference between the professionals and the untrained. Some even have the mindset that as long as they pass the inspection and receive an occupancy permit, they have no liability for incorrect firestopping installations.

Fortunately, there have been articles regarding the liability and accountability that has resulted from actual fires showing that no one associated with the firestop requirements is exempt from liability. (See FCIA.org, articles, Karen Layng)

So…how can specialty firestop contractors set themselves apart from contractors that do not understand the firestop systems zero tolerance installation protocol?

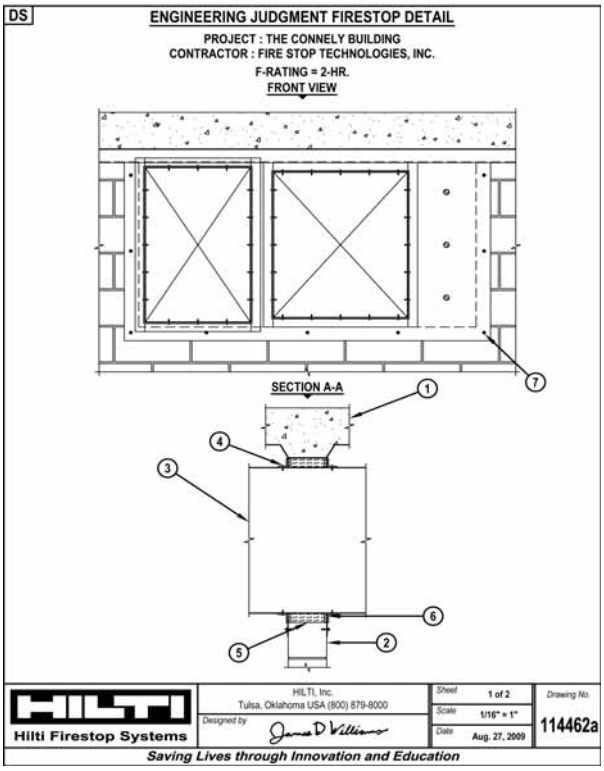
Why should the architect specify the use of standards that may result in an educated, UL Qualified or FM Approved specialty firestop contractor? Why should a construction manager or general contractor choose to utilize a specialty firestop contractor in lieu of having firestopping included in the many trades' bid packages?

If the firestopping is included in a trade's bid package, why should the trade want to subcontract the work instead of self perform? How can firestop specialty contractors make an impact on the industry…exposing that life and fire safety is at risk when firestopping is installed incorrectly, and not in accordance with the tested and listed firestop system?

## In a word, "Documentation"…

Firestop systems documentation comes from approved testing laboratories such as Underwriters Laboratories, Intertek, and FM Approvals. And, documentation is critical.

Many times, a contractor inexperienced at firestopping will choose to install firestop products. They will simply buy some red firestop caulk and have their newest person or cheapest apprentice squirt it into the annular space around a pipe, or gap area for a joint. The contractor typically has no tested system, or engineering judgment (EJ) instructions that guide installation of the products to result in a true firestop system. Therefore, there is no hourly fire rating or air leakage resistance, and the contractor has not met specification and code requirements. This can result in risks and liabilities for those involved in the design, inspection and construction process. More importantly, the system may or may





not work during a fire if not installed to the zero tolerance protocol.

In some cases, the building inspector or fire marshal may not have the time or proper training to identify incorrect installations. In their defense, many of the installations look as though they could be installed correctly, unless cut open. And, building and fire departments do not typically have resources, or responsibility to become quality assurance officers for construction projects.

Because of the lack of an organized education curriculum, installers that are not trained in the firestop industry protocol that products installed to a system design from the UL or other directly, may typically not be able to identify and document the correct tested firestop systems that they are supposed to be using.

This documentation consists of forms that identify information about the firestop installation that was performed, along with the details of the application to verify that all parameters of the system selected matched the conditions at the construction site.

Documentation is also in the form of a label that is placed on or next to each penetration firestop system, or intermittently on joint systems. This raises awareness that there is more to firestopping than simply installing firestop products. Building owners and managers, special inspectors and the Authority Having Jurisdiction (AHJ) are then able to easily recognize firestop products installed in accordance with tested systems or EJ's meeting code requirements for life and fire safety. A labeling section is in the FCIA Firestop Manual of Practice as a reference.

The label also allows for easy inspections, which will assist with project schedules and quality control of firestopping. This not only helps inspectors feel more comfortable about the installation accuracy, but may also encourage them to ask questions to the other trades about site installing firestop products. Such questions as; how are they choosing systems, requesting EJ's and performing their installations? To what system are they installing these firestop products? This will no doubt improve the quality of life safety and property protection for the entire life cycle of the building.

There is also an important TIMELINE that all of the parties connected to the firestop installation must be tied to. This documentation will tie the initially installed penetrations and joint firestop systems that were addressed during the construction phase of the project to the contractor responsible for their installations. This, in turn, separates the firestop applications made during the original construction project from the endless number of new penetrations installed after construction. Telecommunications, electrical wiring, and new piping for services are frequently installed after the

project is completed and turned over to the building owner and manager. No party involved wants to be held liable for installations that were installed after the construction project. There must be a reliable separation!

In our opinion, firestop liability is shown to be guilty until proven innocent. When the installer has the necessary documentation, they are proving professionalism and increased likelihood of correct installations. Documentation will also give the specialty firestop contractor, building owner and manager more information to support their defense, if necessary, should the spread of a fire occur.

