Chapter 6

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Firestop Inspections—Introduction

Firestop inspection is an important part of the total installation process for firestopping. The true cost of firestopping is the price to purchase materials, transport both material and people to the jobsite, install and quality control a firestop installation that becomes a system when installed to the listing and manufacturers installation instructions.

Firestopping inspection can be performed to ASTM E 2174, Standard Practice for On-Site Inspection of Installed Firestops and ASTM E 2393, Standard Practice for the On-Site Inspection of Installed Fire-Resistive Joint Systems and Perimeter Fire Barriers or other methods. In this document there is information about when the ASTM Firestop Inspection Standards are used, why inspection takes place, possible methods, and much more.

Key elements to firestop inspection include and are not limited to:

- ASTM E 2174, ASTM E 2393 Firestop Inspection Standards.
- Listings from an Approved Source such as UL, FM Approvals, Intertek or other testing laboratory directory.
- Guide Information from the directory that might be used during the installation and inspection.
- Engineering Judgements or Equivalent Fire-Resistance-Rated Assemblies (EFRRA’s).
- Firestop Manufacturers installation instructions.
- Firestop Manufactures recommended inspection procedures.
- International Firestop Council's Firestop Inspection Guide and Recommended Guidelines for Performing Destructive Testing for Installed Penetration Firestop Systems, Fire-Resistive Joint Systems, or Perimeter Fire Barrier Systems. (included as an appendix to this document)
- Firestop Manufacturer Safety Data Sheets

Firestop inspection must be performed by people who understand the firestop industry protocol, who work for companies that also understand the industry’s technical zero-tolerance nature. Without understanding how to use the tools listed below and the information in this and other documents, firestop inspection will not produce desired results. The results—a firestop installation to the tested and listed system and manufacturers installation instructions—protects the integrity of Fire-Resistance-Rated and Smoke-Resistant Assemblies—for fire and life safety.

Why Firestop Special Inspection . . .

Firestopping inspection is part of the FCIA’s DIIM™ of Firestopping—the proper Design, Installation, Inspection and Maintenance of firestopping—and all of fire-resistance-rated and smoke-resistant assemblies means better reliability over the building’s life cycle.

Firestop inspection can help Building Owners and Managers and General Contractors get the correct value paid for firestopping installation services. The I & I, Installation and Inspection are tied together, and each is as critical as the other to success. Plus, ongoing maintenance
can only happen if the firestop systems were installed right in the first place. By using a FCIA Member, FM 4991 Approved, UL/ULC Qualified Firestop Contractor, and an Accredited FCIA Member Firestopping Inspection Agency with competent Firestop Inspectors, FCIA believes that Firestopping can be built right so the Building Owner and Manager can maintain fire-resistance for the life of the building.

Why have company accreditation for Inspection Agencies and Contractor Companies plus individual competencies evaluated instead of just ‘certified inspectors’?

FCIA believes strongly in the DIIM strategy for firestopping—and has since the inception of the FCIA. FCIA believes that Proper D-Design of firestopping by a Registered Professional CCS or RSW specifying that tested and listed systems and manufacturers installation instructions by FCIA Member Manufacturers; and I-Installation completed by FCIA Member, FM 4991 or UL/ULC Qualified Firestop Contractors to the listings and manufacturers installation instructions; I-Inspection to ASTM E 2174 and ASTM E 2393 Inspection standards by FCIA Member accredited Firestop Inspection Agencies with Firestop Special Inspectors who have the education and experience to understand the firestop systems analysis—to the SYSTEMS and Installation instructions—completely; and firestopping then must be M-Maintained for the building life cycle for fire and life safety.

By following the FCIA’s DIIM Philosophy, Firestopping can function when called upon by fire or smoke.

Background
Firestop products become firestop systems when the products are installed to the tested and listed system from a directory such as Underwriters Laboratories, (UL), Intertek, Southwest Research Institute, or Approved by FM Approvals, or listed in other nationally recognized testing agency directory and the manufacturer’s published installation instructions. The
Firestop products need to be installed exactly as described in the directory listing and to the manufacturer’s installation instructions to become an acceptable “system”.

Engineering judgments (EJs) also must be installed exactly as shown in the manufacturer’s installation instructions and on the EJ. In the case of EJs, the installation instructions are a combination of the manufacturer’s published installation instructions and the EJ documentation with specific parameters given about the assembly.

Inspections of firestopping have occurred since the start of the industry in the late 1970s. In nuclear power plants, inspection was normal and expected. Firestop system inspection started to appear in commercial, industrial and institutional occupancies somewhat in the 1970s, but not really until the early to mid-1990s.

The project manual, or specification, is the recipe for construction to take place on a building communicating requirements for all types of products used to erect the structure. Specifications have had firestop inspection in the Firestop Section for some time.

The Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC) both jointly develop and maintain a numbering system for the organization of the project manual, or specification, used to construct the building. The numbering system is called “MasterFormat”. The section designated for Firestopping in CSI/CSC’s MasterFormat is 07-84-00, Firestopping. Division 7 of the MasterFormat, the master section, is where thermal and moisture protection is located. Firestopping falls in this thermal and moisture protection section. Also found in this section of MasterFormat is insulation, air barriers, roofing and waterproofing, plus Intumescent Fire Resistive Materials (IFRM) and Spray Fire Resistive Materials (SFRM) fireproofing.

There are five sections for firestopping that deal with specific products. The Firestop Contractors International Association (FCIA) recommends that firestopping be specified in the single section in 07-84-00, Firestopping. Firestopping is a SYSTEMS oriented installation. In addition to firestop products being selected that meet the physical requirement needs of the building, there must be testing that proves suitability of use of the products in specific applications. The testing results are published as SYSTEMS in the various directories from labs referenced above and are referenced as part of the specification.

As to the 07-84-00 Specification, it is FCIA’s belief that firestopping be specified in one place, and only once. That means that there is no specification for firestopping in the mechanical, electrical or plumbing, wallboard, masonry, concrete or other specification section. By specifying firestopping in one place, there is less chance for confusion and
conflict in a document. If firestopping is specified in three or more places, requirements could be lost, and major confusion takes place on firestop projects.

Leading specifiers have specified firestop inspection even before there was an inspection standard for firestopping and before building codes required them. Rather than a standard, they simply specified, “independent inspection of firestopping, paid for by building owner, to be performed by a third party . . .” in Part 3, Execution Section of the 07-84-00 Firestopping Specification.

Building codes also, in some cases, require firestop inspection. The International Code Council, (ICC) develops and publishes the International Building Code (IBC). The IBC has a complete chapter—Chapter 17—devoted to “Special Inspection.”

In the 2007/2008 ICC IBC development cycle, the ASTM E 2174 and ASTM E 2393 Standards for the Inspection of Penetration and Joint Firestop Systems passed, successfully and through the ICC consensus, were added to the 2009 International Building Code’s Chapter 17, Special Inspection.

Firestop Special Inspection is required by the IBC code on certain types of buildings where the 2009, 2012 or 2015 IBC has been adopted by the jurisdiction.

The building types where Firestop Special Inspection is required are “High-Rise” and “Category III or Category IV Buildings stated in table 1604.5”. In Chapter 17 of the IBC, the inspection is required to be performed to ASTM E 2174 Standard for the On-Site Inspection of Installed Firestops & ASTM E 2393, Standard for the On-Site Inspection of Installed Fire Resistive Joint Systems. More on the standards and where they are included later in this document.

The inclusion of ASTM E 2174 and ASTM E 2393 into the IBC is significant. Acceptance of these two standards required great effort and started years before the 2009 I-Codes adapted special inspections for firestopping.
Evolution of Firestop Special Inspection
At the spring 1999 FCIA Education and Committee Action Conference, FCIA member Don Sabrsula of FireSafe of Houston and Roger McKenzie, McKenzie Insulation, asked a question of speaker Mike Pfeiffer, ICC’s Vice President, Code Development. Don and Roger asked, “Why is there no special inspection for firestopping like there is for structural steel fireproofing?” Don continued, “In spray fire resistive material application (SFRM Fireproofing), a contractor installs the products so there is consistency in application and a separate line item for building owners and managers and general contractors to use during the bidding/tender process. In firestopping, it’s a free for all and many projects use multiple disciplines and separate contractors to install firestopping. We really need it for fire safety and smoke protection to be installed correctly—especially when the contractor installing has no idea what firestopping is . . .”

ICC’s Mike Pfeiffer replied, “The code is your code . . . and anyone can write and submit a code proposal. If you want special inspections for firestopping to be added to the International Building Code (IBC), then consider creating standards for inspection at a standards development organization and submitting the standards to the International Code Council (ICC) Code Development Process to become part of the Code.”

This exchange between Don and Mike was the birth of the FCIA Standards Committee and the effort to get special inspections for firestopping as part of the IBC. The FCIA Standards Committee met, and subsequently went to ASTM where it was requested that a Task Group be formed to build the Firestop Inspection Standards.

Firestop Contractors and manufacturers, along with other interested parties collaborated through the consensus process and developed two standards at ASTM—ASTM E 2174, Standard Practice for the On-Site Inspection of Installed Firestops, (Penetrations) and ASTM E 2393, Standard Practice for On-Site Inspection of Installed Fire Resistive Joints and Perimeter Fire Barriers. They became standards in 2001 and 2004, respectfully.

Once the ASTM E 2174 & ASTM E 2393 inspection standards were completed, FCIA submitted a proposal to the ICC Code Development Process to have these standards included in the IBC. The proposals to add Firestopping Special Inspection to the IBC were disapproved over at least two code development cycles, almost 9 years, prior to approval. FCIA’s staff and code consultant worked together to get the standards added to the IBC. The IBC cited the improper insertion of mandatory/non-mandatory language and other needed changes as the reason for disapproval during these periods.
FCIA's Executive Director became Chair of the Task Group at ASTM after the 2nd disapproval of the standards by the ICC’s code development process in about 2007. FCIA then met with industry manufacturers and consultants at ASTM to resolve the mandatory/non-mandatory language and other issues in the standards that caused rejection, with over 65 individual ballots. The ballots were drafted to correct the standards and prepare them for the IBC code submissions. The ASTM ballots passed at ASTM’s E06 Committee with support from building officials, fire marshals, contractors, manufacturers and consultants. The result was that the ASTM E 2174 / ASTM E 2393 were ready for submission to the codes, and eventually, adoption at jurisdictions.

FCIA's submission of the ASTM E 2174 and ASTM E 2393 Standards to the 2008/2009 Code Development Cycle for the 2009 International Building Code then took place. The standards passed at ICC’s Committee Action Hearings and then at the Final Action Hearings in 2009 with the help of many, including FCIA's Staff and Code Consultant. Passing at both hearings meant that the standards would be incorporated into the IBC.

FCIA was the proponent to have these inspection standards added to Chapter 17, Special Inspections of the IBC Code. Chapter 17 now requires inspections in compliance with ASTM E 2174 and ASTM E 2393 for specific structures. (See below)

FCIA also proposed, at the same time, that “FM 4991 Approved Contractors or UL Qualified Firestop Contractors” be required to install the firestop products that become systems after installation on the same type of buildings, High-Rise and Category III and IV buildings. This move to include the contractor programs in the code was in addition to the requirement to inspect to ASTM E 2174 and ASTM E 2393. The vote was very close to mandating the requirement for FM 4991 Approved or UL Qualified Firestop Contractors in the IBC, with the 7-7 vote tie broken by the chair of the Fire-Safety Code committee.

The FCIA’s position was, and remains, that the correct cost value for firestopping is when a knowledgeable Firestop Contractor and knowledgeable Firestop Inspection Company perform the service.

In Canada, Special Inspection for firestopping is not part of the National Building Code of Canada. However, inspection is in many Firestopping MasterFormat Section 07-84-00 specifications across the Provinces of Canada. In parts of the Middle East, inspection to the ASTM E 2174 and ASTM E 2393 Standards is used extensively. In NFPA 101, *The Life Safety Code*, and NFPA 5000, there are references to the ASTM E 2174 and ASTM E 2393 Standards, but not use is not mandated by the code.

**International Building Code (IBC) Requirements and Discussion:**
The IBC requires Firestop Special Inspection, as stated above. Inspection is important as it is to verify that the contractor’s management system is working, and installation quality meets the systems requirements. Firestop Special Inspection is clearly required by the codes with many key points made by the IBC for the Authority Having Jurisdiction (AHJ) to manage the process.
The following passages in italics include the 2012 IBC Chapter 17 Special Inspection requirements for firestopping; Penetrations & Joint Firestops and FCIA’s Notes as well:

**1705.16 Fire-resistant penetrations and joints.** In high-rise buildings or in buildings assigned to Risk Category III or IV in accordance with Section 1604.5, special inspections for through-penetrations, membrane penetration firestops, fire resistant joint systems, and perimeter fire barrier systems that are tested and listed in accordance with Sections 714.3.1.2, 714.4.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.16.1 or 1705.16.2. [IBC 1705.16]

**1705.16.1 Penetration firestops.** Inspections of penetration firestop systems that are tested and listed in accordance with Sections 714.3.1.2 and 714.4.1.2 shall be conducted by an approved Inspection Agency in accordance with ASTM E 2174. [IBC 1705.16.1]

**1705.16.2 Fire-resistant joint systems.** Inspections of fire resistant joint systems that are tested and listed in accordance with Sections 715.3 and 715.4 shall be conducted by an approved Inspection Agency in accordance with ASTM E 2393. [IBC 1705.16.2]

**FCIA Note:** For clarification, “High-Rise Buildings” are defined by IBC in Chapter 2, Definitions.

**HIGH-RISE BUILDING.** A building with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

**FCIA Note:** These high-rise structures and Category III and IV buildings are mandated to have special inspection of firestopping.

The Category III or IV buildings where firestop inspection is required by Section 1604.5 are “special occupancies.” These structures are described in the IBC, Table 1604.5:

**Table 1604.5—Risk Category III Buildings**
Buildings and other structures that represent a substantial hazard to human life in the event of failure, include but are not limited to:

- Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
- Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250.
- Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500.
- Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities.
- Group I-3 occupancies.
- Any other occupancy with an occupant load greater than 5,000.
- Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Risk Category IV.
- Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the International Fire Code; and are sufficient to pose a threat to the public if released. [IBC 1604.5]

**Table 1604.5—Risk Category IV Buildings**

Buildings and other structures designated as essential facilities, including but not limited to:

- Group I-2 occupancies having surgery or emergency treatment facilities.
- Fire, rescue, ambulance and police stations and emergency vehicle garages.
- Designated earthquake, hurricane or other emergency shelters.
- Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
- Power-generating stations and other public utility facilities required as emergency backup facilities for . . . [IBC 1604.5]

- Buildings and other structures containing quantities of highly toxic materials that:

  Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the International Fire Code, and are sufficient to pose a threat to the public if released.

- Aviation control towers, air traffic control centers and emergency aircraft hangars.
- Buildings and other structures having critical national defense functions.
- Water storage facilities and pump structures required to maintain water pressure for fire suppression. [IBC Table 1604.5, Cat. III, IV]

The IBC’s Chapter 7 describes fire-resistance rated and smoke-resistant assemblies with the concept of “continuity.” Fire barriers are to be fire-resistance rated and continuous from fire barrier to fire barrier (or fire wall) and from fire-resistance rated horizontal assembly to the next horizontal assembly . . . and from outside wall to outside wall.

This IBC continuity requirement is the root purpose for all types of fire-resistance rated assemblies and the features of fire-resistance rated and smoke-resistant assemblies. Continuous fire-resistance is required, period.

The “features” of fire-resistance rated assemblies include firestopping, fire and/or smoke dampers, fire rated door assemblies, and fire rated glazing in fire rated barriers and floors. The purpose of the “features” is to maintain continuity where breaches, gaps, voids, openings occur in the fire-resistance rated assemblies. How those breaches are treated is explained in other FCIA Firestop Manual of Practice (MOP) Chapters.

**FCIA Note:** Where the word breaches is used, it is meant to include the words gaps, voids, openings, intersections, where either fire-resistant joint systems are installed or firestopping penetrations take place in these areas.

FCIA supports firestop special inspection for these important occupancies during new construction and, where applicable, in existing buildings. The inspection standards are used
for renovation projects at existing buildings with enough scope and size of firestopping to justify the expense.

FCIA also believes that all fire-resistance rated assemblies require proper routine survey and the products might, and at some point, and for various reasons, require maintenance. The International Existing Building and International Fire Codes, National Fire Code of Canada, NFPA 1 and other fire codes do not require special inspection until such time that the change or construction in the building results in the scope of work viewed needing to meet new construction requirements. While an inspection to ASTM E 2174 and ASTM E 2393 might be a good idea in existing buildings for the purpose of its maintenance, it also may be cost prohibitive to the Building Owner and Manager.

Inspection and maintenance or management is discussed in another section of the FCIA Firestop Manual of Practice as well as both the International Fire Code and NFPA’s Life Safety Code, NFPA 101.

The Purpose of 3rd Party, Independent Firestop Inspection

Firestop systems are installed to very exacting parameters. The parameters are shown in the tested and listed systems from the UL Fire Resistance Directory, Intertek Directory, an approval from the FM Approvals Guide, or other approved source. The parameters for installation are in the manufacturer’s installation instructions, the listings or EJ’s/EFERRA’s, and safety data sheets. All parameters in the tested and listed system or EJ must be met through installing firestop products to the exact details provided in the System, EJ and manufacturers installation instructions–safety data sheets. These documents are the Inspection Agency inspector’s recipe for inspection.