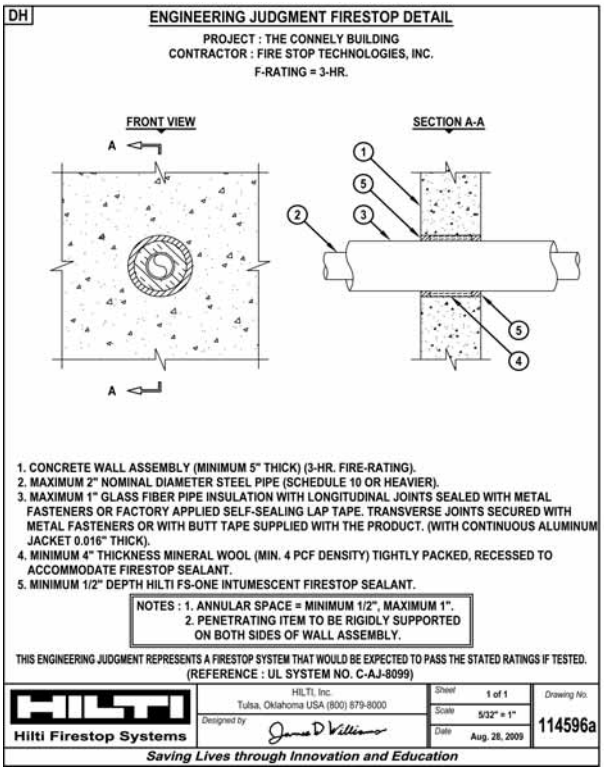
In the event of a lawsuit, everyone – including the firestop product manufacturer from the project – will want to know what system was selected. If the documentation shows that the correct system was selected by the contractor for that application, the manufacturer will no doubt be required to prove that it should have maintained the hourly resistance rating that the system claimed to be able to achieve. The specialty firestop contractor using documentation systems will have documentation, creating a strong defense against litigation. Firestop systems documentation can also be used to create reasonable doubt. If the system did not work, a number of questions should be probed:

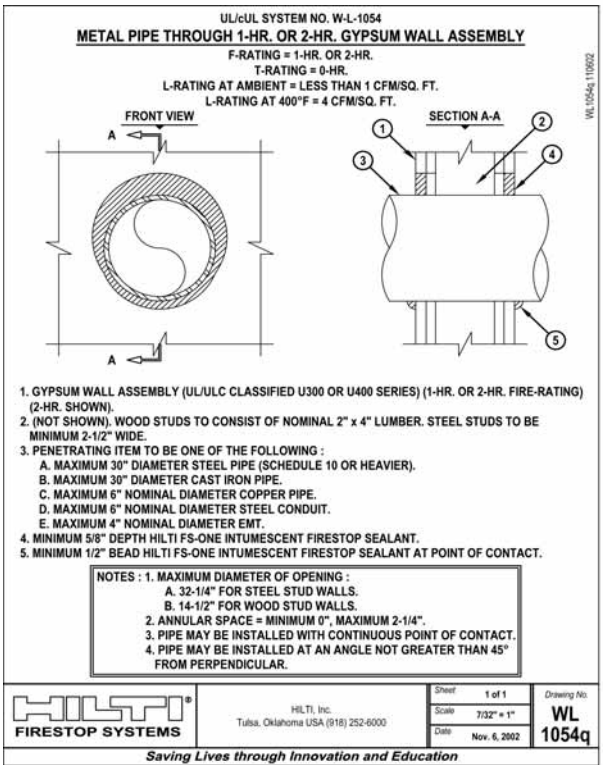
- Was the hourly rating of the system exceeded by fire?
- Did this protected or unprotected penetration or joint system exist when the project was completed or was it added after initial construction?
- Was this penetration or joint firestop system altered or tampered? Maybe a maintenance person or an untrained trade installer repaired a pipe or re-insulated the pipe, fixed an expansion joint, head of wall, or perimeter fire containment system, but did not reinstall the correct firestop system or any system at all.

Because liability protection is such a focus for professional firestop contractors, we thought we may be able to assist other specialty firestop contractors and provide more tools for the firestop industry that would separate a professional firestop contractor from all others, through a session at FCIA's Firestop Industry Conference & Trade Show.

Our objective was to provide resources that would help reduce both their liability and that of their customers by showing how documentation could be used to prove a competent contractors professionalism and innocence.

In order to test our logic, we were




fortunate enough at the November 2008 Firestop Industry Conference and Trade Show, San Antonio, to assemble and perform a "mock trial". The mock trial mimicked what could happen in an actual trial setting should a fire occur, and documentation be provided….or not. To simulate as much realism as possible, FCIA board member Gary Hamilton, of Hamilton-Benchmark, Inc., recruited two attorneys, Joshua Levy and Travis Rhoades, of Crivello Carlson Law Firm in Milwaukee. The two attorneys were so interested in the concept that they assisted us in this endeavor by donating their time and resources to the cause. Each of them put forth a fantastic effort to show how the prosecution would try to discredit the contractor that performed the installation, and that the documentation provided by the specialty firestop contractor can become a contractor's defense tool.

Following the mock trial, many of the specialty firestop contractors in attendance immediately saw the value in a documentation program. Several stated that they were planning to utilize a similar program of their own. Both Levy and Rhodes pointed out that the contractor installing firestop systems is guilty until proven innocent. Without documentation, the contractor has nothing to base a defense, in the event of an actual fire.

Sitting on the witness stand defending your company's actions in a firestop liability case is an eerie feeling, even when it is pretend. I would hate to sit there and tell the prosecution that we did a good job and to "trust us"……. No, I would much rather have conclusive documentation say it for me.

*Jay McGuire is Vice President of Fire Stop Technologies, Inc. (www.firestopstl.com)*

## Compartmentation Documentation – Systems Required

Systems documentation is not new to Effective Compartmentation. It is part of the fire- resistance-rated gypsum wall assembly, fire-rated rolling and swinging doors, frames, hardware, and closers; fire and smoke damper assemblies, fire-rated glazing systems, concrete and concrete block systems as well..

In firestopping and compartmentation, without documentation supporting a systems approach and a zero tolerance installation protocol by a specialty contractor, fire and life safety as well as property protection, may be compromised.

FCIA Members, view the full video at FCIA.org, Members Only.

## SPECIALTY FIRE STOP CONTRACTOR "FRANCHISING OPPORTUNITY"

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Our goal is to impart to each franchise all of the seasoned expertise and trade secrets they will need to be able to successfully reproduce our business approach to satisfied customers in a manner that will result in success. We have traced our steps repeatedly, refined and redefined the product, and analyzed all of the details. The groundwork has been very carefully laid to make our method of addressing fire rated systems and smoke seals, simple and effective for a perfectly completed product every time, so that customers will at once recognize and appreciate the quality, consistency and convenience associated with using Fire Stop America.

**Please visit our website at *www.firestopamerica.com* for more details and our contact information.**

Studies show that a businesses success rate over time is enhanced through franchise business ownership in lieu of starting an independent business with no support.

See the link from our website to "10 reasons to open a franchise".

FSA is an affiliate of Fire Stop Technologies, Inc.

# The Case for Compartmentation

**By Jerry Razwick**

Today's airplanes are extremely advanced. Technology has made it possible for an international flight to be flown almost entirely on autopilot. With a flip of a switch, you can travel safely from New York to London while the pilot gets in a good nap.

However, it's still a requirement (and a comfort) to have a human in the cockpit. As great as computer guidance can be, there is always the possibility of a glitch – and glitches do happen. You wouldn't want to fly without knowing there was a certain amount of backup protection if something goes wrong.

Good fire protection plans are intended to be the same way. There should be a certain amount of overlap, with multiple layers of safety measures in place. Yet all too often, fire protection is viewed simplistically. Some building owners and managers may put all their eggs in one basket, counting on a single technology concept to function perfectly – every time.

For example in 2000, a fire broke out in one of the dormitories at Seton Hall University. This particular fire spread rapidly and became the deadliest dormitory fire in U.S. history, killing three people and injuring an additional 54.

The investigation after the fire showed that the school had relied primarily on fire alarms to warn residents to evacuate the building. And the alarms did activate as intended. However, school officials had not planned on the way students would respond. It turned out that the alarms had gone off unintentionally, or as pranks, 18 times in the past semester. So students awakened by the noise assumed it was another joke, then rolled over and went back to sleep. With the lack of sufficient back-up protection in the dorm, the fire quickly spread from a lobby to the residential areas.

It was a costly and tragic lesson, but it highlighted a critical point: Fire protection plans are incomplete if they do not adequately address the range of potential dangers, including those resulting from human behavior.

For a fire safety program to truly be thorough, it must include four basic components: Detection and alarms, suppression, compartmentation, and building occupant emergency education. While there will always be surprises, these elements must work together to provide the best possible strategy for covering all the bases.

Seton Hall had the detection and alarms portions covered. This includes fire, smoke and carbon monoxide alarms that can alert tenants to a threat. They need to be reliable and activated early enough during a fire to allow people to react in a timely fashion.

Sprinklers, extinguishers and fire hoses make up the category referred to as suppression devices. These can provide invaluable assistance in controlling a blaze before firefighters arrive on the scene. They are intended to deal with a fire before it gets out of control, confining fire growth until firefighters can extinguish it.

These two types of protection – detection and alarms, and suppression – have something in common: They are active systems. In other words, they need something to be activated in order to operate.

Normally, that's not a problem. But there is always the possibility for error. Sprinkler systems perform very well, with high reliability when properly designed, installed, inspected and maintained. However, there is a chance for mechanical or human error with sprinkler systems, and those errors do occur.

Similar points can be made about alarms. Who hasn't forgotten to change a battery in a smoke detector? When the power is out, or alarms aren't in close enough proximity to where a fire originates, there is the potential for less-than-perfect performance.

The Eastside 911 Communications Center in the Bellevue, Wash. City Hall uses Pilkington Pyrostop glass and FireFrames Heat Barrier frames."

The point is, in a real life fire, there may be too many variables to rely exclusively on active systems.

That's why the third category of fire protection is so vital – compartmentation. Fire and smoke resistance-rated building materials such as gypsum, concrete, firestopping, fire dampers and fire-rated glass help divide a building into smaller "compartments," providing a number of barriers that can slow or stop a fire from spreading. When properly designed, installed, inspected and maintained, they can withstand the ravages of fire and maintain their integrity long enough for people to evacuate the premises and to protect vital portions of the building. They also provide time for firefighters to arrive and control the fire.

In some areas of the U.S., there has been a decline in reliance on compartmentation over the last few decades. The U.S. Fire Administration made that observation in their follow-up report on a New York City bank building fire:

The report reads: "High-rise construction systems changed significantly in the

1960s and 1970s. Prior to this period, most high-rise buildings were built with relatively heavy construction, providing a high mass to volume ratio, which tended to provide natural compartmentation, heat absorption and insulation qualities. The newer buildings have much less mass – they utilize lighter weight steel or concrete structural members, curtain wall construction, more windows and thinner floor assemblies. All of these characteristics make the newer buildings inherently less fire resistive than their predecessors."1

Fire-resistant materials and systems that make up compartmentation are essential if anything goes wrong with the detection and alarms, or suppression systems. A good backup plan could mean the difference between life and death. But even if sprinklers and alarms operate perfectly, good compartmentation is a must. Two examples will prove that point.

First, non-fire-rated window glass can only withstand a few hundred degrees of temperature, and may vacate the opening. In addition, if the hot glass is impacted by relatively cool water from a sprinkler or other source, the glass is caught between an expansion and contraction dilemma. As a result, it shatters and leaves a pathway for the flames and deadly smoke. In either case, the glass has vacated the opening and flames and smoke are free to spread through the building. The barrier has been breached.

In contrast, fire-rated glass products, such as ceramics and multilayer products, are required to withstand impact from water in a fire hose stream test. Thus, water from sprinklers poses little problem. The glass remains in place and aids in compartmentation while the sprinklers do their work.

A second example of fire-rated glass offering protection is after the fire has been doused. Sprinklers and fire hoses can generate tremendous amounts of smoke when they control a fire. Fire hoses also make fires contribute smoke more than would a clean-burning fire. If a non-fire-resistance-rated building is not using smoke protection features (glazing and other materials have been used and they are breached), the deadly smoke is able to travel to other areas of the building, sometimes long after the fire is gone.

Sometimes fire-rated construction materials can even make a difference for the building envelope. Most of the time, no one thinks about compartmentation being an issue for the exterior of the building. After all, once a fire leaves a window, where does it have left to spread?