For instance, if the annular space size is stated in the firestop system as maximum 2 inches then an annular space of 2-1/4 inches at the jobsite is unacceptable. If the penetrating item type is copper at the jobsite and the system states steel, then a variance has occurred, and the system again would not be acceptable. The same holds true for joints. If the joint width is to be maximum 2 inches, then the sizing must be 2 inches or less.

For more on systems selection and analysis, refer to Chapters 3 and 5 of FCIA’s Firestop Manual of Practice (MOP).

The International Building Code requires special inspection for certain types of buildings. Although not required by the IBC or other codes for all types of buildings constructed, building owners and managers, designers and specifiers, authorities having jurisdiction, and hiring authorities might require an independent, third-party inspection anyway. The inspection is performed by an agency who employs inspectors to inspect firestop systems. The independent inspection verifies the effectiveness of the Firestop Contractors’ installation quality.

The ASTM E 2174 & ASTM E 2393 Firestop Inspection Standards are sometimes used when they are not required by the various building codes. When specified by architects in construction documents, they provide the option for the third-party Inspection Agency to perform either in-process observation or destructive examination of the installed firestopping system, providing a great check on the Firestop Contractors management system. The inspection’s goal is to verify that firestopping has been installed to the tested and listed
firestop system, and or engineering judgment/Equivalent Fire Resistance Rated Assembly (EJ/EFRRA) and manufacturer’s installation instructions.

FCIA’s maintains its original objective that the special inspection shall, not should, be hired directly by the building owner or the design professional—contracted directly to the building owner, or the building owner’s agent. This contracting methodology promotes Special Inspection Agency and special inspector independence.

Should the special inspection firm be hired by the general contractor, subcontractor or Firestop Contractors directly, there could be conflicts of interest. Conflicts of interest are discussed in a future section of this document.

**Firestop Special Inspection Agency & Special Inspector Qualifications**
The requirements for qualifying the approved agency (or Special Inspection Agency/Inspection Agency) and the special inspector are specified in the International Building Code in Chapter’s 1, 2 and also in 17. There are many terms that are defined in Chapter 2 and general requirements in Chapter 1 that are integral to the code requirements for inspection of firestopping. These are in addition to other qualifications that can be required by the specifications, AHJ and or hiring authority.

The IBC’s Chapter 17, Special Inspections outlines requirements for the Special Inspection Agency, the special inspector and the process used for the inspection of many different construction disciplines. There are also minimum requirements for the firestop inspector to meet in the ASTM E 2174 and ASTM E 2393 Standards. As in all code related issues, the most restrictive requirement applies. This means if the code requirement is stricter than the standard’s requirement, that the code then takes precedence over the standard. The code wins over the standard when implemented in the real world. When it comes to Firestop Special Inspection, the code has some requirements that are more stringent than the ASTM E 2174 and ASTM E 2393 Standards.

**IBC Requirements—Special Inspection Qualifications**
Below are specific passages from the International Building Code that outline the approvals needed for special inspection agencies and special inspectors in the International Building Code. First, in IBC’s Chapter 1, the Scope of Inspections is introduced:

**110.3 Required inspections.** The building official, upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.10.

**110.3.8 Other inspections.** In addition to the inspections specified in Sections 110.3.1 through 110.3.7, the building official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the department of building safety.

**110.3.9 Special inspections.** For special inspections, see Chapter 17.  
[IBC 2015, 110.3, 110.3.8 110.3.9]

**FCIA Note:** In section 110.4, the code gives the building official the authority to accept reports from approved inspection agencies. The word approved is in italics as it is a defined term in the IBC Chapter 2.
110.4 Inspection agencies. The building official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability. [IBC 2015 110.4]

110.6 Approval required. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official . . . [IBC 2015 110.6]

FCIA Note: The definitions from Chapter 2 of the International Building Code (IBC) also present more about Special Inspection, and it is slightly different between the 2009 and 2015 version of the IBC.

Special Inspection—Inspection as herein required of materials, installation, fabrication, erection or placement of components, and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards. [IBC 2009, 202]

SPECIAL INSPECTION. Inspection of construction requiring the expertise of an approved special inspector in order to ensure compliance with this code and the approved construction documents. [IBC 2015, 202]

FCIA Note: In the IBC Chapter 2, there are two types of special inspection. The IBC makes a distinction between continuous and periodic special inspection:

Continuous special inspection. Special inspection by the special inspector who is present when and where the work to be inspected is being performed.

Periodic special inspection. Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed. [IBC 2015, 202]

FCIA Note: Also in IBC’s Chapter 2, are definitions for Approved and Approved Agency. The approved agency is the company that is approved to inspect whatever discipline is to be inspected.

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official. [IBC 2015, 202.2 Definitions]

APPROVED. Acceptable to the building official or authority having jurisdiction. [IBC 2015, 202.2 Definitions]

FCIA Note: In Chapter 2, there is also a definition for the Special Inspector in addition to the Special Inspection Agency. According to the code, the inspector is employed by or retained by the Special Inspection Agency, which is some form of entity, a company.

To provide a quantifiable way for the AHJ to Approve the Special Inspection Agency and the Special Inspector, FCIA worked with International Accreditation Services in IAS’ Accreditation Criteria (IAS) AC 291 to build an accreditation program for firestopping inspection.
companies. For Firestopping, IAS AC 291 includes a requirement for all inspectors to have passed the FM or UL Firestop Exam or the International Firestop Council Firestop Exam.

As stated in the IBC, the code requires approval by the Authority Having Jurisdiction of BOTH the Inspection Agency (company) and the Special Inspector (the individual inspector):

**SPECIAL INSPECTOR.** A qualified person employed or retained by an approved agency and approved by the building official as having the competence necessary to inspect a particular type of construction requiring special inspection.  
**[IBC 2015, 202.2 Definitions]**

**FCIA Note:** Then, there is also further discussion about the approved agency in Chapter 17 at the very beginning of the chapter, that refers to the definition of the Approved Agency.

1703.1 Approved agency. An approved agency shall provide all information as necessary for the building official to determine that the agency meets the applicable requirements. **[ICC’s IBC 2015 1703.1]**

FCIA NOTE: The Approved Agency must meet applicable requirements such as independence of the company and inspectors employed or retained from the contractors, manufacturers, manufacturers reps and distributors that sold the material, discipline or trade to be inspected.

1703.1.1 Independence. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed.  
**[ICC’s IBC 2015 1703.1.1]**

FCIA NOTE: Under Independence, there is a very clear basis for keeping the inspector, manufacturer and contractor as separate entities. ASTM E 2174 and ASTM E 2393 provide further clarification that the contractor not be related to, a competitor of, distributor, or manufacturer of the products being installed. Taken together with the IBC, there are very clear directions that independence is important in this process.

The IBC also mentions that the inspector needs to be competent. How does an individual inspector prove competence in firestopping?

We at FCIA believe that the UL/ULC or FM Firestop Exams provide the appropriate proof that the inspector is competent. While there might be exams offered by others, the FM and UL/ULC Firestop Exams offer 16 years of experience in firestop examinations from a true third-party, independent organization. Plus, both FM Approvals and UL/ULC are well known and respected entities in the standards and code arenas.

The Chapter 17 of the IBC also directs that the Approved Agency have the equipment, calibrated, plus experienced personnel educated in conducting inspections. This means everything from safety to construction surrounding awareness, and many other aspects of working on project sites.
1703.1.2 Equipment. An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated. [ICC’s 2015 IBC 1703.1.2]

1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections. [ICC’s 2015 IBC 1703.1.3]

FCIA NOTE: To meet IBC Chapter 17 Code requirements above and approve the Special Inspection Agency, there are actually two parts—two approvals—of the IBC requirements that the AHJ must satisfy. The Special Inspection Company (agency) needs to be approved and so do the individual inspectors that will look at the firestopping. That’s the dual approval—inspector and inspection agency.

The word approved in “approved agency shall employ . . .” trigger the requirement for a company to be approved by the AHJ for this work.

What’s an agency? An agency is some type of company. The company can be any form. Forms of corporations are:

- Sole Proprietors
- Limited Liability Company (LLC)
- Limited Liability Partnership
- Sub-Chapter S
- “C” type Corporation.
- Other types of company, varies worldwide.

The IBC Code does not dictate which type of company is hired by the building owner and manager to inspect firestopping. The code only requires that there needs to be an entity, an agency, which is a company.

There might be other qualifications, such as years in business, insurance coverage, licensing, experience in the same type and complexity of work inspected, or other requirements.

Back to Special Inspections. Further, the IBC Chapter 17’s 1704.2 states,

1704.2 Special inspections. Where application is made to the building official for construction as specified in Section 105, the owner or the owners authorized agent, other than the contractor, shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705 and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections identified in Section 110. [IBC 2015 1704.2] Bold emphasis added.

This section states that the owner or owner’s authorized agent, other than the contractor, employs an approved agency for the inspection. This is a very critical section as it protects against a very important conflict—construction schedule vs. inspection quality.
The contractor referenced in the code is the general contractor, subcontractor or other contractors working on the project.

It is FCIA’s position that none of these individual companies are to hire the Special Inspection Agency. This protects against the general or other contractors influencing decisions or assessments made by the Special Inspection Agency.

If the general contractor hires the Inspection Agency and is ultimately responsible for making schedules work, and the installation does not meet requirements, it could be "passed", just to meet schedule. Also, the manufacturer of firestop products and materials used in the firestop systems is not eligible to be the firestop inspector, as defined by the IBC’s Chapter 17.

Additionally, in ASTM E 2174 and ASTM E 2393, there are sections that state there needs to be independence. The independence is separation of the inspector and Inspection Agency from the contractor company installing the work very similar to what is in the IBC. More from the ASTM standards later in this document.

In the next IBC Section, the qualifications for the Special Inspection Agency’s employed or retained special inspectors are stated.

1704.2.1 Special inspector qualifications. Prior to the start of construction, the approved agencies shall provide written documentation to the building official demonstrating his or her competence and relevant experience or training of the special inspectors who will perform the special inspections and tests during construction. Experience or training shall be considered relevant when the documented experience or training is related in complexity to the same type of special inspection or testing activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as the special inspector for the work designed by them, provided they qualify as special inspectors. [IBC 2015, 1704.2.1]

FCIA Note: In this section 1704.2.1, it is clear there are no “certifications” required by the code for the people who inspect the firestopping. What is required by the code is “competence and relevant experience or training” of the special inspectors.

Further the code in 1704.2.1 also states that the special inspector has “documented experience and training in the same type of special inspection for projects of similar complexity and material qualities”.

This is a very critical point. Why? Inspecting a breach in an fire-resistance-rated or smoke-resistant assembly created for a single penetrating item is much less complex than a breach with multiple penetrating items with an installed firestop system. Multiple plastic penetrating items through breaches in fire-resistance rated and smoke resistant assemblies can be much more complex than a single penetrating item or even a multiple metal penetrating item system. Each building occupancy type may have more complex piping, electrical, communication and other systems, meaning more complex firestop systems to inspect.
Therefore, the code requires that competency be measured in the same type and complexity of systems to be inspected.

Finally, this section of the code does allow the “registered design professional in responsible charge” as the approved agency. This means that the registered architect may perform the special inspections instead of the Special Inspection Agency—if they meet the same requirements as the firestop special inspector, competence in the same type and complexity of materials inspected. Proof is required for that too, in FCIA’s opinion. Proof could be passing an exam in addition to project references.

In Chapter 17, there are requirements for AHJ approval of both the special inspector (individual) and the Special Inspection Agency (company). The next section describes how the AHJ and Authorizing Agency (AA) may make the decision to approve the firestop Inspection Agency and firestop inspector.

**Special Inspection Agency Qualifications**

**Accreditation—International Accreditation Service (IAS) IAS AC 291**

Chapter 17 of the International Building Code requires that the building official approve the Special Inspection Agency company that will perform special inspections in Section 1703.

Using IAS AC 291, the AHJ and the Building Owner and Manager have a quantifiable way to provide a basis for the approval of the Inspection Agency company. Proof of competence, equipment, personnel and procedures is one way to approve a company. Another way to approve the company—and the individual inspectors—that they have the ability to perform inspections—is through accreditation to IAS AC 291.

According to International Accreditation Service,

> “Accreditation is a formal, independent verification that a program or institution meets established quality standards and is competent to carry out specific conformity assessment tasks. Conformity assessment tasks may include, but are not limited to, testing, inspection, or certification.

Typically, governmental regulatory agencies such as the Consumer Product Safety Commission (CPSC), the U.S. Environmental Protection Agency (EPA), or the Nuclear Regulatory Commission (NRC) require accreditation to verify the technical competence of organizations like laboratories, inspection bodies, and certification agencies.

Organizations responsible for public safety and welfare such as building departments, hospitals, schools, and police and fire departments also seek accreditation to demonstrate their competence and reliability.

Accreditation has been used for over 50 years as the definitive means of evaluating organizations and is now utilized by all the world’s major economies and many developing economies.” [IASonline.org]

Many of the firestopping manufacturers proudly proclaim, and rightfully so, accreditation to ISO 9000 standards. The ISO 9000 audits assure that the manufacturer complies with their own quality manual during company operations—from management to manufacturing.
FCIA was the first sub-contracting industry to use accreditation to build better firestopping through the quality management process. FCIA believes that accreditation provides Firestop Contractor companies with ways to quantitatively prove their competence in Firestop Contractor company operations.

To help the AHJ meet the 1703.1 section of the IBC through approval of the Inspection Agency, FCIA worked with International Accreditation Services (IAS) to develop a special Firestopping Section in the IAS AC 291 for Firestop Inspection Agencies.

IAS AC 291 is the Accreditation Criteria for Special Inspection Agencies. It helps the Authorizing Agency to comply with code requirements through company procedures that direct both the inspector and the Inspection Agency in firestop inspections.

The IAS AC 291 Accreditation is a management system based quality assessment program where IAS Auditors verify that the processes the Special Inspection Agency uses, are actually being followed. The IAS AC 291 also assures that the responsible individuals managing the Firestop Inspection Agency and the inspectors have competence, and an industry benchmark level of knowledge, all with the objective that the company manage firestop inspection operations properly.

This accreditation program, IAS AC 291, provides proof that the Inspection Agency meets the IBC’s 1703.1.3 requirement that requires competence. The FM & UL Firestop Exam or IFC Firestop Exam are used to assess competence and the individual firestop inspector’s knowledge at the Special Inspection Agency in the specific discipline. This is part of IAS AC 291 Accreditation. (Visit www.fcia.org, Inspection Agency accreditation, for more info).

**IAS AC 291 Accreditation Process**

For Firestopping accreditation, once a person passes the FM or UL Firestop Exam, then IAS performs an audit of the firestop inspection operations of the company. The audit is an assurance that the Firestop Inspection Agency company procedures for firestop inspection are being followed.

Also, the IAS AC 291 Accreditation is a way for special inspection agencies to prove their company is competent to employ special inspectors that inspect firestopping, as is stated in the code. The IAS AC 291 also accredits several other construction industry disciplines, from welding to masonry. The Special Inspection Agency can apply for and get accredited as part of the scope of accreditation.

As part of the IAS AC 291 for Firestopping, either the FM or UL Firestop Exam, IFC Firestop Exam, are required for individual firestop inspectors employed by the firm. The FM or UL Firestop Exam, IFC Firestop Exam prove to AHJs who approve and Authorizing Agencies (AA’s)—Building Owners and Managers who hire—the Approved Agency and Individual Firestop Inspectors, that personnel are educated, and meet requirements in 1703.1.3.

**The FM Approvals (FM) & Underwriters Laboratories (UL/ULC) Firestop Exam**

The FM & UL/ULC Firestop Exams are credible industry exams. These 3rd party administered exams test the knowledge of the individual inspector to prove to the AHJ the person’s understanding of the firestop industry, practices, systems analysis, materials characteristics. Through education and examination, the inspector can provide proof they are capable of
Introduction and Background

Knowing what to do during firestop inspections. The FM or UL/ULC Firestop Exams provide proof of knowledge. FM & UL/ULC provide the unbiased ability to grade these exams fairly and without influence due to direct affiliation with those who sell firestop products or services. UL Canada also has a module for Canada for those who work in Canada.

Where required by code, the individual inspector needs to be approved by the AHJ. The individuals who pass the FM or UL Firestop Exam may also become appointed as a responsible person by the Special Inspection Agency Company under the IAS AC 291, Accreditation of Special Inspection Agencies program—or just become test proven firestop inspectors.

FCIA’S Firestop MOP & IAS AC 291

FCIA’s Firestop Manual of Practice (MOP) is the industry textbook resource document used as the basis of the FM and UL Firestop Exams. The document has generic descriptions of the firestop materials that are used to make firestop systems. The MOP covers systems selection and analysis, identification systems, has a glossary and info about test standards, codes and more. The document is used as the text book for both the FM and UL/ULC Firestop Exams used to evaluate the competence of a person that works in an Inspection Agency. Systems analysis and firestop industry knowledge are big parts of both exams and are critical to both inspectors and contractors. FCIA’s Firestop MOP focuses on the testing, product descriptions and SYSTEMS analysis, among other things. The MOP is used by both contractor and inspector personnel at Firestop Contracting Companies and Inspection Agencies.

FCIA’s MOP is offered to FCIA Members at a discounted rate. Non-FCIA Members can buy the FCIA MOP document as an investment in their company. FCIA offers the FCIA MOP for FREE to Governmental Building Code Officials, Fire Marshals, and Specifiers with Design Firms (CCS’s, CDT’s and RSW’s) as a service to the industry. If you have friends that might qualify, have them send an Email info@FCIA.org to request a FREE FCIA Firestop MOP.

The IAS AC 291 Accreditation Criteria offers a credible credential for Special Inspection Agency companies. The accreditation in is multiple parts and helps make the Special Inspection Agency a better company.

The process to get accredited is that the Firestop Inspection Agency needs to develop a management system manual—a set of policies and procedures that is auditable—based on the IAS’ AC 291 Accreditation Criteria. The accreditation criteria is available at www.IASonline.org.

In the company management system manual is information about procedures for firestop inspection. Included in the management system are training of employees, responsibilities, calibration of equipment, inspection processes and much more.
After the quality manual is developed and the Inspection Agency has performed at least one inspection using the processes in the quality manual, the company can submit the manual for approval to the auditing agency, such as International Accreditation Service (IAS), and schedule the audit.

During the audit, the auditor asks questions about the personnel responsibilities, processes, variance control and recordkeeping that the Firestop Inspection Company keeps of its inspections at the Inspection Agency Office. The auditor may also visit an inspection project site to verify that the processes stated in the quality manual are used.

After the audit, the company is either awarded accreditation or denied accreditation.

To maintain IAS Accredited Special Inspection Agency status, the company is audited annually by IAS for continued compliance.

**FCIA Recommends IAS AC 291 Special Inspection Agency Accreditation, FM & UL Contractors Too**

Why? The IAS AC 291 Special Inspection Agency is a complete package. IAS AC 291 is focused on both the Inspection Company and the individual inspector’s knowledge, competency and understanding of the Firestop Industry.

To inspect ... or contract ... properly, the company needs to understand the firestopping “zero tolerance” requirements for firestop systems installation/inspection at the company level first—and accreditation is quantifiable proof.

Then, the company communicates direction to employees who inspect. This direction is required to get the firestop products installed—and inspected—in breaches created for penetrations and joints to the tested and listed system and manufacturer’s installation instructions.

The tested and listed systems are found in the Directories, online or print, from the testing laboratories. Labs such as Intertek, Southwest Research and UL/ULC. UL/ULC publishes directories including UL/ULC Fire Resistance Directory with Listings and FM Approvals, an “Approval Guide”. These are available free online. (www.UL.com, www.ApprovalGuide.com, www.INTERTEK.com, www.SWRI.org)

Both the Firestop Inspection Company and the Inspector Qualifications are key components to Firestop Inspection success. The focus for success with inspection services needs to be on the Firestop Inspection Company.

The Firestop Inspection Company takes the business and technical risks as a company. The business risk, both financial and operational, the process of purchasing insurance to the jurisdiction mandated minimums, and company culture that results in firestopping inspected to the listings and manufacturer’s instructions, manufacturers acceptable minimums—all this risk—is taken by the company.
The risk can be reduced by having individual inspectors and a business philosophy where understanding the firestop industry protocol for no variations to tested and listed systems, EJ’s and Manufacturers published installation instructions is company-wide and well understood.

FCIA believes that having the company as an IAS AC 291 Accredited Special Inspection Agency and that includes educated, experienced and competent inspectors, is important. In addition to a great Firestop Inspection Company, FCIA also believes that the choice made by the general contractor or Building Owner and Manager using either one or more specialist Firestop Contractor Companies—FM 4991 Approved or UL Qualified—is important and affects fire and life safety in buildings.

By purchasing firestop product installation services from FM 4991 Approved Firestop Contractors and or UL/ULC Qualified Firestopping Contractors, and having inspection, the cost of firestop construction is optimized. The cost is optimized because the contractor with the right management system gets the firestopping installed right the first time. That means less cost for inspections due to less non-conformances in the installation. And, it's all due to the Firestop Contractor Company and the Inspection Agency Company having the appropriate culture for firestopping.
Scope of Work & Special Inspection Agency Responsibilities

Special Inspection Agencies have very critical services to perform. The services provided by the Special Inspection Agency are verifying that the firestop installation is in accordance with the construction documents—tested and listed system listings, manufacturers installation instructions. This is the main scope of work for the Special Inspection Agency.

Authorizing Agencies may hire special inspection agencies for other scopes of work as well. The other scopes of work include items such as the fire-resistance rated walls and floors, fire dampers, fire rated glazing, fire doors. The scope of work beyond firestopping must be in writing and part of the contract for the Special Inspection Agency with the Authorizing Agency, or purchaser. That Authorizing Agency is supposed to be the Building Owner and Manager directly.

In fire-resistance-rated assemblies, the firestopping is a unique system that that requires specialized knowledge and special inspection as required by the International Building Code and or by construction documents.

There are several disciplines that require special inspection. However, in the fire-resistance-rated construction industry, not all require special inspection. For instance, the fire-resistance-rated gypsum wall does not require special inspection. Fire-resistance-rated concrete floors might require testing for certain other properties such as compression strength, slump, etc. Fire-resistance rated concrete masonry units might also require inspection.

The fire and smoke protection features such as fire-rated glazing, fire-rated swinging doors with builder’s hardware or rolling fire doors do not require special inspection.

Fire dampers that have firestopping used as part of their tested and listed system will require a special inspection of the firestop portion of the damper. Fire dampers alone do require testing at commissioning, then one year later and every 4 years in all occupancies other than hospitals, which is a 6-year inspection frequency. The commissioning and in-service inspections (or surveys) for fire dampers are required in NFPA 80, Standard for Fire Doors and Other Opening Protectives.

In addition to inspection by a third party for quality control and compliance, there is another type of “inspection”. Inspection that is performed by a Firestop Contractor to check his or her own work or to view the conditions of existing buildings, is sometimes called inspection. It is also known as Survey. Some Firestop Contractors Survey. A “Survey” might be performed to determine if assemblies are visibly compliant and if the contractor’s management system is working. The frequency will be less than that required of ASTM E 2174 or ASTM E 2393.
Surveys are especially helpful to assess an existing building. FCIA has a Recommended Professional Practice for Survey, available to FCIA Members in the Members Only Section of www.FCIA.org. It is available for a fee to those that are not FCIA Members.
Special Inspection Process—
Code & Standards Requirements—Differences
Both ASTM E 2174 and ASTM E 2393 have requirements for reporting variances to the
tested and listed systems and manufacturer’s instructions. The International Building Code
(IBC) also has a requirement for reporting.

In IBC’s Chapter 17, 1704.2.4, Report Requirements, there are some critical requirements
that are more restrictive than the ASTM E 2174 and ASTM E 2393 Inspection Standards.
The first key point in the International Building Code is that the discrepancies found shall
be brought to the immediate attention of the contractor for correction. That means the
Firestop Inspector employed by the Special Inspection Agency and Firestop Contractor need
to be communicating real time, either face to face or via text and pictures to accomplish the
immediate notice intent of the IBC.

While the code states immediate notice to the contractor, the ASTM E 2174 and ASTM
E 2393 Standards require only a one (1) day notice to the contractor from the Special
Inspection Agency Inspector when variances occur. The one-day notice is less stringent and
very inefficient for the Building Owner and Manager. If notice to the contractor is immediate,
the problem with firestop installation can be fixed right away. If not, the contractor can
continue to make the same mistake for a full day, meaning more reworking of installations
causing possible delays to the project. Consider the project that is behind schedule and the
Firestop Contractor expedites through placing hundreds of workers on the project. There
are a lot of mistakes that can be created during the lag time from discovery of an error and
reporting it to the Firestop Contractor. The Firestop Inspector that reports late on variances
that could have been prevented by immediate communication provides less value to the
total project and the eventual customer, the Building Owner and Manager.

In the IBC, there is a rule that the stricter requirement of either the code or
standard applies.

Therefore, the one-day notice in the ASTM E 2174 or ASTM E 2393 is overridden by the
immediate notice to the contractor from the inspector that is required in the IBC. See below
for the exact language.

1704.2.4 Report requirement. Approved agencies shall keep records of
special inspections and tests. The approved agency shall submit reports of special
inspections and tests to the building official and to the registered design professional
in responsible charge. Reports shall indicate that work inspected or tested was or was
not completed in conformance to approved construction documents. Discrepancies
shall be brought to the immediate attention of the contractor for correction.
If they are not corrected, the discrepancies shall be brought to the attention of the
building official and to the registered design professional in responsible charge prior to
the completion of that phase of the work. A final report documenting required special
inspections and tests, and correction of any discrepancies noted in the inspections or
The actual sections for Firestop Special Inspections from the IBC’s Chapter 17 are as follows:

1705.16 Fire-resistant penetrations and joints. In high-rise buildings or in buildings assigned to Risk Category III or IV in accordance with Section 1604.5, special inspections for through-penetrations, membrane penetration firestops, fire resistant joint systems, and perimeter fire barrier systems that are tested and listed in accordance with Sections 714.3.1.2, 714.4.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.16.1 or 1705.16.2.  
**[IBC 2015, 1705.16]**

1705.16.1 Penetration firestops. Inspections of penetration firestop systems that are tested and listed in accordance with Sections 714.3.1.2 and 714.4.1.2 shall be conducted by an approved Inspection Agency in accordance with ASTM E 2174.

1705.16.2 Fire-resistant joint systems. Inspection of fire resistant joint systems that are tested and listed in accordance with Sections 715.3 and 715.4 shall be conducted by an approved Inspection Agency in accordance with ASTM E 2393.  
**[IBC 2015, 1705.16.2, 1705.16.3]**

In the three sections above, the mandate to inspect penetration firestops and fire-resistant joint systems takes place.

The IBC in Chapter 17 also gives the Building Code Official the ability to require special inspection of other assemblies not listed in Chapter 17. These scopes of inspection work are in addition to firestopping and those specialties mentioned in Chapter 17.

1705.1.1 Special cases. Special inspections and tests shall be required for proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:

1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
2. Unusual design applications of materials described in this code.
3. Materials and systems required to be installed in accordance with additional manufacturer’s instructions that prescribe requirements not contained in this code or in standards referenced by this code.  
**[IBC 2015, 1705.1.1]**

The Details—Special Inspection


Breaches, gaps, voids, openings, are created to allow for service items such as pipes, ducts, electrical, communications systems and or for independent movement of assemblies, separation for compatibility. These breaches are what creates the need for firestop systems. Firestop systems add needed continuity to the fire-resistance rated and smoke resistant
assemblies extending the fire-resistance rating of the wall or floor through the breaches made for service penetrations and joints.

The ASTM E 2174, 2014b and ASTM E 2393, 2010, reapproved 2015, Standards are standardized inspection procedures used by Inspection Agencies to inspect firestopping. In addition to the International Building Code, there are references to ASTM E 2174 and ASTM E 2393 in NFPA 101, The Life Safety Code and NFPA 5000. There are also references to the standards in Architect’s Master Specifications. FCIA collaborated with the Master Specification Agencies to have ASTM E 2174 and ASTM E 2393 inserted into the specs worldwide. The ASTM E 2174 and ASTM E 2393 standards are written to be used worldwide and are not limited to North American or USA applications. These standards are required on certain types of buildings in the USA, and specified by architects on projects in Canada and parts of the Middle East. The United Arab Emirates requires the use of special inspections on certain buildings that are designed to the Abu Dhabi Building Code.

**ASTM E 2174/2393, The Details**

As shown in ASTM E 2174, the Scope of ASTM E 2174 is to inspect firestop system to the inspection documents.

**ASTM E 2174**

1. **Scope**

   1.1 *This practice covers the establishing of procedures to inspect firestop products and firestop systems,* including methods for field verification and inspection. This practice is referenced in the International Building Code, Chapter 17, Special Inspections.

   1.2 *This practice addresses all types of firestop products that become firestop systems once installed to the tested and listed system or judgment into fire resistive assemblies.*

   **NOTE 1—Firestop System is defined in Test Method E814. Firestop products are the products used in constructing a firestop system.**

   1.3 *This practice provides methods by which qualified inspectors verify that required firestops on a project have been installed and that their installations are in accordance with the inspection documents. [ASTM E 2174]*

**FCIA Note:** References in ASTM E 2174-14 include the ASTM E 176, Terminology of Fire Standards; E 631, Terminology of Building Construction; E699 Practice for Evaluation of Agencies involved in Testing, Quality Assurance, and Evaluating of Building Components; E814 Test Method for Fire Tests of Penetration Firestop Systems; UL 1479-94 Fire Tests of Through-Penetration Firestops; and the International Building Code.

ASTM E 2393, *Standard for the On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers* covers the many types of fire-resistance-rated joint systems installed in breaches, gaps, openings, joints, where two assemblies need protection.
From Section 1, Scope, of ASTM E 2393;

**ASTM E 2393**
1.1 *This practice covers the establishment of procedures to inspect fire resistive joint systems, including methods for field verification and inspection.*
1.2 *This practice addresses all types of fire resistive joint systems and of perimeter joint protection.*

*Note 1—Fire resistive joint system and joint are defined in Test Method E1966 and UL 2079.*

*Note 2—Perimeter joint protection is defined in Test Method E2307.*

*Note 3—Fire resistive joint systems include joints between two fire resistive assemblies, and perimeter joints between a fire resistive floor assembly and a non-fire-resistive wall assembly. The application of these systems are sometimes extended based on an evaluation to other types of construction.* [ASTM E 2393]

**FCIA Note:** In ASTM E 2393, the scope sets the tone for the inspection of fire-resistance-rated joints. This includes perimeter fire barriers, head of wall, bottom of wall, expansion and other joints.

**Standards References**
In ASTM E 2174-14 and ASTM E 2393-10, there are references to applicable standards.

**In Section 2 of the ASTM E 2174-14, the test standards referenced include:**

- ASTM C1241, Test Method for Volume Shrinkage of Latex Sealants During Cure
- ASTM E176, Terminology of Fire Standards
- ASTM E631, Terminology of Building Constructions
- ASTM E699, Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
- ASTM E814, Test Method for Fire Tests of Penetration Firestop Systems
- UL 1479-94, Fire Tests of Through-Penetration Firestop Systems
- International Building Code

**In Section 2 of ASTM E 2393-10, the test standards referenced include:**

- ASTM E176, Terminology of Fire Standards
- ASTM E631, Terminology of Building Construction
- ASTM E699, Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
- UL 2079, Fire Tests of Fire Resistive Joints
- International Building Code
- NFPA 5000 Building Code
Terminology, Definitions—E 2174 & ASTM E 2393
The ASTM E 2174 has several definitions key to the standard and how the process works. From ASTM E 2174-14, important definitions include, but are not limited to:

3.1 Definitions—Terms defined in Terminology E631, Terminology E176, and Practice E699 will prevail for terms not defined in this document.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 accredited testing laboratory—a company engaged in conducting testing and possesses a valid evaluation report for testing services and is recognized by the AHJ. [ASTM E 2174 & ASTM E 2393]

In ASTM E 2393, the language is slightly different:

3.2.1 authorizing authority (AA)—the designated person, or organization, or their duly authorized representative, charged with the administration and enforcement of the provisions of this inspection document.

Note 4—Examples of the AA include the responsible Architect, Engineer, Building Owner, or their representatives. [ASTM E 2393]

FCIA NOTE: This section refers to the testing laboratory that the manufacturer uses to evaluate the products through fire testing and smoke-resistant property determination.

3.2.2 authority having jurisdiction (AHJ)—the designated authority, or their duly authorized representative, charged with the administration and enforcement of the local fire code or building code, or both. [ASTM E 2174 & ASTM 2393]

FCIA NOTE: The AHJ is a very well-known term in many parts of the world. The definition is self-explanatory and means the individual authorized by the jurisdiction to implement the requirements in the building code. The Jurisdiction could be a country, state, province, emirate, territory, county, city, municipality, or other entity.

3.2.3 authorizing authority (AA)—the designated person, or organization, or their duly authorized representative, charged with the administration and enforcement of the provisions of this inspection document. [ASTM E 2174 & ASTM 2393]

Note 2—Examples of the AA include the responsible architect, engineer, building owner, or their representative. [ASTM E 2174, Note 2]

FCIA NOTE: The AA, Authorizing Agency is the eventual purchaser of the firestop inspection services—the Building Owner and Manager and not the general contractor. This person, designated by a company, is defined in ASTM E 2174 in 3.2.3, and in ASTM E 2393, the same way in section 3.2.1. There is no note in ASTM E 2393 currently, only ASTM E 2174.

The purchaser of inspection services is also defined in the International Building Code. If the inspection is classified as special inspection, the IBC rules apply that the building owner or owners authorized agent “other than the contractor”, shall employ the Special Inspection
Agency. If the inspection is other than required by code, the ASTM E 2174 or ASTM E 2393 Authorized Agency (AA) definition outlines who the AA can be.

In ASTM E 2393, section 3.2.3 covers the accredited testing laboratory.