The answer may depend on the building. In 1988, a fire broke out on the 12th floor of the First Interstate Bank Building, a 62-story high rise in Los Angeles. Firefighters responding to the blaze encountered unexpected snags with the active fire protection systems: The building's two fire pumps had been shut down to facilitate connection of a new sprinkler system being installed in the building, and the sprinkler system itself was not yet operational.

The fire took full advantage of the three hours and 40 minutes it had to burn. Instead of burning through the floors, the fire burst the exterior windows, then leap-frogged up the side of the building to the next three floors.

Today, fire-rated glass and curtainwall systems, with fire ratings up to two hours, are available to prevent such expansion of a fire. Glass that forms the skin of a building no longer needs to be vulnerable to fire, and in fact can provide much needed protection.

When it comes to fire safety, too much is on the line to rely solely on a single method of protection. The best of all worlds is when effective compartmentation, detection and alarms, and suppression systems are teamed with occupant safety education for maximum protection on every level. A design that incorporates active and passive fire-protection systems is by far the superior choice.




***Jerry Razwick*** *is Founder and President of Technical Glass Products (TGP), a distributor of specialty glass and framing as well as architectural products. He has been a glass factory agent in foreign and domestic markets for over 25 years. Razwick has served on the Industry Advisory Committee for Underwriters Laboratories, Inc. and is an active member of AIA, CSI, NGA and GANA. www.fireglass.com*


*1. United States Fire Administration Technical Report Series, New York City Bank Building Fire: Compartmentation vs. Sprinklers(http://www.interfire.org/res_file/pdf/Tr-071.pdf)*

# Multi Family Housing - Is It A Burning Issue?

**By Don Sabrsula**

Whether we live within the confines of a large city or enjoy the less congested suburban lifestyle, both may affect how we think about fire and life safety.

The big city seems to focus on the infrastructure of skyscrapers. High-rise fire catastrophes, like the One Meridian Plaza in Philadelphia, the twin towers of the World Trade Center, or World Trade Center 7 draw worldwide attention. It is then that we shutter at the loss of life and property…then ask, what can we do to stop it?

Except high-rise hotels, condos, and apartment buildings, most high rise structures are non-residential office buildings designed as a setting to work an 8 to 5 day, then head home to relax and rest.

National Fire Protection Association (NFPA) statistics state that the One Meridian Plaza fire occurred on a Saturday evening, February, 1991. The building was unoccupied. The 38-story office building sustained structural damage as fire engulfed nine floors and resulted in death to three firefighters with an additional 24 firefighters and one civilian injured. The building was razed.

In contrast to that event, the fire that resulted from the World Trade Center twin tower attacks the morning of Sept. 11 2001, occurred during working hours, resulting in 2,666 fatalities, numerous injuries and collapse of both office buildings. World Trade Center 7 had been evacuated, yet experienced total burnout and collapse.

Fortunately, many non-residential office building fires occur during "off–hours" and therefore result in few or no occupant fatalities. However, there can be large property losses.

NFPA estimates that in 2007 there were 1,537,000 fires responded to by fire services causing $14.64 billion in property loss, with $10.64 billion in structure losses. These fires resulted in 3,430 deaths and 17,675 civilian injuries. Of these estimated deaths, only 105 civilians died in non-residential structure fires. Civilian injuries related to non-residential structure fires were estimated at 1,350. Reports also indicate that between 2000 and 2004 (exclusive of the 9/11 incident) only .7% of all reported structural fires occurred in office occupancies.1

As a suburban inhabitant, our fire safety focus is small shops, shopping malls and homes. NFPA fire loss statistics classify homes as one and two family dwellings, apartments, town homes, condominiums, row homes or manufactured homes. The National Multi Housing Council reported on a 2008 current U.S. population survey, by Household Type or Type of Structure people reside in 2.

## U.S. HOUSEHOLDS: Renters & Owners

| Type of Household | Number of Households (000s) | % of U.S. Total | Number of Residents (000s) |
|---|---|---|---|
| Renter-Occupied Housing | 37,469 | 32% | 88,558 |
| Owner-Occupied Housing | 79,350 | 68% | 210,548 |
| Total | 116,819 | 100% | 299,106 |

Source: NMHC tabulations of 2008 Current Population Survey, Annual Social and Economic Supplement, US Census Bureau ( http://www.census.gov/cps)

## What Type of Structure Do Renter Households Live in?

| Type of Structure | Number of Households (000s) | Percentage of Households | Number of Residents (000s) |
|---|---|---|---|
| Single-family homes | 12,011 | 32% | 34,045 |
| Structure with 2 to 4 units | 7,218 | 19% | 17,213 |
| Structure with 5 or more units | 16,489 | 44% | 32,921 |
| Mobile Homes | 1,562 | 4% | 4,026 |
| Other | 189 | 1% | 353 |
| **Total** | **37,469** | **100%** | **88,558** |

Source: NMHC Tabulations of 2008 Current Population Survey, Annual Social and Economic Supplement, US Census Bureau (www.census.gov/cps.) "Other" housing includes unit in hotels, rooming houses, dormitories, tents or unspecified housing.

The summary is; of the, 116.82 million households that comprises the U.S. population of 299.11 million in 2008, 88.56 million households live in rented housing. Of renters, 23.7 million households live in structures indicated to be units, apartment type homes representing a population of 50.13 million people, or 16% of the U.S. population.

The U.S. Department of Commerce reports that construction of new homes and apartments jumped 17.2% in May 2009 over April's record low. Applications for building permits also rose in May. The increase includes 7.5% increase in single family dwellings and 61.7% increase in multi family units. This is a strong indication that the population trend is moving toward multifamily living. With this in mind, let's explore the statistics regarding fire in residential structures.

Of the 1,557,500 fires responded to by the fire service in

2007, it is estimated that 530,500 were reported structure fires. Of the 530,500 structure fires 414,000 were residential fires, accounting for 78% of all structure fires. Of the 414,000 residential fires, 300,500 occurred in one and two family dwellings accounting for 56.6% of all structure fires. Another 98,500 occurred in apartments accounting for 18.6 % of all structure fires.

NFPA also reports that in 2007 home structure fires caused 84% of the civilian fire deaths and 77% of the civilian injuries. Of the $14.64 billion of property loss to fire in 2007, $10.64 billion was attributed to structure loss. Of the property loss in structure fires $7.546 billion occurred in residential properties. An estimated $6.23 billion occurred in one- and two-family dwellings. An estimated $1.164 billion also occurred in apartments. Other property fire loss is attributed to special structures, industrial properties, public assembly properties and fires outside structure such as wild fire incidents.

Reviewing statistics that history and research provide, we cannot ignore facts. How safe are we in homes and what is being done to ensure our protection? Why are there so many deaths and injuries where we live and sleep and what causes them? NFPA reports findings for 2003 to 2006. And, cooking equipment is by far the leading cause of home structure fires (40%) while smoking materials lead in home fire deaths (25%). Other causes include:

- Heating equipment 18%
- Electrical and lighting 6%
- Intentional 5%
- Clothes dryer or washer 4%
- Confined trash or rubbish 2%

High rise multifamily housing

What's being done to solve these problems? Standard notification systems or those that simulate a voice of authority are available to wake us, new requirements for sprinklers in all residential new construction have appeared, fire-resistance-rated assemblies' are offerred, and more.

In early America, George Washington and Thomas Jefferson encouraged the development of regulations to develop minimum standards for health and safety. 4 Today, most of the United States is covered by modern building code regulations including structural, safety to health, security and energy conservation.

One- and two-family home construction, (dwellings-duplexes) is regulated by ICC's International Residential Code (IRC). The IRC includes standards from NFPA and other standards development organizations such as ASTM, UL, etc. Multi-family dwellings – apartments, townhomes, and condominiums – are regulated under the ICC's International Building Code (IBC). NFPA 5000 also covers multi family residential structures, with some parts of NFPA 101, the Life Safety Code, used in certain multifamily occupancies.

With regard to the research and statistics presented concerning residential structure fires and the percentage of total structure fires (78%) they represent, a discussion of applications of the 2006 International Building Code and multifamily housing requirements follows.

Chapter 3 of the IBC determines use and occupancy classifications for buildings and structures. Section 310 describes multi-family occupancies as R1 or R2 classifications, while assisted living is R4, with different requirements…since people are less likely to be able to evacuate under their own power. R2 classifications encompass residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including: apartment units, boarding houses (non-transient) convents, dormitories, fraternities and sororities, hotels (non-transient) monasteries, motels (non-transient) and vacation time share properties. Not being an architect or design engineer, I will not attempt to interpret the total code as it relates to this classifica-

Multifamily housing means many people at risk

tion, however, will touch on a few chapters and sections related to construction, life safety and compartmentation, and in some instances, paraphrase its wording.

Chapter 4 Section 419.2 addresses separation walls defined as walls separating dwelling units in the same building and walls separating sleeping units in the same building. For compliance we are then directed to Chapter 7, which addresses fire- resistance-rated construction. In Definitions of Chapter 7, the fire-resistance rating is defined as 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 Chapter 7, Section 703. Section 703.2 refers to ASTM E119 as the fire test standard. Section 703.3 states that prescriptive methods can be used as well, where materials, systems or devices that have not been tested are incorporated as part of the fire-resistive-rated assembly. The key point of the section is that with some exceptions, materials and methods of construction used to protect joints and penetrations in fire-resistant rated building elements shall not reduce the fire-resistant ratings of the assembly.

This section of the code combined with section 712 and 713 has resulted in firestop manufacturers spending millions of dollars for research, development and testing, to qualify firestop products. These products become systems when installed by knowledgeable contractors to the listing, tested in accordance with test standards ASTM E814, or UL 1479 for penetrations or ASTM E 1966, ASTM E 2307, or UL 2079 for joints.

The ASTM E814 or UL 1479 standard testing is much like the ASTM E119, except that the fire-resistant-rated assembly, floor or wall, is now penetrated by pipe, conduit, cable wiring, ducts or other construction items. During the fire test, the fire- resistance rating of the assembly cannot be reduced. Section 712.4.1.1.2 refers to the F and T rating of the firestop system. The “F” Rating is the resistance of the firestop system, stated in hours. The “T” Rating is defined in Chapter 7 as the time period that the firestop system including the penetrating item, limits the maximum temperature rise to 325 degrees Fahrenheit above its initial temperature on the non-fire side. An exception to the “T” Rating is when floor penetrations are contained within the cavity of a wall.

UL 1479, incorporates air leakage criteria to measure the migration of smoke and or hot gases through the penetration before as the system is burned, resulting in an “L” Rating, in cubic feet per minute, per square foot of opening area. “L” Ratings are required in 712.5, for smoke barriers. Proactive building owners may decide to specify smoke barriers to limit the spread of smoke in buildings, although not required by code.

Section 713 applies the same fire-resistance requirements to joints installed in or between fire-resistance-rated walls, floors, or floor/ceiling assemblies and roofs or roof/ceiling assemblies. The code language states, with some exceptions, that these joints shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the, wall, floor, roof, in or between which it is installed. The testing standard required by code in Chapter 7 Section 713.3 is ASTM E 1966 or UL 2079.

Chapter 4 Section 419.3 refers to horizontal separations, floor ceiling assemblies separating dwelling units in the same building and floor ceiling assemblies separating sleeping units in the same building with fire-resistance-rated construction as referenced in Section 711. Section 711.3 states that the fire-resistance rating of the floor and roof assembly shall not be less than required by the building type of construction. Type of construction is addressed in Chapter 6 and table 601. Section 711.3 continues to state that floor assemblies separating dwelling units in the same building or sleeping units in R1, Hotel, R2 and I1 occupancies shall be a minimum 1-hour fire-resistance-rated

construction with some exceptions for building type and sprinklers. Treating the through penetrations and/or joints within or between fire-resistance floor ceiling assemblies are also discussed in Chapter 7, Section 712 and 713.

As you can see, there's a lot more to figuring out how to construct a building than meets the eye. Planning, systems selection, and human behavior analysis goes into regulatory code development that governs construction in multi-family homes.