3.2.3 accredited testing laboratory—a company engaged in conducting testing and possesses a valid evaluation report for testing services and is recognized by the AHJ. [ASTM E 2174 & ASTM 2393]

The IBC really makes it clear about who can hire the Special Inspection Agency:

1704.2 Special inspections. Where application is made to the building official for construction as specified in Section 105, the owner or the owners authorized agent, other than the contractor, shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705 and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections identified in Section 110. [IBC 2015 1704.2]

Back to the ASTM E 2174 & ASTM E 2393, where the evaluation report is defined:

3.2.4 evaluation report—an approved document issued by the Model Code Body Evaluation Service or by the AHJ. [ASTM E 2174 & ASTM 2393]

FCIA NOTE: While this is nice to have, firestop systems are a tested and listed system AND manufacturers installation instructions based industry. This means firestop systems are governed by the boundaries set in tested and listed systems and the manufacturer’s installation instructions or EJ’s and not an evaluation report. The testing laboratory might be accredited, which may suffice for being approved by the AHJ. Certain jurisdictions may require an evaluation report for the products. This evaluation report does not replace the need for tested and listed systems and manufacturer’s installation instructions to prove fire-resistance ratings and smoke-resistant properties.

3.2.5 inspection document—any information provided to the inspector by the AA that is to be used as the basis for the inspection process. This information shall include, but is not limited to, project specifications, contract drawings, Listed Designs, judgments, manufacturer’s instructions and designs, building codes, and other documentation. [ASTM E 2174 & ASTM 2393]

NOTE 3—The approved firestop submittal typically includes the firestop manufacturer’s product data, a design listing of the tested firestop system or the engineering judgment design with illustrated drawings or descriptive text or both for the purpose of verifying each installation and conducting the field-inspection procedures. [ASTM E 2174, 2014]

ASTM E 2393 does not have a note, but instead, a discussion.

3.2.5.1 Discussion—The approved fire resistive joint system submittal should have sufficient details including the manufacturer’s product data, a design listing of the tested
Special Inspection Process

Fire resistive joint system or the engineering judgment design with illustrated drawings or descriptive text, or both, for the purpose of verifying each installation and conducting the field-inspection procedures. [ASTM 2393]

FCIA NOTE: This section 3.2.5 brings up another very important document needed for the inspection. The Special Inspection Agency must have the manufacturers published installation instructions, the listings—tested and listed systems—and approved designs, project specifications and life safety drawings that show where the fire-resistance rated, and smoke-resistant assemblies are located in order to perform the inspection. Engineering Judgments (EJ's) that may have been found to be needed are also required.

Life Safety Drawings denote where fire-resistance-rated assemblies occur. Koffel Associates Image

Also, the life safety drawings must show the areas that have fire-resistance-rated and smoke resistant assemblies. Finally, the Inspection Agency needs to employ inspectors with the skill to evaluate the systems installed in the field, comparing them to the tested and listed system design and manufacturers installation instructions—and the manufacturers acceptance criteria—as provided in the “inspection document”.

3.2.6 inspection form—the document contained in this standard practice that is used to record information obtained during the inspection(s). [ASTM E 2174 & ASTM E 2393]

FCIA NOTE: The inspection form in ASTM E 2174, ASTM E 2393 3.2.6, is the base line minimum information that must be used to gather information reported to the AA and AHJ. Each firestop Inspection Company will have its own unique form as its unique document. The inspection form can be used as their way to be efficient and gain a competitive advantage over another Inspection Agency. The important fact is that the inspection form must have a minimum amount of information, as has been stated on the form in the ASTM E 2174 and ASTM E 2393 Standards. Both ASTM E 2174 and ASTM E 2393 have an
inspection form as part of the ASTM Standard Practice Document. It is the minimum amount of information required to be reported to the AA.

| INSPECTION FORM | Reference No.  
|-----------------|-----------------|
| Inspection Date: | Inspector:  
| Installer: | AA:  
| AHJ: | Project:  
| Firestop Type per Inspection Documents:  
| Quantity of Firestop Type on Project: | Quantity Inspected Today:  
| Total Quantity Inspected to Date:  

### Inspected Firestops

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### Repaired Firestops

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<th>Location &amp; Inspection Form Reference</th>
<th>Compliant “Yes” If “No” State Deficiency</th>
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ASTM E 2174 Inspection Form. [ASTM E 2174, 2014]
<table>
<thead>
<tr>
<th>Inspection Date: ___________________</th>
<th>Inspector: ______________________</th>
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</thead>
<tbody>
<tr>
<td>Installer: ________________________</td>
<td>AA:______________________________</td>
</tr>
<tr>
<td>AHJ:______________________________</td>
<td>Project:________________________</td>
</tr>
<tr>
<td>Fire Resistive Joint System Type per Inspection Documents:</td>
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</tr>
<tr>
<td>Quantity of Fire Resistive Joint System Type on Project: __________</td>
<td>Quantity Inspected Today: ________</td>
</tr>
<tr>
<td>Total Quantity Inspected to Date: ________________</td>
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</tbody>
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**Inspected Fire resistive joint systems**

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<th>Location &amp; Inspection Document Reference</th>
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**Repaired Fire resistive joint systems**

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**FIG. 1 Example of Inspection Form**

ASTM E 2393 Inspection Form. [ASTM E 2393, 2014]

In Section 3.2.7, the inspector requirements are outlined.

3.2.7 inspector—an individual meeting the qualifications set forth in this document and who performs the inspection. [ASTM E 2174 & ASTM E 2393]

**FCIA Note:** Although the inspector is defined in ASTM E 2174, ASTM E 2393, the International Building Code states specific requirements that must be followed in addition to the ASTM E 2174 and ASTM E 2393 requirements stated in 3.2.7.
The International Building Code (IBC) states specifically that Special Inspection is performed by the Agency hired by the building owner or the building owner’s agent, not including the contractor. Special Inspection can also be performed by the design professional in responsible charge or engineer of record that employs inspectors. This language from the IBC keeps the process transparent.

3.2.8 judgment—an evaluation of a field condition which does not conform to an existing tested and listed system. [ASTM E 2174 only]

3.2.8.1 Discussion—Judgments are expected to be issued by a manufacturer or an accredited testing laboratory on the basis of an appropriate combination of engineering principles and testing. [ASTM E 2174 & 2393]

NOTE 4—The judgment is commonly referred to as an “Engineering Judgment” in the firestopping industry. These judgments are not always issued by engineers. [ASTM E 2174, ASTM E 2393, discussion 3.2.8.2]

NOTE 5—Some AHJs allow a judgment by the manufacturer if there is no tested and listed system for the non-typical condition, others do not. Most AHJs will allow judgments by accredited testing laboratories. [ASTM E 2174, ASTM E 2393, discussion, 3.2.8.3]

FCIA NOTE: This section, 3.2.8, Engineering Judgments (EJ’s) covers a lot.

EJ’S & EFRRRA’S
Engineering Judgements (EJ’s) are called Judgements in the ASTM E 2174 and ASTM E 2393. However, in the FM 4991 Standard for the Approval of Firestop Contractors, the EJ’s are defined as an Equivalent Fire Resistance Rated Assembly, or EFRRRA’s. An EFRRRA is a very strong statement. When requested by the contractor and provided, it is a claim by the manufacturer of the firestop products that they believe the EFRRRA to be equal to a fire-resistance rated firestop system.

EJ’s and EFRRRA’s are an area that needs clarification for the firestop contractor and firestop inspection agency—are they allowed, and what are the restrictions—at the jurisdiction where the work takes place. Clarity is also needed by specification as well. As stated prior, some AHJ’s will not allow EJ’s to take place. That may mean more testing for the manufacturer successful at selling their materials on the project. This is especially true when EJ’s are only allowed on a limited basis or not allowed at all. The EJ/EFRRRA requirements will have been solved by the firestop contractor and the AHJ, long before the Firestop Special Inspection Agency has been hired by the Authorizing Agency.

The ASTM E 2174 section 3.2.8, and note 4 and 5, as well as sections in ASTM E 2393, state that the EJ’s are expected to be issued by a manufacturer or an accredited testing laboratory. This is giving a signal from the standard to those preparing judgements that these EJ’s need to be produced by these organizations and only them. In FCIA’s opinion, the closer the EJ or EFRRRA writer is to witnessing the fire testing and manufacturer’s chemistry, the better.
This brings up the question, is a third party engineer capable of writing an EJ? It is possible that a 3rd party engineer or fire protection engineer might be able to write an engineering judgement based on fire test reports and other information available to the engineer. It seems based on the language above in 3.2.8.1 of the ASTM E 2174 and ASTM E 2393 Standard, it is really stating that those with firsthand knowledge write the EJ’s. That statement seems to not preclude outside engineers from writing EJ’s. There are 3rd party engineers and fire protection engineers who do and have produced judgements. In Canada, when professional engineers perform this work, they are obligated to follow the judgement from writing through installation.

Finally, the AHJ has the authority to accept EJ’s based on 104.10 and 104.11 of the International Building Code. In Canada and other countries, the administrative sections of the code may give the authority to the building official to accept EJ’s as well. There is a complete section on EJ’s in FCIA’s MOP under the Systems Selection Section. Additionally, FCIA has references the International Firestop Council’s Guidelines for Engineering Judgements. (http://www.firestop.org/engineering-judgment-guidelines.html).

The next section discusses listing labels.

3.2.9 listing label—identification applied to the product that includes the name of a quality assurance agency indicating that a representative sample of the product or material has been tested and evaluated by the quality assurance agency. [ASTM E 2174 & ASTM E 2393]

**FCIA NOTE:** in FCIA’s opinion, this listing label is the label that appears on the manufacturer’s product packaging. This label refers the user to another document—a directory and the listing—which is where the tested and listed systems reside, providing the installation parameters for the system.

3.2.10 quality assurance agency—a company that is engaged in conducting inspections, or certification, or listing and labeling services, or any combination, and possessing a valid evaluation report for quality assurance and is recognized by the AHJ. [ASTM E 2174 & ASTM E 2393]

**FCIA NOTE:** This definition sets the stage for who the Inspection Company, or Special Inspection Agency, can be on a project. The definition clearly states that the quality assurance agency is a company.

The labeling that is being discussed in the ASTM Standard does not mean a physical label being applied to a firestop system in a new or existing building. It seems to be referring to labeling of fire doors.

**Minimum Requirements, Types of Firestops to Inspect**
In Section 4 of the ASTM E 2174 Practice, further scoping language is used. Both the ASTM E 2174 and ASTM E 2393 state that the standards set forth the minimum requirements for the inspector’s qualifications, types of firestops to be inspected, minimum information required to verify compliance with inspection documents and minimum information to be on the standard inspection and report forms.
**FCIA’s position is that the types of firestops are recommended to be “by listing/system AND by contractor installing the system” for both ASTM E 2174 and ASTM E 2393 documents. More on this later in the document.**

Section 5 of the ASTM E 2174 and ASTM E 2393 states that the inspection (practice) objective is to report on installed firestop systems and verify compliance to the inspection documents. The inspection is not to establish performance criteria of the inspected systems nor provide a basis for the selection of installers. Installers is also another word for the Firestop Contractor installing firestop materials to become firestop systems when installed to the listings. The inspector’s scope is limited to inspection as scoped in the standard—firestopping—and nothing more.

Should the AA decide to hire the Inspection Agency for inspections of other components of fire-resistance-rated or smoke-resistant assemblies, it has the right, as always, to hire for this work. The additional scope may include the work of other contractors and not only the Firestop Contractor. This is especially critical as the Firestop Inspection Agency scope of work is to review firestopping. If the scope of work is firestop inspection, then the firestop inspection agency inspector is not to judge the fire-resistance of the wall or floor, unless that is part of the scope of work that has been contracted with the Authorizing Agency.

**Firestop Inspector Qualifications—ASTM 2174/2393**

Section 6 is where the minimum requirements for the individual Firestop Inspector are stated in ASTM E 2174 and ASTM E 2393 Standards. This section does not supersede the Firestop Inspection Agency and Firestop Inspector Qualification requirements in the International Building Code’s Chapter 17. The IBC requirements are invoked when Special Inspections are required by the building code or if the specifier adds requirements to the project manual. From a specification perspective, because the IBC is a recognized consensus document, the language from the IBC can be used as a basis for hiring Inspection Agencies.

**The individual inspector requirements in ASTM E 2174 & ASTM E 2393 include:**

6. Inspector—ASTM E 2174

6.1 Qualifications—An inspector shall be acceptable to the AHJ and shall meet at least one of the following requirements:

6.1.1 Meet the criteria contained in Practice E699 for agencies involved in quality assurance; or [ASTM E 2174 & ASTM E 2393]

**FCIA Note:** FCIA does not recommend using this E 699 standard alone to assess the competence of the special inspector for ASTM E 2174 or ASTM E 2393. It is quite clear that the standard has some applicability that is outside the scope of the Special Inspector and Special Inspection Agency. It is helpful and can be used in conjunction with other competence evaluation tools.
From ASTM E 699’s Scope,

1. Scope

1.1 This practice provides a guide for the information to be obtained and provides specific recommended criteria for evaluating the capabilities of an agency to conduct inspections and tests and to report on tests performed in accordance with ASTM standards primarily on factory built components and assemblies.

1.9 Specification E329 specifies minimum requirements for agencies testing and/or inspecting materials used in construction and which are primarily assembled on the jobsite.

It is stated that the ASTM E329 Specification is meant for Inspection Agency Companies. The ASTM E699 also has a complete quality control program for an Inspection Agency Company that describes personnel training, and other issues.

**FCIA’s position is that the individual Firestop Inspector working for the Inspection Agency that holds the contract to perform inspections take and pass the FM or UL/ULC Firestop Exam and IFC Firestop Exam to be judged as competent in firestopping.**

The AHJ and AA needs to review the training, competence and experience of the individual firestop inspector to be sure that they have knowledge of inspecting the same type and complexity of work to be inspected.

In section 6, the ASTM E 2393 is slightly different than the ASTM E 2174. The ASTM E 2393 calls the inspectors contract inspectors and jurisdictional inspectors, as shown below:

**6. Inspector Qualifications**

6.1 Inspectors shall either be contract inspectors or jurisdictional inspectors.

6.2 Contract Inspectors:

6.2.1 Contract Inspectors shall be acceptable to the AHJ and shall meet at least one of the following requirements.

In ASTM E 2174, 6.1.2, and ASTM E 2393, 6.2.1.2, both standards require:

6.1.2 Have a minimum of two years experience in construction field inspections and have education, credentials, and experience acceptable to the AA; or [**ASTM E 2174 & ASTM E 2393 6.2.1.2**]

**FCIA NOTE:** This requirement in 6.1.2 requires two years construction field inspection experience AND have education, credentials and experience acceptable to the AA.

Where the IBC Special Inspections are mandated, not only does the AA have to approve the Special Inspector, it also must approve the Special Inspection Agency. The AHJ does this by
coming up with their own requirements in the jurisdiction along with using the guidelines in the IBC and the ASTM E 2174 Standard. This is a very key difference between the code and the standard. BOTH requirements must be met if the Special Inspector is to be approved for work as a Special Inspector performing special inspections to IBC’s Chapter 17 where the code requires special inspection.

6.1.3 Be a quality assurance agency accredited by the AHJ.

[ASTM E 2174 & ASTM E 2393, 6.2.1.3]

**FCIA NOTE:** While the ASTM standard is noble to include this requirement to be accredited by the AHJ, we do not know of programs where the inspector is accredited by the AHJ.

**Accreditation Is for the Company**
First, accreditation applies to organizations and companies. Firestop Contractors get accredited to FM 4991, *Standard for the Approval of Firestop Contractors* or UL’s UL/ULC Qualified Firestop Contractor Program.

Second, Inspection Agencies can be accredited to International Accreditation Services IAS Accreditation Criteria for Special Inspection Agencies, AC 291. Although the IAS is owned by the International Code Council—a membership organization of code officials—it does not make the AHJ the accrediting organization. There are also other accreditors of Special Inspection Agencies located worldwide.

**Certification, Competence Is for the Individual Inspector**
Individual Firestop Inspectors prove their competence through relevant education and training. Examinations can quantifiably prove competence of the individual inspector. The FM or UL Firestop Exam and IFC Firestop Exam, provide a quantified level of competence through an examination on firestop industry SYSTEMS Selection and Analysis and protocol. This, with experience in the same type and complexity of buildings that the person has inspected, results in a competent Firestop Inspector.

It is difficult to provide an individual accreditation program for individual inspectors for a key reason. The reason is that the individual Inspector might not work for the Inspection Agency company forever. The individual inspector does not own the inspection records. The records kept of inspections by the Firestop Inspector are owned by the company. The Inspection Agency owns the records and the processes used to inspect. Therefore, there is nothing for the IAS or other accrediting organizations to audit should the person leave the Inspection Agency company. That’s why accreditation is for companies and the company should be the focus of accreditation. The company keeps the records and can be audited regardless of whether the person who did the inspection is still with the firm or leaves for another company. The proof of competence is for the individual inspector who works for the inspection agency company.

The International Accreditation Services accredits to IAS AC 291 Accreditation Criteria. IAS AC 291 Inspection Agencies can be found at [www.FCIA.org](http://www.FCIA.org) and [www.IASOnline.org](http://www.IASOnline.org). The websites are available for the AHJ to have proof of accreditation of the agency. Approval of the Inspection Agency company can then take place based on their accreditation. IAS and other accrediting organizations accredit special inspection agencies.
Conlicts of Interest
The next section, conflicts of interest, is a focus of both the International Building Code and the ASTM E 2174 & ASTM E 2393. The language below is from ASTM E 2174, E 2393:

6.2 Conflicts of Interest:

6.2.1 The inspector shall be completely independent of, and divested from, the installer, contractor, manufacturer, or supplier of any material being inspected.