In firestopping alone, there are over 8,000 systems that maintain continuity of fire-resistance-rated assemblies in buildings. Continuity is part of the International Building Code (IBC), NFPA 101, Life Safety Code and NFPA 5000, Building Construction and Safety Code requirements.

Each firestop system is unique. Firestop systems have written and graphic details depicting the type of fire-resistance-rated construction being penetrated or expansion/control joint, and the materials used to build the system. The "System" lists specific construction items that are being penetrated, fire rating, the annular space limitations around the penetrating item or joint width, as well as a description of the firestop product(s) or device(s) utilized to create the system. Together, the products, installed by those knowledgeable in systems, maintains the integrity and fire-resistance rating of the wall or floor.

Due to the technical nature of fire resistance, and the unique systems approach for a firestop system, the Firestop Contractors International Association (FCIA) has labeled the industry a "Zero Tolerance Installation" and protocol. To get firestopping right, the system must be followed without variation. Any variations can cause possible failure of the system to protect the compartment created in the building.

In multi-family construction, because people are sleeping for a good part of their stay and are not as aware as they might be in offices, extra protection is needed to cover the risk presented. For that reason and the large number of people at risk, multi-family construction is the one of the most protected occupancy there is under the codes, IBC or NFPA.

Fire-resistance-rated construction can be made of concrete, concrete block, gypsum wallboard, combination gypsum/wood floor systems, concrete, or concrete/metal composite floors systems all protected with fire-resistance-rated and or smoke-resistant firestopping. Fire doors protect the big openings, with or without fire-rated glazing, fire and smoke dampers help limit smoke and fire spread, as well as fire resistant glazing where clear view is expected, and perimeter fire containment systems prevent horizontal and vertical fire spread, in each residential multi-family unit.

Older structures built under codes prior to sprinkler requirements may be relying on compartmentation and detection/alarm systems for main fire protection and occupant protection in addition to the egress system. The fire-resistance-rated walls and floor penetrations and openings must be well protected as they are a main component of the fire protection strategy.

Protecting compartmentation in multi-family structures is everyone's responsibility. Doors need to close properly, firestop systems must be installed properly and documented. Just like maintaining the sprinkler or detection and alarm system over the life of the building, compartmentation needs to be maintained. In this case the occupants can report troubles because people can physically see the compartmentation. Doors, open holes around cables, pipes, can be seen, then protected when reported to building management.

The International Fire Code, Fire Resistance Rated Construction, Section 703.1, states the building owner and manager responsibility for fire resistance…and very clearly:

703.1 – "The required fire resistance rating of fire-resistance-rated construction (including 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 properly repaired, restored or replaced when damaged, altered, breached, or penetrated. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with approved methods capable of resisting the passage of smoke and fire. Openings through fire resistance rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly."

The code references discussed above were only relative to fire-resistance-rated construction and just barely touch the surface of the design process and requirements for buildings to meet code requirements.

May we all strive to see our building and life safety codes evolving to meet the ever changing new technologies and threats that present themselves in the construction and design industry, assure ourselves that proper application of these codes is essential and that the enforcement of these codes become secondary to none. Some one's life depends on it.

1. SOURCE, NFPA FIRE LOSS IN THE US 2007 FULL REPORT, 08/08, NFPA FIRE ANALYSIS AND RESEARCH, QUINCY, MA.

2. Source: NMHC tabulations of 2008 Current Population Survey, Annual Social and Economic Supplement, US Census Bureau (http://www.census.gov/cps)

3. "Building Codes – How they help you'', International Code Council, Building Safety Week, 8-622-02-06.

***Don Sabrsula*** *is Founder and President of FireSafe of Houston, Inc, and an FCIA Director. He is based in Katy, TX and can be reached at don@firesafehouston.com.*

# Value of Quality Processes in the Contractor Industry

## UL's New Qualified Contractor Programs

**By Betsy Titus**

Construction quality is a concern to many, particularly when it comes to the installation of fire and life safety aspects of a building. Why? Installation can be left to contractors that may lack the proper knowledge and best practices to get the job done right. Fortunately, ISO 9000 compliance adapted for the construction industry is rapidly becoming a prerequisite for construction companies seeking international construction contracts, and the same may soon be true for firms operating solely within North America.

Why should the construction industry adopt the ISO 9000 quality management system approach? The discipline and systematic approach helps companies structure their processes to consistently meet clients' requirements. In the construction industry, the key is meeting requirements – code and architect/specifier requirements – that are communicated in construction documents. Meeting requirements is essential to greater assurance of fire and life safety in building construction today.

Establishing ISO 9000 principles in the construction subcontracting industry is a paradigm shift for an industry whose "factory" is a building under construction. Construction subcontractors deal with changing weather, changing construction teams at each new jobsite, and designs that change from one structure to the next.

The paradigm shift comes with great benefits to contractors, as well as everyone concerned about quality in building structures. Installation companies that adopt ISO 9000 principles benefit through increases in "bottom line" profit as a result of better efficiency, continual process improvements and waste reduction. The architect, specifier, general contractor and design-build entities, building owners and managers, and regulatory authorities benefit by gaining a greater assurance that construction products are installed to requirements.

ISO 9000 principles provide consistent and effective control of key processes, project management, promotion and standardization of good working practices, a vehicle for planned training of employees, greater emphasis on communication, leadership, effective remote site management, accountability, contractual control, and control of suppliers – which all translates into use of controlled and consistent processes. This means greater assurance that the specified designs are installed to requirements.

Two such fire and life safety materials and systems that are installed in the field while a building is under construction are firestop systems and spray applied fire resistive materials (SFRMs). Their performance often depends on the quality of the selection and installation of materials that become systems at the jobsite. In turn, selection and installation depend on the knowledge and best practices of contractors responsible for those critical processes. Unfortunately, the architects that create the design and specifications, and the general contractors that select specialty contractors to install to specifications on a jobsite have few resources to help them identify contractors possessing the proper knowledge and that utilize the industry's best practices.

UL's Qualified Contractor Programs assess and qualify contractor firms that have demonstrated knowledge and a comprehensive management system that specifically focus on the selection and installation of firestop systems or SFRMs. The contractor firm's employees are given exams on industry standards, and the firm's management systems are audited to provide an integrated approach – demonstrated knowledge and management system – to controlling the processes in addressing architectural, Authority Having Jurisdiction (AHJ) and customer requirements.

The management system requirements are based on ISO 9001 principles that require a complete system of checks and balances, and practices enabling a contractor to comply with established customer requirements. Management system requirements also incorporate selection and installation best practices established by two key contractor industry associations: Firestop Contractor International Association (FCIA) and National Fireproofing Contractors Association (NFCA).

Contractors are required to establish and effectively implement and maintain a management system that focuses on the selection and installation of firestop systems or SFRMs. Specially-trained UL auditors conduct an audit of a contractor's processes to verify that processes exist and that they are being used effectively on the job. The essential processes required include:

- Construction document requirements and review of building plans and specifications
- Selection, purchasing, storage and handling of materials
- Installation, application and field quality assurance

procedures – transmitting design and installation requirements to the field

- Inspection, testing and calibration of equipment – testing to verify that installed designs meet requirements
- Control of nonconforming materials
- Installer inspections and correction processes
- Training and qualification of staff
- Audits of their own work and processes for continued improvement

Aedan Gleeson, president of Gleeson Powers, Inc. and UL's first Qualified Firestop Contractor emphasized that, "The UL Qualified Firestop Contractor Program challenged our company to be the best at what we do. It has made us a better company by implementing quality processes in our work."

Richard Clayton, president of Clayton Coatings, Inc. and UL's first Qualified SFRM Contractor said, "Clayton Coatings has utilized quality management processes in our work for years which has challenged our company to be the best. We expect to be able to further differentiate Clayton Coatings as a quality organization by achieving UL Qualified SFRM Contractor status."

The UL Qualified Contractor Program is now included as a contractor qualification option in MasterSpec, one of the leading resources used by architects, engineers and specification professionals to write specifications for projects. MasterSpec is published by ARCOM, for the American Institute of Architects (AIA). As a result of this inclusion, the UL Qualified Contractor Program continues to show up in new building projects throughout North America and beyond.

To earn UL Qualified Contractor status, a contractor firm's Designated Responsible Individual (DRI) must pass a three-hour written exam. Then, the contractor firm must pass a UL-administered audit of its management system, both at the contractor's facility and as applied on the job site. A contractor firm that meets the UL Qualified Contractor Program requirements receives a UL certificate effective for one year. Qualified Contractors are re-audited annually at both the facility and jobsite to verify that the contractor's management system continues to comply with program requirements.

You can visit UL's online directory at www.ul.com/contractor to find contractor firms that have been qualified to UL's Qualified Contractor Program. Accessible to architects, authorities, contractors, manufacturers and building owners, the directory contains a list of Qualified Firestop Contractors and a list of Qualified SFRM Contractors.

Qualified Contractors can also promote their UL Qualified Contractor status by displaying the UL Qualified Contractor logo in their promotional materials.

## The Benefits of UL's Program

While other contractor certification programs exist, UL's program has the benefit of being backed by UL's engineering staff with years of knowledge and experience with fire resistive assemblies and Effective Compartmentation. This, coupled with UL's specially-trained audit staff located throughout North America, provide an independent, third-party evaluation that architects, general contractors and regulatory authorities can look to for greater peace of mind.

The ISO 9000 quality management system approach can be an appropriate and effective tool for construction firms in North America and beyond. UL's Qualified Contractor Program is now available to provides architects, building owners and managers, general contractors and design-build firms a recognized qualification to specify, identify and select specialty contractors that have been assessed by an independent, third-party organization for their knowledge and best practices using the management system approach.

*For more information on the Underwriters Laboratories' Qualified Contractor programs, contact Betsy Titus at (847) 664-2530 or Elizabeth.Titus@us.ul.com.*

# Industry News

## Industry News

**FM & UL Programs Gaining Steam** – As FCIA Celebrates 10 years, a founding vision is reality – contractors can set themselves apart through an independent authority. With 60 FM 4991 Approved and 13 UL Qualified Firestop Contractors worldwide, this program is widely available. Contractors, Inspectors, UL's Firestop Exam schedule is at http://www.fcia.org.

**FCIA Firestop Industry Conference & Trade Show** – FCIA celebrates its 10th anniversary at the Ritz Carlton, Key Biscayne, FL. Lots of info is at http://www.fcia.org, events.

**IAPMO UPC Plumbing Code and ASME A 112.20.2** – A United Association (UA) of Plumbers, Pipe Fitters Union employee chaired the American Society of Mechanical Engineers (ASME) group that developed ASME A 112.20.2. FCIA objected to the four years experience in piping installation requirement to apply firestopping, yet the plumbers overruled.

FCIA's point during ASME, IAPMO and ANSI Hearing processes was that Firestopping is a fire resistance issue, not plumbing. California and Oregon have amended out ASME A 112.20.2 from their IAPMO 2009 UPC adoptions.

**New Versions, ASTM Firestop Systems Inspection Standards** - FCIA received notice that ASTM E 2174 – 09, Standard Practice for On-Site Inspection of Installed Fire Stops, and ASTM E 2393 - 09 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers have issued by ASTM.

**Masonry Industry Tools for Fire Resistance** – At the National Concrete Masonry Association mid-year meetings, NCMA approved a new guide for determining fire-resistance ratings of concrete masonry products made using unconventional or unlisted aggregates. Plus, a new online program for calculating fire-resistance ratings, sound-transmission, and energy values was introduced. Contact Dennis Graber, dgraber@ncma.org.

# Industry News

**New Thermafiber Website** - Thermafiber, Inc. launched its redesigned website, with more details about Thermafiber's widely specified mineral wool insulation products and services. Visit http://www.thermafiber.com.

**FCIA Member 1st ULC Qualified Firestop Contractor** – National Firestop Limited, of Winnipeg, Manitoba, Canada, is the 1st ULC-Qualified Firestop Contractor. Check out them all at http://www.fcia.org, UL Qualification, FM 4991 Approval.