6.2.2 The inspector shall not be a competitor of the installer, contractor, manufacturer, or supplier of any material being inspected.

6.3 The inspector shall submit notarized statements to the AA assuring compliance with 6.2.

6.4 The inspector shall make a written submission to the AA requesting acceptance. If accepted, the AA shall present the inspector with written confirmation of acceptance. [ASTM E 2174 & ASTM E 2393 6.2.2, 6.2.2.1, 6.2.2.2, 6.2.3, 6.2.4, 6.2.5. note, the language is the same, the numbering system different]

ASTM E 2393 adds the following to this section.

6.2.4 The contract inspector shall provide proof of insurance required by statute, or by the AA, or by the AHJ, or by any combination of these.

6.3 Jurisdictional Inspectors:

6.3.1 A jurisdictional inspector shall have qualifications as required by the AHJ. [ASTM E 2393]

FCIA Note: When required to be used by the International Building Code, the inspector qualification requirements in the E 2174 and E 2393 are in addition to those listed in the Chapter 17 of the IBC. The ASTM E 2393 then adds that there is a jurisdictional inspector that can perform the work, where needed. This is for when the jurisdictional inspector performs the special inspection.

In section 6 of the ASTM E2174 and ASTM E 2393 Inspection Standards, it is stated that the inspector needs to be “completely independent of, divested from, the installer (Firestop Contractor), contractor (General Contractor), manufacturer or supplier”. In FCIA’s opinion, this sets up the independence needed for an objective inspection.

When a competitor of a Firestop Contractor is allowed to be the Firestop Inspection Agency employing Firestop Special Inspectors on a project they were unsuccessful at winning, the inspection might be unfair to the successful contractor who just beat them on a contract. That can be a problem for all involved and why the ASTM E 2174 and ASTM E 2393 standard asks for “independence” of the inspector and the contractors, suppliers, etc. The IBC also asks for independence as well.

Section 6.2 does not preclude Inspection Agencies who are firestop contractors from inspecting firestop projects. The Inspection Agency needs to demonstrate independence
from conflicts. If the AHJ believes that a Firestop Contractor as an Inspection Agency employing inspectors is independent enough from the installing contractor, the AHJ can allow the AA to hire a firestop contractor (installer) to inspect the firestopping. If not, then they can deny approval of the inspector and inspection agency.

The ASTM E 2174 and ASTM E 2393 then further states that notarized statements from the inspection agency are needed to claim independence. The notarized statements can be submitted to the AA and AHJ as part of the approval process of the Special Inspection Agency and special inspector. Should a contractor be hired to perform the special inspection, the company will have to prove, without a doubt, independence from the Firestop Contractor, the manufacturer and the distributor before being approved to perform such inspections. The standards are very clear about conflicts being resolved prior to inspection. ASTM E 2393 then further requires that the Firestop Inspection Agency submit proof of insurance required by statute, Authorizing Agency or AHJ, or combination of the parties.

**Inspection Documents**

In Section 7, Inspection Documents, the requirements to perform the inspections starts. In Section 7, the AA and AHJ review the documents before providing them to the Inspection Agency. The Agency supplies the documents to the Firestop Inspector who is employed by the Inspection Agency. A “Complete Set” of documents is required.

**ASTM E 2174**

7.3 The AA shall provide the inspector with a complete set of inspection documents at least ten working days prior to the inspection. The inspector shall review all inspection documents prior to conducting any inspection. When the inspector believes that the inspection documents contain conflicting information or documentation that the inspector believes is insufficient to perform the inspection, the inspector shall submit written notification of the potential conflict and obtain written clarification from the AA before conducting any inspection. [ASTM E 2174 & 2393]

**Materials**

In Section 8, Materials, the Firestop Inspector employed by the Inspection Agency needs to verify that all materials used for firestopping have been tested in accordance with the test standards that qualified the products suitable for use in the specific application. This is the direct reference to the listings.

Verification is completed by reviewing listing labels on containers of product shipped to and received at the project site. Then, the agency employed Firestop Inspector searches the documents provided by the AA for the tested and listed systems and verify that the test standard used on the container labels relate to the listings (systems). The standards referenced on the labels must cross reference with the submitted listed assemblies.

8.4 All materials used in firestop systems shall have been tested or evaluated as part of the system in accordance with Test Method E814 or UL 1479-94 as required by the building code or fire code, or both. [ASTM E 2174]

8.1 The inspector shall verify that the materials and systems used for fire resistive joints on the job are in compliance with listed systems that have been tested in accordance
with Test Method E1966 or UL 2079, and are Listed and Labeled for the intended use. [ASTM E 2393]

Notifications

In Section 9, the Inspection Notification Schedule is established. Note that in this section that there is a requirement for the Inspection Agency Firestop Inspector and the Firestop Contractor(s) personnel to agree on a schedule for the notification of several events.

The Inspection Agency is responsible for having the inspector fulfill the requirements in section 9 in ASTM E 2174.

9.1 The inspector and installer shall mutually agree upon a schedule for the notification of the following:

9.1.1 Inspection of firestop materials,

9.1.2 Start of installation, and

9.1.3 Anticipated completion of inspection.

9.2 The inspection schedule shall not interfere with the installation process.

9.3 The installer shall notify the inspector within one working day when any item agreed to on the schedule must be changed due to unforeseen circumstances, such as material delays, project change orders, or other installation conflicts. [ASTM E 2174]

ASTM E 2393 is very similar, but slightly different.

9.1 The inspector and installer(s) shall mutually agree upon a schedule for the notification of the following:

9.1.1 Start of installation of fire resistive joint systems,

9.1.2 Anticipated schedule of inspection(s) of fire resistive joint systems, and

9.1.3 Anticipated completion of inspection(s).

9.2 The inspection schedule shall not interfere with the installation process.

9.3 The installer shall notify the inspector within one working day when any item agreed to on the schedule must be changed due to unforeseen circumstances, such as material delays, project change orders, or other installation conflicts. [ASTM E 2393]

FCIA Note: The inspection schedule is very specific. It states that the Inspection Agency employed Firestop Inspector and Installer Firestop Contractor shall—and shall means mandatory/required—agree on a schedule for the start and anticipated completion. There also needs to be notice of changes within one day of when the schedule would have had the inspector at the site. This is for efficiency of the inspection by all.
At this point, it makes sense to have had a pre-project meeting with the firestop contractor, special inspection agency personnel to be sure all understand the inspection method. Key items like who provides ladders, scaffolds or other lifting equipment is discussed. Mobile phone numbers and email addresses are exchanged. A mock up is built and reviewed by both the firestop contractor and special inspection agency. For contractors, they need to factor in the inspection time, repair costs, and quantify it in their proposals. Extras might be in order if the inspections exceed what is stated in the standard.

As stated earlier, the International Building Code states that the notice of variances from the Inspection Agency Inspector to the Firestop Contractor must be immediate. With the development of mobile phones with text and picture taking and transmitting capabilities, the immediate communication required by the IBC can take place. It is in the Building Owner and Managers interests that immediate notice take place. The wasted resources—time, production, reworking rejections and more—used on untimely reports on deviations, all delays the project. Delays cost the customer, the Building Owner and Manager, money.

**On-Site Field Inspection**

Section 10 has the recipe for the on-site field inspections performed when inspecting to the ASTM E 2174 and ASTM E 2393 Standards. It is imperative to follow ASTM E 2174 and ASTM E 2393 when they are mandated by code or specified, bought and paid for by the owner, as required by the construction documents.

In 10.1 of both standards, the Firestop Inspector is mandated to be provided access to the area to be inspected. Further, section 10 states the Firestop Inspector is to use the inspection document requirements in 7.3 to identify and locate the fire-resistance rated assemblies where firestop installations are located.

The installing Firestop Contractor is to notify the inspector that materials have arrived. This is so the inspector can verify that they meet the requirements in the tested and listed systems noted in the inspection document. The information is then recorded.

Then, there are specific instructions about firestop systems that will be concealed, and the info is again recorded.

In ASTM E 2393, there is a note that shows examples of areas that will be concealed:

**Note 5**—The following are some examples of construction details that may not be visible after the installation process: amount of free movement area, the rated floor assembly thickness, the width of opening, and the wall construction.

One of the most critical sections in both ASTM E 2174 and ASTM E 2393 keeps needed separation between the Firestop Inspector and Firestop Contractor personnel is the section 10.6.

In 10.6, it states that the Firestop Inspector is not to be the Firestop Contractor’s Foreman nor Superintendent. It is clear in section 10.6 where it states that the inspector is not to supervise the work. This is for a very specific for a reason. It means the general contractor needs to hire a Firestop Contractor that understands what Firestopping is—systems—and
has the management system to get the installation of the firestop products to the tested and listed system or EJ/EFERRA, correct.

Also, the Firestop Inspection Agency and Inspector needs to be independent and not part of the supervision of the work. This allows a Firestop Inspection Agency to stay out of the “meet or beat the schedule syndrome”. The “meet or beat schedule” goal can be a conflict with an objective inspection. If there’s a schedule to meet, there could be compromised inspections where something is passed when it should have failed . . . all to meet a schedule.

FCIA’s position is that supervision is defined as performing systems selection for the contractor when they don’t know what the system should be. As such, the Firestop Inspector does not supervise the work nor suggest systems for the Firestop Contractor to install when they get the systems incorrect. Why? Since this is not continuous inspection, the Inspection Agency has no idea if the firestop contractor installed the right systems when the Inspection Agency was not on site to coach the firestop contractor through the systems selection and installation process. The General Contractor is responsible for hiring the right firestop contractors for each and every construction discipline—MasterFormat Section—that they hire, including Firestopping.

This division of responsibilities has been made very clear in the Firestop Inspection Standards and for good reason. Hiring a Firestop Contractor means that they understand the scope of work and how to get firestopping installed to the tested and listed system or EJ/EFERRA. Hiring the Special Inspection Agency is done for inspection, not for coaching and increased production.

10.6 The inspector shall not supervise or in any manner direct any aspect of the installation process. This includes, but is not limited to, the following:

10.6.1 Handling and storage of materials,

10.6.2 The mixing of materials,

10.6.3 The cutting or fastening of materials, and

10.6.4 The preparation of substrates.

FCIA NOTE: In 10.7, the Firestop Contractor is to notify the Firestop Special Inspection Agency upon start and completion of the work. The Firestop Special Inspector is mandated to complete the inspection within two days of the notice from the Firestop Contractor by the practice. Also in this section, the Firestop Special Inspection Agency is not required to be on site at the start of the installations. The Firestop Special Inspection Agency is responsible to be on site to perform minimum inspections as stated in the sections below:

10.7 When work is started or completed per the schedule in Section 9, the installer shall notify the inspector. Inspection of completed work shall take place within two working days from notification by the installer. [ASTM E 2174 & ASTM E 2393]
10.8 The inspector shall verify and document that the firestop systems required in the inspection documents have been installed. \[ASTM E 2174\]

10.9 The inspector shall verify that every firestop system inspected as required by 10.12.2 is in accordance with one of the documents specified in 7.4. \[ASTM E 2174\]

10.9 The inspector shall verify that every fire resistive joint system inspected as required by 10.12 is in accordance with one of the documents specified in 7.4. \[ASTM E 2393\]

10.10 The inspector shall verify that every firestop system inspected as required by 10.12.2 is in accordance with the manufacturer’s instructions. \[ASTM E 2174\]

**FCIA NOTE:** These two sections, 10.9 and 10.10 are where the “tested and listed systems and manufacturers published installation instructions” are the required inspection documents, in addition to those mentioned in 7.4. Without the listings and the manufacturer’s instructions, there is no way to tell what was installed and whether code requirements were met.

**Inspection Quantity**

Below is the actual amount stated by the standards for firestop special inspection. In short, inspection is through random witnessing a minimum of 10% of each type of penetration firestop, no less than one per 10,000sf (946.7m2), or destructive testing of a minimum of 2%, but not less than one, of each type of firestop.

10.11 The inspector shall verify compliance of the firestop system by observing the installation process and by taking and recording measurements of the substrates and materials being installed or by destructive examination of completed installations. \[ASTM E 2174, ASTM E 2393\]

10.12 Inspection frequency shall depend on the method of inspection and the scope of the project. The method of inspection shall be one of the following:

10.12.1 The inspector shall be on site during installation and randomly witness a minimum of 10 % of each type of firestop product being installed, or \[ASTM E 2174 only\]

10.12.2 The inspector shall conduct a post installation inspection, which shall require destructive type verification of the firestop system and repair of the firestop system. A minimum of 2 %, but not less than one, of each type of firestop shall be inspected per floor or for each area of a floor when a floor is larger than 10 000 ft² (946.7 m²). An area consists of 10 000 ft² or less. \[ASTM E 2174 only\]

**NOTE 7**—The AA may determine the types of firestop systems and subsequently the number of each type that is to be inspected, in addition to the minimum required by this standard. The determination of a “type” will typically be a function of a unique combination of parameters, including penetrant type (for example, metal pipe, plastic pipe, cabling), firestop material or device (for example, intumescent caulk, collar, sealant), and penetrated substrate (for example, gypsum wall, concrete floor, composite floor deck). \[ASTM E 2174 only\]
The FCIA discussion on the “Types of Firestops” is that the “Type” is “By Firestop System by Firestop Contractor”. For more on this, see the discussion on Inspection by Type of Firestop later in this document.

ASTM E 2393 is different in this section than the ASTM E2174 because the ASTM E 2393 only focuses on fire-resistive joint systems. However, FCIA’s position is still the same as it refers to the “Type of Firestop”.

Below is the recipe for inspecting these joint assemblies from ASTM E 2393. It is different than ASTM E 2174 in that it relies on random witnessing and does not give the option for destructive testing.

10.12.1 The inspector shall be on site during installation and randomly witness a minimum of 5% of total linear feet of each type of fire resistive joint system being installed, or

10.12.2 The inspector shall conduct a post-installation inspection, in accordance with 10.12.2.1(1) through 10.12.2.1(4), except for mechanical systems, which shall be inspected in accordance with 10.12.1.

Note 6—It is usually practical and cost-effective to inspect mechanical joint systems by witnessing installation.

10.12.2.1 The method shall be approved by the AA and the AHJ, which shall require one of the following methods:

(1) Destructive type verification of the fire resistive joint system and repair of the joint system;
(2) Disassembly and verification of the components and reinstallation of the joint system;
(3) Visual inspection and verification of the component or entire joint system, where a visual inspection establishes conformance to the document enumerated in Section 7; or
(4) Other appropriate methods showing compliance with the approval process or manufacturers’ instructions or specifications, or both.

10.12.2.2 Inspection shall consist of a minimum of one sampling per type of joint system per 500 lineal feet.

Note 7—The AA may determine the types of fire resistive joint systems and subsequently the number of each type that is to be inspected in addition to the minimum required by this practice. The determination of a “type” will typically be a function of a unique combination of parameters, including joint type (head of wall, wall to wall, floor to wall, floor to floor, floor to exterior wall) firestopping material or system (for example, intumescent, caulk, mortar, sealant, mechanical, factory preassembled), and substrates (for example, gypsum wall, concrete floor, composite floor deck). [ASTM E 2393 only. Similar to Note 7 in ASTM E 2174]
**FCIA Note:** The inspection of fire-resistant joint systems in ASTM E 2393 is different than the penetration firestop inspection to ASTM E 2174. The main difference is that the fire-resistance-rated mechanical joint systems are inspected visually during installation rather than destructive testing. This is due to the permanent nature of the fire-resistance-rated joint installations. The assemblies are anchored with fasteners or very strong adhesives including epoxies and other materials. The fire-resistance-rated joints can be made of steel or aluminum and are very difficult, if not impossible, to destructively test. Destructive testing might also destroy the functionality of the complete joint assembly as well.

**Inspection by Type of Firestop**

**FCIA Note:** The types of firestop to be inspected is determined by the AA and the Firestop Inspection Agency. The quantity of firestop systems inspected might vary based on agreement between the AA and the Inspection Agency in the contract between the parties. Additionally, the AA might also have the “type of penetrations” inspected defined in different ways depending on the project and Firestop Contractors selected.

For instance, there are projects where the method for Firestopping the general contractor or building owner or manager has chosen for installation is “firestop to be installed by each construction discipline—plumber, mechanical, electrical, masonry, wallboard, etc.” that installed assemblies or the service items that penetrate through breaches, gaps, openings, or joints in fire-resistance-rated assemblies.

Based on this “he or she who pokes the holes in the walls and floors firestops them” method of installation, it is conceivable that using the simple 2% destructive or 10% observation method for inspection might miss an installing contractor’s work completely. At the same time, other contractors might be subject to a greater number of firestop systems inspected than others.

Consider the system below where the firestop system is determined to be the “type of firestop”. The type of firestop in a simple C-AJ-1175 is as follows:

For instance, see the penetrating items listed in the tested and listed system number C-AJ-1175, from the **UL Online Certifications Directory:**

A. **Steel Pipe**—Nom 8 in. (203 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. **Conduit**—Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
C. **Conduit**—Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.
D. **Iron Pipe**—Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
F. **Copper Pipe**—Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.

Conceivably, many contractors can install firestopping to C-AJ-1175. The electrical contractor, Heating, Ventilation and Air Conditioning (HVAC) or mechanical contractor, sprinkler piping contractor, plumbing contractor, fire-alarm contractor, communications contractor, low voltage electrical contractor, Specialist Firestop Contractor and others might
Many contractors install the piping that is listed in this system (type) that penetrate the breach in a fire-resistance-rated assembly. If the inspection only reviews the electrical contractors’ conduits, it might miss two, three, seven, ten or more contractors who are installing firestopping—a life safety risk—in FCIA’s view.

From the fire-resistive joint systems perspective, the same situation exists. There might be a different contractor installing fire-resistive joint systems in gypsum wallboard for head of wall (HW) assemblies than in the perimeter fire barrier—CW systems, concrete floors for FF designs, concrete block walls, WW systems—just to name a few areas.

As such, it seems the definition of firestop type as referred to in the standards is quite vague and could result in missed inspections. Therefore, FCIA recommends:

*To comply with the inspection quantity as required by ASTM E 2174 and ASTM E 2393 where it refers to “Type of Firestop”, FCIA recommends ‘inspection by type of penetrating item, and its covering, and joint firestop SYSTEM, by Firestop Contractor’.*

The reason for this position is that the type of firestop is really dictated by the “system” design from the UL Fire Resistance Directory, FM Approval Guide, Intertek or other testing and listing agency directory and the installing Firestop Contractor.

The inspection “by Firestop Contractor” adds that the inspection covers all the possible companies that might install firestopping for that particular system. What this does is prevents missed inspections on a company’s work during the 2% destructive method or 10% visual method of inspections. The same holds true for the ASTM E 2393. Adding the language “by Firestop Contractor by listing group”, means that the inspection will check the quality processes of all types of Firestop Contractors that might perform work at a project.

The importance of this inspection by SYSTEM and “by installing contractor” methodology is that the company that was the missed firm from the inspection, may be the worst or best Firestop Contractor and still not be subject to any inspections. This could bring a fire and life safety risk to an important item that the building code has deemed to need what it calls a “Special Inspection”.

**Single Firestop Contractor Choice**

The general contractor or Building Owner and Manager can dictate “means and methods” of firestop installation. If the general contractor or Building Owner and Manager chooses the “firestop installed by the whoever pokes the hole or makes a breach or joint” method of firestopping, there are consequences related to inspection. One of the consequences might include missed inspections. If the inspection is not by type of SYSTEM to inspect and also by type of contractor, many contractors who installed firestop could skip out on or get an inadequate quantity of inspection that does not comply with either the ASTM E 2174 or ASTM E 2393 Standard.
There are also consequences for choosing a Firestop Contractor for all the firestop work on a project—which results in savings. When a General Contractor or Building Owner and Manager chooses a single Firestop Contractor, the result is that there might be much less missed inspections for the Firestop Contractor—and reduced inspection costs—due to efficiencies from the single firestop contractor concept. When the general contractor or AA chooses a single Firestop Contractor to perform firestop work, the inspection also might be much easier and less costly to the building owner and manager.

The position from FCIA is that there should be one scope of work—07-84-00, (or 07-84-10) Firestopping, a Comprehensive Spec—for firestopping including protecting the breaches, gaps, joints, intersections and openings made in fire-resistance rated or smoke resistant assemblies.

**Minimum and Maximum Inspection Quantities**

The ASTM E 2174 and 2393 both provide a minimum inspection quantity to be inspected. However, neither standard states what the maximum amount of observation nor destructive inspection take place. A maximum inspection quantity is not in the documents. This is critical to know for both the Firestop Contractor and the Firestop Inspection Agency on a firestopping project.

FCIA’s position is that the types of firestop AND a maximum quantity of firestop inspected needs to be communicated to the Firestop Inspection Agency and installing Firestop Contractor before the Firestop Contractor and Inspection Agency provides a proposal for the firestop inspection work. If the inspection becomes 100% observation, both the Special Inspection Agency and the Firestop Contractor need to know because it will affect worker productivity—both the Firestop Contractor workers and the Inspection Agency inspector’s productivity.

Since the total cost of installation is the cost of the installation AND the cost of the inspection of the work, the percentage of inspection including a maximum affects the total cost of firestop installation.

The method of inspection can be either destructive or through observation. Observation as an inspection method verifies installations through viewing how the system is assembled. Destructive testing needs repair by the Firestop Contractor. Destructive testing above the minimum requirements also means more labor used by the Firestop Special Inspection Agency. That scope of work for inspection must be very transparent for all to estimate the time spent for both installation and inspection.

While inspectors try not to slow production, the inspector’s presence can cause a decrease in productivity for the firestop containment worker installers. The Firestop Contractor needs to understand this and factor it into production rates. This does not mean that inspection is bad . . . it simply means that increased costs for inspection based productivity decreases, and the associated destructive testing repairs, needs to be factored into the costs of the project.

For Firestop Special Inspection Agencies, they need to be able to understand the scope of their work as well. Scope determines how they provide pricing for services, plan and schedule their workforce. Planning cannot take place without clear communication of
the scope of firestop special inspection by clear communication through the project’s construction documents. FCIA Member Special Inspection Agencies work at not being obstructionist to the Firestop Contractor’s production. That is part of the value they provide to the Building Owner and Manager or Architect of record hiring these companies.

**How to Inspect:**
The ASTM E 2174 and ASTM E 2393 do not give guidance to the Inspection Agency Firestop Inspector about how to inspect firestop systems. For instance, should destructive testing be the method chosen, there is no guidance in the ASTM Standard on how the actual destructive test shall take place.

Does the agency employed firestop inspector cut the complete firestop assembly out to observe thicknesses of sealants?

Should the inspector disassemble the complete length of fire-resistant joint system? To the next seam?

What about counting the number of wrap strips and types when they are buried underneath firestop sealant or behind a restricting collar?

How are the struts that support composite sheet on large systems reviewed?

What about the orientation of mineral wool or other insulations behind firestop sealants or firestop sprays?

And, how about the backing, damming or forming insulation density?

None of this is stated in detail in the ASTM E 2174 or ASTM E 2393 Standards. The standards simply state a quantity to inspect.

**FCIA’s position is that the manufacturer of the firestop products provides published installation AND inspection instructions for the Firestop Contractor and Firestop Special Inspector to use.**

**The manufacturer should outline the appropriate method(s) to inspect the firestops and provide acceptability of the system. In absence of inspection instructions, the inspector needs to understand the manufacturer’s acceptable minimum thicknesses of firestop spray, firestop sealant, appropriate fastening pullout strength for anchors, and other critical elements to conform to the tested and listed systems on the project inspected.**

**Measuring Sealant and Spray Thicknesses**
The acceptable thicknesses of sealants, sprays and other products need to match the laboratory listings and manufacturers installation instructions. For firestop sealants, laboratory listings are published with wet sealant thicknesses. Shrinkage of the cured firestop sealant (and spray) materials needs to be calculated based on the listings, manufacturer’s instructions and testing. (See International Firestop Council recommendations, [http://www.firestop.org/engineering-judgment-guidelines.html](http://www.firestop.org/engineering-judgment-guidelines.html)).
Spray firestop materials are likely to have a wet and dry thickness published on manufacturers product data sheets and installation instructions meaning the measurement is clearly stated for destructive testing when the products are dry.

Firestop sealants do not have a dry thickness value stated on manufacturers product data sheets and installation instructions. The Firestop Contractor and Firestop Inspector need guidance on how to discover the dry thickness of firestopping sealants when the inspection is destructive in nature. The manufacturer of the firestop materials might list a percent shrinkage expected after curing on their product data sheets. The listings might also reference shrinkage testing to ASTM C1241, Standard for Volume Shrinkage of Latex Sealants During Cure.

However, there might not be statements from the manufacturers of the thickness acceptable during the curing process. Total cure of firestop products depends on several variables depending on the type of material, temperature and humidity. Each material will have a shrinkage value due to the unique chemistries for each product type from the various and different manufacturers.

The International Firestop Council, the association of Firestop Manufacturers, has published a document on firestop destructive inspection when it comes to sealant thicknesses.


There are no documents like the above referenced document from the Council about any other firestop products.

According to the Council’s IFC Recommended Guidelines for Performing Destructive Testing for Installed Penetration Firestop Systems, Fire-Resistive Joint Systems, or Perimeter Fire Barrier Systems, firestop sealant thickness is to be measured where the sealant bonds to the surfaces of the penetrating item and the wall or floor assembly for penetrations. For joints, the measurement is to be at where the sealant touches the surfaces of the assemblies. In both cases, this surface where the sealant touches the assembly is known as the “bond line”.

There are some Firestop Inspection Agencies who conduct the thickness measurement for firestop sealants at both the bond line and also somewhere in the middle of the annular space or joint width areas. The reasoning behind this is to see if the Firestop Contractor was consistent with the thickness throughout the profile of the sealant. However, the measurement can be difficult due to the varying time, temperature and humidity that might occur during cure and at the time of the destructive test.

**Measuring Equipment**
Once the firestop material has been identified that it can be destructively reviewed via a test cut, the Firestop Special Inspector needs use the correct equipment to cut and measure during the Firestop Special Inspections.
When the test samples are built at testing laboratories, tape measures are used to measure the depths, annular spaces, to determine conformance to a system parameter. Tape measures, disassembly tools, knives, are some items used as tools by the Firestop Special Inspector.

The Firestop Special Inspector should not be using micrometers to measure the thickness of firestop sealants or sprays and annular space or joint, void, gap sizes. Why? The testing laboratory used a tape measure to measure these items before testing. The tape measure used at the laboratory was not a calibrated tape measure. To be consistent, the Firestop Contractor and Firestop Special Inspector need to be using the same type of measuring equipment that was used by the testing laboratory to develop the tested and listed system. Plus, a micrometer is used to measure rigid materials and not necessarily a softer sealant material. A false reading of thickness might result using this type of material.

In 10.13, 14, and 15, non-conformances are described. For discussion purposes, we've included the language below.

**ASTM E 2174**

10.13 Any type of firestop system noted in 10.12.2 that does not comply with the inspection documents will require repair or replacement and re-inspection of that firestop system plus one full additional inspection, of the number specified in 10.12.2, of that type firestop system. If non-compliance occurs on 10 % or more of the quantity of like firestop systems within 10.12.1 or 10.12.2, then inspection of those particular type firestop system shall cease. The installer shall inspect their own work, repair or replace those like firestops within the area prior to re-commencement of inspections by the inspector. [*ASTM E 2174. ASTM E 2393 is the same language, substitute joints*]

**FCIA NOTE:** In 10.13 of both ASTM E 2174 and ASTM E 2393, the section states that extensive amounts of non-conforming installations have consequences. The standard states that there be one additional inspection of each type of firestop that had the deficiency for the violating contractor. Additionally, the Firestop Contractor needs to repair the variances, then inspect their own work before having the inspector return.
There are more requirements below.

**ASTM E 2174**

10.14 All observed deficiencies shall be documented and marked on the inspection forms. In addition, the inspector shall physically identify the location where a required firestop system has been omitted or where the inspection results indicate that the installed firestop system does not comply with the inspection documents.

[ASTM E 2174, ASTM E 2393. ASTM E 2393 inserts the word fire-resistive joint systems at firestop system]

10.15 The inspector shall advise the contractor of any deficiencies noted within one working day. [ASTM E 2174, ASTM E 2393]

**FCIA NOTE:** In section 10.15 of ASTM’s firestop inspection documents, there is a difference between the International Building Code (IBC) and the ASTM E 2174 & ASTM E 2393 Inspection Standard.

The IBC, where Firestop Special Inspections are invoked by the code requirements, state that deficiencies are to be communicated to the installing contractor IMMEDIATELY.

The ASTM E 2174 and ASTM E 2393 Standard allows one (1) day to pass before communicating the deficiency to the contractor. This is not acceptable in those cases where the IBC code has mandated the inspection. The IBC states immediate notification and code requirements supersede standards requirements when the code is more stringent than the standard.

**FCIA’s position is that deviations shall be communicated to the firestop installation contractor immediately even if the International Building Code has not required special inspection and it is required only by specification.**

Should a contractor have a very large crew, and all use the same system wrong, there could be massive amounts of errors made while the inspector watches and says nothing for the full day that is allowed by the ASTM E 2174 and ASTM E 2393 Firestop Inspection Standards. The material, and time wasted, can cause issues with schedule and friction between the Firestop Special Inspector and Firestop Contractor.

In the same spirit, the Firestop Contractor needs to communicate immediately with the Firestop Inspection Agency when changes are made to the schedule, to systems selected and other key items that both parties need to be aware of during construction and inspections.

**ASTM E 2174**

10.16 Repair of firestops damaged during inspection shall be conducted according to the manufacturers recommended procedures and methods. The repaired firestop product that was damaged shall comply with the inspection documents.
10.17 When repairs have been made to firestop systems with documented deficiencies, the installer shall notify the inspector. Follow up inspections of firestop systems with repaired deficiencies shall take place within two working days from notification by the installer. The repaired firestop system that contained deficiencies shall comply with the inspection documents. [ASTM E 2174, ASTM E 2393. ASTM E 2393 inserts the word fire-resistive joint systems at firestop system]

FCIA Note: The key point in 10.16 is that the manufacturer is to recommend the procedures for both the destructive cutting and for repairing firestops that have been inspected. This brings up many questions regarding repairs of the materials used in systems.

Firestop Destructive Testing Repairs
For destructive inspection, does the complete firestop need to come out of the assembly? Can small samples be taken and be acceptable to the manufacturer?

For repairs, can a sealant patch be used? How will the patch affect other properties of the firestop system, such as movement capabilities, smoke-resistance, all over the longer term? All these questions, and more, must be answered by the manufacturer of the firestop system materials. The manufacturer is who understands the unique chemistry of each product and how it can or cannot be repaired, refastened, etc.

10.18 Inspection forms, as defined in 3.2.6, shall be submitted to the AA and installer within one working day after an area is inspected. [ASTM E 2174, ASTM E 2393]

FCIA Note: This section on firestop inspections focuses on forms used to record the inspection results. In Section 11 of both ASTM E 2174 and ASTM E 2393, minimum requirements for Firestop Inspection forms are explained.

First, according to the standard, they need to be submitted to the AA and Firestop Contractor within one day after an area is inspected. Again, should there be deficiencies, the Inspection Agency, if inspection is code required, must notify the Firestop Contractor immediately upon discovery of deficiencies.

11.1 Inspection forms, as defined in 3.2.6, shall be submitted to the AA and installer within one working day after an area is inspected.

Note 8—The delivery of inspection reports in a timely manner helps to ensure that project construction schedules are not delayed and that the installer has an adequate opportunity to repair all deficiencies prior to the work of other trades (for example, installation of gypsum wallboard, ceilings, ductwork, and so forth) impairing or obstructing proper installation. [ASTM E 2174]

There is a slight difference in the ASTM E 2393 language in this section.

11.3 Inspection forms shall be sequentially numbered, starting with “1,” and only contain information about one type of fire resistive joint system. Use a new inspection form for
each type of joint system. Use as many inspection forms as needed. Attach drawings and additional pages if needed.

11.4 When deficiencies or repairs are made to a fire resistive joint system, the inspection form number shall be cited on the inspection form (see Fig. 1) for cross reference [ASTM E 2393]

The inspection forms must be written and clearly describe the results of the inspection and any deficiencies, must be numbered, and contain info about each type of firestop system separately. Inspection forms need to have notes where non-conformances occurred.

In Section 12, the ASTM E 2174 Standard states that an inspection report is required. The report must have the project name, location and reference number, name and address of the inspector (and Inspection Agency), installing contractor, prime contractor, AA, AHJ. The report must have a summary page as well.

**ASTM E 2174 & ASTM E 2393 Report**
The form that the reports are to cover, at a minimum, include the following:

**First, the basics. What project, where, who inspected, who authorized the inspection, and who is the AHJ.**

12.2 The final report shall contain a cover page with the following:

12.2.1 The project name, location, and reference number;

12.2.2 The name and address of the inspector;

12.2.3 The name and address of the installer, as well as the prime contractor if different;

12.2.4 The name and address of the AA; and

12.2.5 The name and address of the AHJ.

**Then, the report details need to be covered.** What were the types and quantity of firestops inspected? How were the percentages of firestop to be inspected calculated? How were the total number of firestops to be inspected found? From whom? Did the inspector inspect the quantity that was specified by the ASTM E 2174 or ASTM E 2393? Were the percentages of deficiencies reported?

12.3 The final report shall also contain a summary page with the following:

12.3.1 Types and quantity of each firestop system on the project according to the inspection documents.

12.3.2 Which verification method from 10.12 was used to ascertain compliance with the inspection documents.
12.3.3 The quantity of each firestop system inspected on the project and a notarized written statement by the inspector that the number of firestop systems inspected comply with 10.12.

12.3.4 The summary page shall also contain percentages of deficiencies for each type of firestop system referenced in the inspection documents.

12.3.5 A total number of deficiencies shall be expressed as a percentage of the total number of firestop systems inspected.

12.4 The final report shall also contain copies of all information submitted by the inspector to the AA.

12.5 The final report shall also contain copies of all inspection forms submitted during the inspection process. They shall be arranged chronologically.

[ASTM E 2174, ASTM E 2393 is the same]

As the reader can see, the report forms are a large part of the final report and are used to calculate the various report summaries.