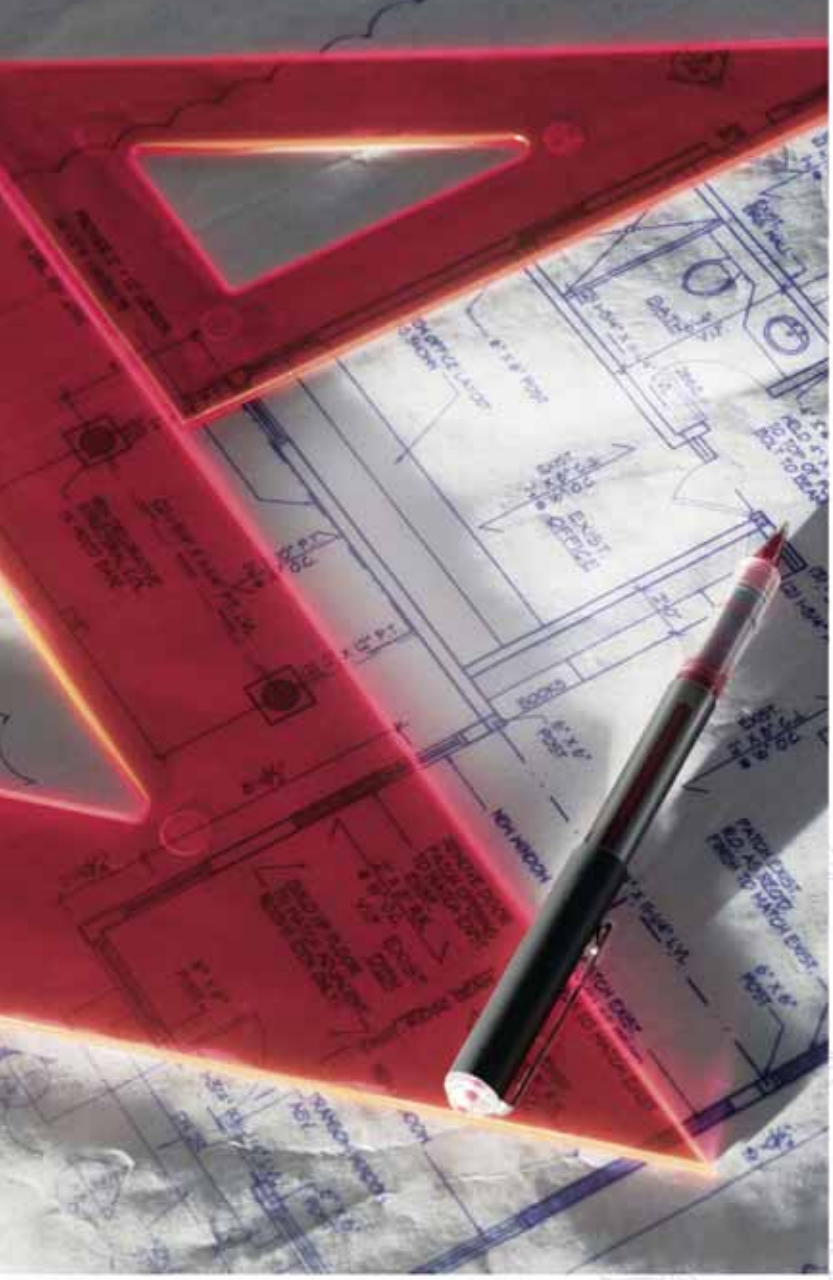
**Gypsum Association Fire Resistance Manual Updated** – The Gypsum Association released the 19th edition of GA-600, Fire Resistance Design Manual (FRDM). Since 1959, the association has regularly published the latest in fire-resistance rated gypsum system designs. http://www.gypsum.org.

**Global Environmental & Safety Merges** – Telgian Corporation announced the acquisition of Global Environmental & Safety, a firestop consulting and inspection firm in Philadelphia. With Global E&S, Telgian offers a full-service balanced approach to the fire protection industry (Detection, Suppression and Compartmentation) worldwide. Telgian's Philadelphia office is home to the Firestop Division, and Patrick and Michelle Tesche, former Global owners.

## Code Corner

The ICC 2009/2010 Code Development Cycle starts October 24. FCIA's Code Consultant, Bill Koffel, Koffel Associates, Inc., submitted proposals for FM 4991 and UL Qualified Contractors, ASTM E 2174 and E 2393 Inspection Standards, and more. For specific code proposals, visit http://www.iccsafe.org, Code Development.

Watch for a report on ICC Code Committee Actions, and NFPA Fire Protection Features Meetings, over the next several issues of Life Safety Digest.



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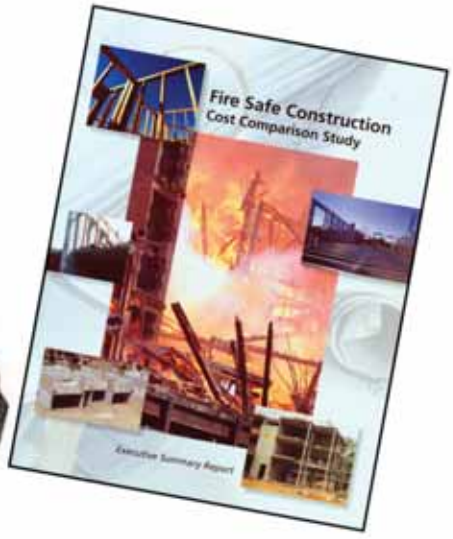
**The Fire Safety Construction Advisory Councils** of the midwest recently commissioned an independent and extraordinarily revealing study evaluating construction costs utilizing wood framing, light gauge steel framing and non-combustible concrete construction.

Using a four story building model with two different layout considerations, the study addresses costs in 3 cities in Illinois & Indiana.

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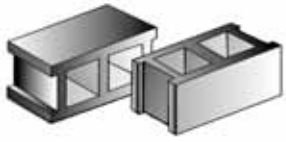

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