**FCIA Note:** In the Appendix, there are discussions about who the Firestop Special Inspector might be.

X1.1.2 Therefore, it is possible that in addition to meeting the requirements set forth in this practice that the inspector is also one of the following:

X1.1.2.1 A code official,

X1.1.2.2 An architect,

X1.1.2.3 An engineer,

X1.1.2.4 A representative of a quality assurance agency or an accredited testing laboratory, or

X1.1.2.5 A licensed professional in the construction industry.

[ASTM E 2174, ASTM E 2393 is the same]

**Based on the information in the IBC and ASTM’s E 2174, ASTM E 2393, in FCIA’s opinion, the Firestop Special Inspection Agency that employs the Firestop Special Inspector needs to be a company of some type.**

A sole proprietor is a form of company. A USA Internal Revenue Service, the Type S, Type C or a LLC corporation is a company. Also, a LLP is a company entity.

The critical part of this is that the Inspection Agency, employing one or one thousand inspectors, have a company philosophy that focuses on systems analysis and manufacturer’s published installation instructions for inspecting firestopping—penetrations and joint assemblies. It is the company that directs the inspectors on when a variance is a variance.
The company is responsible for the inspections, records, procedures, etc. It is only when the company directs the inspector the correct method to inspect firestopping, can the installation AND inspection be successful.

**Firestop Inspection When Not Required by Building Code**
The International Building Code (IBC) has several building occupancies where the special inspection of firestopping is mandated. There are also types of buildings where inspection of firestopping is not required by the IBC.

Specifications might require firestop inspection. Or, a building owner and manager might require it for additional quality control. Once the building owner or manager chooses to utilize Firestop Systems Inspection, the entity enters into a contract to hire an independent firm to perform reviews during the course of construction in new or existing buildings.

The Firestop Inspection firms’ scope of work might include the following:

- Reviewing of specified firestop inspection methods, ASTM or otherwise.
- Attend and/or direct firestop preconstruction, start-up meetings or progress meetings.
- Review and/or observe or destructively test installed mock-up systems.
- Reviewing installed systems in either;
  - Observation test method of an agreed upon percentage.
  - Destructive test method of an agreed upon percentage.
  - Both types of inspection, with minimum and maximum quantities of inspection.

- Performing a general/visual review of installed systems.
- Understanding identification systems (labeling, tagging).
- Understanding firestop systems submittals such as manufacturer’s published product data sheets, Safety Data Sheets, manufacturers’ published installation instructions, and tested and listed firestop systems and EJ’s.
- If part of scope, observing as-built tested and listed systems and EJ documentation and or close out submissions.
- Other consulting services to ensure compliance with the Authority Having Jurisdiction (AHJ) or Building Owner and Manager, design specification requirements such as reviewing firestop systems submittals including manufacturer’s published product data sheets, Safety Data Sheets, manufacturers’ published installation instructions, and tested and listed firestop systems and EJ’s/EFRRAs.

**Firestop Special Inspection Agency Company Instruction, Procedures and Documents:**
There are various methods for inspecting firestopping in buildings. Some methods include standards, some do not.
First, the Standard for the On-Site Inspection of Installed Firestops (ASTM E 2174) and Standard for the On-Site Inspection of Installed Fire Resistive Joint Systems, (ASTM E 2393) are mandated by the 2012 and 2015 International Building Code (IBC) for buildings 75’ and higher above lowest fire department access (High Rise) and Category III and IV Buildings from Table 1604.5. (below).

<table>
<thead>
<tr>
<th>RISK CATEGORY</th>
<th>NATURE OF OCCUPANCY</th>
</tr>
</thead>
</table>
| I             | Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to:  
• Agricultural facilities.  
• Certain temporary facilities.  
• Minor storage facilities. |
| II            | Buildings and other structures except those listed in Risk Categories I, III, and IV. |
| III           | Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:  
• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 500.  
• Buildings and other structures containing Group E occupancies with an occupant load greater than 250.  
• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.  
• Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities.  
• Group I-3 occupancies.  
• Any other occupancy with an occupant load greater than 5,000.  
• Power generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.  
• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the International Fire Code; and  
• Are sufficient to pose a threat to the public if released.  

The mandate for special inspections is for those jurisdictions that adopt the code including Chapter 17, Special Inspections and the buildings stated above. Some jurisdictions do not adopt the Chapter 17 and amend out the requirement for special inspections during the code adoption process.

The second method is non-code required inspection. When the building type is not as described in the International Building Code or other code not requiring mandatory
inspection, specifications can require the ASTM E 2174 and ASTM E 2393 Standards. The specification that includes requirements not included in the code mandate from the IBC is an “above code” requirement. Designers and their building owner clients have that right to specify above code, and inspection for firestopping might be one of the items added. When not code required, the building owner and manager, general contractor, other purchasers, are able use any inspection method they choose, including the ASTM E 2174 and ASTM E 2393 Standards.

In master specifications, the Standard for the On-Site Inspection of Installed Penetration Firestops (ASTM E 2174) and/or Standard for the On-Site Inspection of Fire Resistant Joint Systems and Perimeter Fire Barriers, (ASTM E 2393) are specified in Firestopping sections in the 07-84-00 area, and required during the firestop procurement process. The master specifications have had the ASTM E 2174 and ASTM E 2393 standards specified due to FCIA’s efforts with these important agencies.

Firestop inspection companies might also develop procedures for inspecting installed or in-process firestop systems that are above and beyond the requirements in Standard for the On-Site Inspection of Installed Penetration Firestops (ASTM E 2174) and/or Standard for the On-Site Inspection of Fire Resistant Joint Systems, (ASTM E 2393). When deviating from the ASTM Inspection Standards, the procedures should be limited to inspections of structures that are not one of the types of buildings specified to have mandatory firestop special inspection as specified in Chapter 17 of the International Building Code. If performing firestop special inspection on structures that are part of the building code mandate, they need to conform to or above the requirements in the ASTM E 2174 and ASTM E 2393 Firestop Inspection Standards.

Firestop Inspection Agency firms follow the scope of work set forth in Construction Documents or as negotiated between the building owner/manager and the Firestop Special Inspection Firm. Each inspection agency firm may have its own inspection operational policies and procedures. This is no different than any other environment where company competitive advantage is built through unique processes. The key element is that the Firestop Inspection result in firestop systems complying with the tested and listed system and manufacturer’s installation instructions. Most important, Special Inspection Company procedures must reflect the specified inspection requirements in the construction documents.

Inspections take place for firestopping when mandated by building codes or specification. Some inspections are based on an accepted scope of work and or the ASTM E 2174 and ASTM E 2393 Inspection Standards as approved by the owner or hiring authority, and, if applicable, the Authority Having Jurisdiction (AHJ).

Where the Special Inspection is required by Code, the minimum amounts of inspection are specified in ASTM E 2174 and ASTM E 2393 Firestop Inspection Standards. Each building owner has the right to choose to have Firestop Special Inspection quantities above minimum code requirements. Should they choose to have inspection, it makes sense to use the ASTM 2174 and ASTM E 2393 Inspection Standards as is, as they are consensus based, industry standards and not optional in code required situations.
As stated, the scope of work of a Firestop Special Inspection Agency can be greater than what is required in the ASTM E 2174 and ASTM E 2393 Standards.

Activities performed by the firestop inspection firm over and above the ASTM E 2174 and ASTM E 2393 Standards might include:

- Reviewing construction documents (drawings, specifications and addendums).
- Establishing with the general contractor the company installing the firestop products the type of inspection services that will be completed. If the requirements differ from the construction document requirements, variances need to be discussed amongst the entity that hired the Firestop Inspection Agency and the Firestop Contractor. The discussion is required as the Firestop Contractor might need to account for a certain amount of reduced installation productivity due to the firestop special inspections.

This is especially true when the Inspection Agency inspector is observing the installation process. Should the amount of inspection change, installation productivity might decrease causing increased cost of construction for the Firestop Contractor and possible extras charged to the building owner. Firestop Contractors who specialize in firestopping know that inspection is part of the process. When installing to the tested and listed systems and manufacturers installation instructions, the Firestop Contractor generally won’t see a reduction in production.

Those contractors who look at firestop as simply installing “fire-caulking” will see an increased cost of installation to comply with true firestop systems—the listings and the installation instructions—which they should have built in to their costs anyway. Also, those contractors who look at firestopping as “fire-caulking” without systems, can be from 3 to 50 times less expensive than those who understand the systems and factor them into their costs of doing business. Not following systems is similar to when the code or specification requires electrical conduit and the contractor decides to skip that part of the installation and simply install cabling without conduit instead.

- Determining project organizational flows as communicated in construction documents (contacts, direction of paper flow, inspection sequences, inspection schedules, etc.)
- Inspection of the firestopping either after installation (destructive) or during construction (observation)

Code interpretation sometimes is stated as part of the scope of work for the Firestop Special Inspection Agency. The construction documents communicate the code requirements to both the Firestop Contractor and the Firestop Inspection Agency. The code interpretation should already have been completed by the design professional and Building Code Official and not be part of the Firestop Special Inspection Agency’s scope of work.

**Submittal Review (If Applicable for the Inspection Agency Firm)**

The submittals are sent from the successful Firestop Contractor through the communication channels set by the construction documents for approval. The Special Inspection Agency might or might not be involved in the submittal review and approval as their contract may not have been awarded at the time.
Special Inspection Process

The flow of the official submission might be from sub-contractor to the general contractor, consultant/architect-engineer, building owner manager or the building owner’s representative, and finally to the Authority Having Jurisdiction (AHJ) for approval. Each project rules are set forth in the construction documents, usually in Division 1 of the specification/project manual.

Below are some components of a submission from the Firestop Contractor:

- **Firestop Tested and Listed System or Nationally Recognized Testing Agency Approved Designs, EJ’s/EFRRA’s**—The Firestop Systems from a Nationally Recognized Testing Laboratory (Agency) and Engineering Judgments/ Equivalent Fire Resistance Rated Assemblies, (EFRRA’s) from the manufacturer, fire protection engineer or testing laboratory working in conjunction with the manufacturer, are the key components of the assembly. Additionally, the designer/ AHJ reviewer must ensure that F-Fire, T-Temperature, H-Hose Stream and or L-Air Leakage & W-Water, I-Insulation and I-Integrity ratings are submitted on documentation provided, as applicable.

- **Product Literature**—Manufacturer’s product data sheets, manufacturers installation instructions, literature. Many manufacturers publish a wide variety of documents from data sheets to installation instructions, inspection and maintenance instructions for their products.

- **Installation Instructions**—The manufacturer’s installation instructions are imperative to have for recommended surface preparation, installation details, etc. The installation instructions are critical to installation in addition to the tested and listed systems.

- **Safety Data Sheets (SDS)**—These documents are required to meet many requirements, depending on national, state, provincial, emirate, territorial and local laws and codes that might not be mentioned in construction documents or on manufacturer’s product data sheets or installation instructions. It is important for both the inspector and the firestop workers to have this information for many reasons, including selection of personal protective equipment.

- **FCIA Membership Certificate**—FCIA Members have invested in their industry through the dues that fund research, education and other resources. Some specs require FCIA Membership. More specifiers should consider it.

- **FM 4991 Approved Contractor or UL/ULC Qualified Firestop Contractor Program Certificates AND Designated Responsible Individual (DRI) Documentation**—The submittal should describe the COMPANY approval or qualification, and the PERSONNEL qualifications of the appropriate personnel (Designated Responsible Individual—DRI) and the workforce as well. Certificates from FM Approvals and or UL/ULC or other agencies for the company, as applicable, accompany submittal. As such, there would be two separate certificates. One certificate from FM Approvals or UL/ULC covers the company and another from FM Approvals or UL/ULC handles whether a person at the company has passed the FM or UL Firestop Exam. Once a person at the Firestop Contractor passes the exam, they can be appointed as a Designated Responsible Individual (DRI) by the company.

We at FCIA have the utmost respect for the firestop material manufacturers. They have invested in product development and testing to name a few of their
commitments to the industry. They also invest in education for those that install and inspect firestopping.

Some manufacturers have developed Firestop Contractor “programs”, that might look like other industry approved contractor programs. Other industry material manufacturers provide long term performance warranties of their products.

In firestopping, there is no program like would be found in the roofing industry where the contractor is responsible for the first 2 years of service, then the manufacturer for the next 18 years.

There are programs for Firestop Contractors offered by the manufacturers. It is important to note that Firestop Contractor qualification programs are not all the same. It seems the Manufacturer Firestop Contractor programs offer some education level for the contractor personnel. There seems to be no contract tie in between the Firestop Contractor and firestop product manufacturer offered in the firestop industry like the roofing industry warranty programs where the contractor and manufacturer are under agreements.

FM 4991 and UL Qualified Firestop Contractor Programs

The construction industry is one of the last industries to adopt the quality management process using standards to recognize company quality. Standards would include International Organization for Standardization (ISO) Standards, such as ISO 9000 or ISO 17020. Manufacturers in the construction product industry have the ISO 9000 status in many cases. Firestop Contractors in the industry, unless they are FM 4991 Approved or UL Qualified, do not.

To improve the installed quality of firestop systems, FCIA worked with FM Approvals and UL/ULC to build Quality Management System based programs modeled after ISO 9000 and ISO 17020 principles.

The FM 4991, Standard for the Approval of Firestop Contractors and or the UL/ULC Qualified Firestop Contractor Program are both quality management system programs. In both these programs, the Management System of the Contractor is audited by either FM Approvals or UL/ULC for a fee. Both of these FM 4991 and UL/ULC Programs are independent audits of the contractor’s management system. The programs are not free, unlike the manufacturer programs. The cost is around $6500–$11,000 and is based on audit and travel costs. The programs cover all aspects of firestopping including penetrations, joints and perimeter fire barriers.

The FM 4991 or UL/ULC Firestop Contractor Programs are Accreditation Programs pertaining to the complete company in addition to the individual. To prove that the company is FM 4991 Approved or a UL/ULC Qualified Firestop Contractor, only certificates from FM Approvals or UL/ULC are official.

Manufacturer certificates that state that a company is accredited, certified, or other statement, to a manufacturers program are not acceptable substitutes for the FM 4991 Approved or UL/ULC Qualified Contractor Program Certificates.
• **VOC Certification**—Some specifications require air quality volatile organic compound content of materials to be published in manufacturer’s product data sheets or other documents.

• **Physical Property Requirement Verification**—Some Inspection Agency consultants work with the designer to ensure that project design requirements are met. The project design requirements could include sustainability/LEED, moisture resistance, movement capability, chemical, biological, radiation compatibility, security requirements, finishes and acoustical properties. The Designer and or General Contractor, Building Owner and Manager, should verify that documentation exists to prove suitability for use of products in specific applications. The Firestop Contractor can provide information to the Building Owner and Manager through the proper channels to the Inspection Agency.

There also need to be details made for where firestopping and other fire resistive materials such as spray fire resistive materials, (SFRM either cementitious or fiber fireproofing), intumescent fire resistive materials, (IFRM Fireproofing), fire-rated duct wrap, or other materials contact with or are a part of the firestop system. This needs to be reflected in the tested and listed firestop system or EJ/EFRRRA and manufacturers installation instructions.

• **Classified Firestop System Design** or EJ/EFRRRA are submitted by the Firestop Contractor and reviewed by the General Contractor, Architect, Building Official, likely long before the Firestop Inspection Agency is hired for the project.

• **Firestop Material Samples**—Evaluating the characteristics of the material (i.e., hardness, flexibility, color, anchors, curing, compatibility etc.).

• **Proposed Installation Schedule**—The schedule is reviewed with General Contractor, those installing penetrating items, walls and floors, through breaches in the assemblies, during the pre-construction meeting.

• **Proposed methods for inspection**—There are several processes that should be reviewed between the Firestop Contractors, General Contractor, Firestop Inspector, and others should a firestop inspection process be implemented:

  i. Method of as-built documentation recording (drawings, pictures, schedules, manual or electronic)
  ii. Method of identification system (tagging / labeling), recording of data, (manual or electronic . . . see FCIA Appendix section on identification systems.)
  iii. Method of reporting work completed.
  iv. Product material properties, including temperature and humidity range during the transportation, storage and prior to as well as post installation, including service life of the products. This should be covered in the specifications.
  v. Product shelf life and life expectancy of installed firestop materials used in the systems. The manufacturer of the firestop products will have to provide the life expectancy and maintenance requirements of the products. Some manufacturers include this in their published product data sheets.
  vi. Product curing time and shrinkage rates of the sealant products.
vii. Methods of communication to the Firestop Contractor and time allowed to communicate variances, deviations, non-conformances. Note that this varies from immediate to one day.

- **Firestop Contractor Quality Control Program**—FM 4991 Approved, UL/ULC Qualified Firestop Contractor Program compliant, Quality Management Systems are one example of a quality control program. Note that the FM 4991 Approved Firestop Contractor and UL/ULC Qualified Firestop Contractor might not provide the contractor Quality Management System Manual to the General Contractor or Building Owner or Manager, Facility Engineer.

The contractor quality management system manual is the contractor’s proprietary information. The contractor might show this manual to entities outside the company. However, the FM 4991 Approved, UL/ULC Contractor should not be leaving the Quality Management System Manual as a submittal.

- **Manufacturer Visit**—The specification might require a visit by the manufacturer of the firestop products if the manufacturer permits such a visit from their company employees to view the installation. The construction documents might also provide criteria about the manufacturer’s involvement in the project.

A manufacturer review might not be as valid as an independent inspection because of the potential conflict. The conflict happens because it is sometimes difficult for a manufacturer to provide criticism on firestop installations to Firestop Contractor customers who are purchasing the product.

This is where the conflict between the supplier and customer comes into play during the inspection process. This is also why the ASTM E 2174 and ASTM E 2393 state that the manufacturer, manufacturer’s representative, distributor or supplier have conflicts that preclude them from inspecting the firestop installation.

This potential conflict is referenced in ASTM E2174 & ASTM E2393, section 6.1, as a possible conflict of interest that might exist because of the economic relationship between the firestop product manufacturer and the Firestop Contractor from the Firestop Contractor.

- **Close out procedures**—At firestop project close out, operation and maintenance manuals, warranties offered by contractor, manufacturer or others, cleaning, re-penetrating requirements, maintenance program requirements, and other information must be delivered to the building owner by the Firestop Contractor. The Special Inspection Agency provides the Inspection Report that forms the complete firestopping file from which the Building Owner and Manager can maintain the assemblies.
Documentation and Firestopping
The firestop industry emphasizes documentation as proof of the systems installed in the assemblies that are fire-resistance rated or smoke-resistant. Without the firestop documentation of systems, products and assemblies, the inspection Building Owner and Manager will have no idea how to repair firestopping. As-built and close-out firestop documentation requirements should be reviewed by the Firestop Contractor with the Building Owner and Manager.

The responsibility for these documents really lies with the Firestop Contractor who finalizes the systems used and the Building Owner and Manager. The Firestop Contractor is the provider of the firestop systems documentation including tested and listed systems and manufacturers installation and maintenance instructions. How the construction communication channels are dictated is determined by the construction documents which governs the work and communication flow.

The specification sections in Division 1 govern the documentation required and Division 7 provides the technical information to be provided to the Building Owner and Manager.

Before a structure can be maintained correctly, it needs to be built right and documented. The documentation is critical for the Building Owner and Manager to have a record of to maintain fire-resistance as it is demanded by the International Fire Code.

The International Fire Code and NFPA 101, The Life Safety Code, both have requirements for documentation that needs to be in the Building Owner and Managers records until the building is not required to keep the documents.

The ICC’s International Fire Code requires maintenance of fire-resistance rated construction and smoke resistant assemblies, under 703.1 of the code.

703.1 Maintenance. The required fire-resistance rating of fire-resistance-rated construction, including, but not limited to, walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems, shall be maintained. Such elements shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained.

FCIA Note: The bold in the 703.1 is included in the code, but not bolded nor italicized. The bold was added by FCIA for emphasis. The International Fire Code (IFC) is quite direct in its direction to the Building Owner and Manager. It mandates a visual inspection by the owner take place annually and that repairs, restoration and replacement take place where damaged. Records of this visual inspection are also required.
The building owner can either provide their own personnel to perform the inspection or hire a Firestop Contractor or Firestop Inspection Agency to perform this inspection.

This action is more a survey of existing buildings than an inspection. For more information about surveys of firestopping, check out FCIA’s RPPS-01, Recommended Professional Practice for Survey, version 1.

Additional language from the International Fire code is below.

Where concealed, such elements shall not be required to be visually inspected by the owner unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. 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. [IFC 703.1, 2015]

**FCIA Note:** In this section, it states that the inspection of existing building’s fire resistance is for only those areas where there is access relatively easily to the areas. Also of note is that the code asks for protection of fire resistance with “approved methods”. Approved means by the building official. The building official defers the method of protection to the code that the building was constructed under. In some cases, that may mean materials that are not firestop systems.

It is FCIA’s opinion that using firestop systems for repairs is the best method to comply with the code. Why? About 85%+ of the cost of the repair or maintenance is in labor time for the firestop-containment worker to get to the area, bring materials to the barrier, and only 15% of the cost is material. Therefore, the added cost of installing a firestop system vs. a generic product that might work in a fire and is not proven, is minimal when looking at the total cost of installation.

**703.1.2 Smoke barriers and smoke partitions.** Required smoke barriers and smoke partitions shall be maintained to prevent the passage of smoke. Openings protected with approved smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105. [IFC 2015 703.1.2]

**FCIA Note:** In this section and the section below, fire partitions, fire barriers, fire walls, smoke partitions and smoke barriers—the complete assemblies—are included in the maintenance section of the fire code. When the walls, barriers and partitions are mentioned, it is important to note that the assemblies need to be repaired to be fire-resistance rated. Where required, that means a patch that will pass a hose stream test. That means in gypsum walls, framing the assembly as recommended by the Gypsum Association publication GA-225. For concrete walls or floors and concrete block walls, there needs to be backup data for patching those assemblies as well.

**703.1.3 Fire walls, fire barriers and fire partitions.**
Required fire walls, fire barriers and fire partitions shall be maintained to prevent the...
passage of fire. Openings protected with approved doors or fire dampers shall be maintained in accordance with NFPA 80. [IFC 2015 703.1.3]


**SECTION 4.5.8 Maintenance, Inspection, and Testing**

**4.5.8.1** Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature is required for compliance with the provisions of this Code, such device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature shall thereafter be continuously maintained in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the AHJ. [101:4.6.12.1] Bold and underline is for emphasis of a point only.

**FCIA Note:** In this section, the code asks for “continuous maintenance” of fire resistance.

**4.5.8.2** No existing life safety feature shall be removed or reduced where such feature is a requirement for new construction. [101:4.6.12.2]

**4.5.8.3** Existing life safety features obvious to the public, if not required by the Code, shall be either maintained or removed. [101:4.6.12.3] Bold and underline is for emphasis of a point only.

**4.5.8.4** Any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature requiring periodic testing, inspection, or operation to ensure its maintenance shall be tested, inspected, or operated as specified elsewhere in this Code or as directed by the AHJ. [101:4.6.12.4] Bold and underline is for emphasis of a point only.

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

**FCIA Note:** In this section, there are requirements for ongoing maintenance for fire-resistance rated construction as well as smoke resistance due to the ‘life safety feature’ designation in the language at 4.5.8.2, 4.5.8.4 and 4.5.8.5. Not only is the code requiring maintenance, inspection testing or operation, it also requires a responsible person. The responsible person ensures that the maintenance, inspection and testing of fire-resistive construction and other items takes place. This could be outsourced to a Firestop Contractor or Firestop Inspection Agency.
In the United Arab Emirates, the UAE Fire and Life Safety Code of Practice, requires that fire-resistance be continuous through firestopping as shown in 1.21.15.2:

**Chapter 1, SECTION 21—Firestopping**

21.15.2 The required fire resistance rating of installed firestop systems shall be visually inspected by the owner or owner’s Inspection Agency annually. Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil defense.

21.15.3 Any new Openings made therein for the passage of through penetrants, shall be protected with approved firestop system to comply with applicable codes as per the guidelines of Civil defense.

**FCIA Note:** In this section of the UAE’s Fire and Life Safety Code of Practice, it states that the Owner or Owners Inspection Agency needs to inspect the fire-resistive construction annually.

In FCIA’s opinion, the document does not preclude the Building Owner from hiring a Firestop Contractor or Firestop Inspection Agency to perform this work for them based on the language above. It simply clarifies that the inspection be done and inspected, allowing the Firestop Inspection Agency and Firestop Contractor equal opportunity. The AHJ will determine acceptability of the Company performing this work.

For all fire codes, the requirements have existed for a very long time. There is also a requirement in the 2018 version of the International Fire Code that the Building Owner and Manager keep an inventory of fire-resistance-rated and smoke-resistant assemblies. The FCIA Member Firestop Contractor, FM 4991 Approved or UL Qualified and Firestop Inspection Agency, IAS AC 291 Accredited, are best qualified to handle the documentation needed to build an inventory of fire-resistance in buildings including firestopping.

**More on Documentation for Contractor, Inspection Agency, Building Owner:**

Below are some of the key elements that need to be communicated by the Designer through the construction documents and provided by the Firestop Contractor for approval before construction of firestop systems:

- Inventory of locations of fire-resistance rated assemblies and firestop systems
- Sample tags or labels. (See FCIA MOP Identification Systems Chapter)
- Review of close out documents:
  - Operation and maintenance manuals.
  - Firestop inspection reports.
  - Tested and Listed Systems or Approved Systems.
  - Product Data Sheets, SDS, Installation Instructions.
  - Cleaning procedures for cleaning material from and around installed penetrating items, joints, gaps, etc.
  - Cleaning chemical compatibility with firestop products.
  - Resistance to other chemicals, exposures, expected to occur in the facility.
  - Product limitations.
Start-Up/Pre-Job Meeting—As referenced in Chapter 5 of the FCIA Firestop Manual of Practice, the pre-construction meeting is very important and critical for success.

The Firestop Contractor meets with the General Contractor/Building Owner and those other companies creating breaches, holes, openings, joints, gaps in fire-resistance rated and smoke-resistant assemblies that allow for membrane and through penetrations and or joints as specified.

The purpose of the meeting is to outline tested and listed systems parameters so that assemblies can be built properly. Assembly components such as annular spaces, spacing between penetrating items and each other, walls and ceilings, movement criteria, and other pertinent firestop parameters that affect penetrating item and joint areas long before the Special Inspection Agency is chosen. These same items can be discussed during the pre-construction meeting with the Special Inspection Agency and the Firestop Contractor. If the Inspection Agency has been hired prior to this discussion, then that party can be part of the pre-construction meeting.

Below are some key parties, points and discussion items for pre-construction meetings:

- General contractor, Construction Manager, Firestop Contractor and or Firestop Inspection Company representative might chair these meetings.
- Chair of the meeting or General Contractor provides agenda to Firestop Inspection Company and Firestop Contractor, who may also have a separate agenda to manage their needs during the meeting.
- Overlap with other Firestop Contractors on the same project is covered. Questions to cover include who is responsible for firestopping which discipline’s breaches.
- Coordinate with other trades to manage breach, joint, gap, void, opening sizes, including minimum/maximum annular space, joint, gap, breach sizes.
- Sequencing of installation discussion with construction manager, general contractor or appropriate firm to ensure access to penetrating items, joints.
- Tested and listed system requirements.
- Substrate—Preparation, type for the system.
  - Framing required for the system.
  - Penetrating item and their required supports.
  - Joints sizing, shape, etc.
- Compatibility of firestop systems materials with other building materials.
- Protection of installed products until cure, and responsibility of same.
- Distribution of submitted firestop designs or firestop listed systems to other construction disciplines so annular spaces are provided that match limitation of the systems.
- Accessibility to areas for Building Owner’s future maintenance.
- Temporary construction for firestopping installation and curing requirements including when connecting into an existing building(s).
- Installation temperature requirements.
- Review building systems including mechanical & electrical systems, proposed pathways through fire-resistance rated assemblies or fire-separations.
- Close-out procedures.
• Recording/meeting minutes.
• Clarify requirements for firestopping fire dampers, non-rated assemblies.
• Documentation requirements to fulfill specification Division 1 and Division 7 requirements.

Mock-Up—Although not required by the ASTM E 2174 and ASTM E 2393 Standards, a mock-up built by the Firestop Contractor and reviewed by the General Contractor, Building Owner and Manager, Firestop Inspection Agency Inspector is a good idea.

This part of the inspection process brings the firestop systems installed in actual field conditions to the forefront so all can agree on what the systems will look like after installation. Destructive testing or observation can be used to evaluate the mock-ups and plan for manufacturer’s acceptable sealant and spray thicknesses.

There are several points that must be reviewed and agreed upon before starting this portion of the process:

• Quantity of firestop designs that shall be used as mock-ups.
  i. FCIA suggests that all the firestop systems anticipated to be used on the project be built and reviewed, where it is reasonable.
• Location of mock-ups to be constructed.
  i. FCIA suggests that the mock-ups be located where they can be viewed by those that prepare the breaches, gaps, voids, openings, that need to be treated with firestopping.
• Mockups set the standard of acceptance during construction.
• Discuss how installation of penetrating items can affect the firestopping. What happens when the annular space changes? Penetrating item type?

Before the inspection takes place on the mock up, the Firestop Inspection Agency and Firestop Contractor need to discuss several topics including but not limited to:

• Finished appearance / workmanship.
• Sequencing of firestop installations.
• Discuss firestop inspection type:
  i. General review (visual)
  ii. Observation (visual)
  iii. Destructive (tools, ladders provided by Firestop Inspection Agency, unless otherwise negotiated with Firestop Contractor)
  iv. Both Observation and Destructive Testing
  v. NOTE: These methods need to be defined prior to the contract bidding / tender taking place so that appropriate planning can be done by both the Firestop Inspection Agency and the Firestop Contractor. Schedules can be affected by the type of inspection.
• Inspection shall be “by type of system by type of contractor”. (see previous discussion)
• Review of other items affecting the installed firestop system and the inspection.
• Sample/mock-up review of proposed methods of protecting installed system.
Type of Inspection (Detailed Description)—The definition of the type of Firestop Inspection is critical to the Firestop Contractor and Firestop Inspection Agency success on every project.

Without a clear scope of work and responsibility, the Firestop Contractor and Inspection Agency companies might not be able to meet forecasted labor and material quantity estimates as submitted. It also causes issues with schedules, causing delays, possible disputes, and might result in charges for extra work to the Building Owner and Manager. The scope of the inspection is explained in the inspection standards, specifications and scope of work contracted by the Building Owner and Manager and Inspection Agency.

Below are the possible types of inspection.

- ASTM E 2174, Standard Practice for the On-Site Inspection of Installed Firestops
- ASTM E 2393, Standard Practice for the On-Site Inspection of Fire-Resistive Joint Systems and Perimeter Fire Barriers
- Non-Standard Inspection, as defined by specifications or agreement by the Authorizing Agency (AA) and the Firestop Inspection Agency.

Each inspection type has methods that might be used to inspect. Below are a few key points to be covered.

- General review (visual) and Observation
- Destructive
- Re-inspection
- Quantity and Type required
- Substantial review only

Regardless of the type of inspection, FCIA recommends that some random destructive examination be incorporated into the inspection.

Schedule of Inspections & Possible Issues—This process helps set the parameters for inspection that signals to the Firestop Contractor and Inspection Agency key elements of the project.

The schedules are meant to create an understanding of critical issues prior to getting to the actual field process of inspection.

- Schedule—Once the type or types of firestopping systems are established for inspection, develop a schedule with the Firestop Contractor. Allow for random inspection by Firestop Inspection Agency for unannounced visits.
  
  i. Base the schedule on the General Contractor’s/Construction Manager’s overall project schedule.
  
  ii. Review the inspection schedule with the Firestop Contractor’s proposed schedule.

- Cancellations—Discuss the impact of cancelling an inspection (affects to the inspection costs).
- Turnaround time for distribution of reports shall be done in timely practice.
i. **FCIA NOTE:** FCIA’s position is that the notice, reports, be distributed immediately from the Firestop Inspection Agency to the responsible person at the Firestop Contractor. Since text messaging and pictures can be transmitted real time, even though the standards allow for a maximum of one day for deficient item reporting, immediate reporting is preferred. Remember, the International Building Code in Chapter 17 requires immediate notification to the contractor of deficiencies.

- The schedule should include the following submission dates:
  i. Submission and approval of proposed listed systems should already be approved by the architect and AHJ long before the Firestop Inspection Agency inspector arrives on the project.
  ii. Project meetings.
  iii. Completion of mock-up(s).
  iv. Inspection types.
  v. As-built and close out documents provided to the general contractor.

- Firestop Contractor’s own quality control inspections or surveys of installed work. It is important to understand that this quality check is only for keeping the firestop installation process on track from a quality perspective.

**Inspection Process Details**—During this part of the process, the actual work of inspection takes place. There are several things to keep in mind:

- What is expected of the Firestop Contractor and Firestop Inspection Agency inspector during review:
  
  i. What is the method for inspection?
     1. ASTM E 2174 and ASTM E 2393 Inspection as required by the building code adopted in the area? Modified for above code inspection? Modified for less than code required quantities.
     2. ASTM E 2174 and ASTM E 2393 Inspection modified for a specific project that does not require the standards to be used.
     3. Specified inspection of some kind as agreed by the Building Owner and Manager, Inspection Agency and contractors.

  ii. **Tools and Equipment**—Accessibility to firestopping? This is critical to discuss regardless of the whether the inspection is mandated by the building codes or not. Tools and equipment and roles and responsibilities must be established prior to commencing the inspection.

  1. Who is to provide ladders, lifts to get to firestopping?
  2. Who is to be cutting, replacing firestop systems? There might be insurance limitations for this action for inspection agencies.

    a. Firestop Inspection Agency might or might not perform the services above. If the firestopping contractor is to provide these services—such as accessing ladders and cutting into firestop assemblies—then there needs to be compensation for the time, risk and equipment usage.
Firestop Contractors might not allow Firestop Inspectors to cut into their firestops. The Firestop Contractor may require that their own personnel cut into or disassemble the firestop systems for destructive testing. The Firestop Contractor also might or might not allow the Firestop Inspection Agency Inspector to use the Firestop Contractor’s ladders and equipment. This needs to be discussed and agreed at the pre-project meeting.

iii. Who shall be present during firestop inspection?
1. Firestop Inspector employed by the Firestop Inspection Agency.
2. Firestop Contractor company representative which might include the Company’s DRI, and or firestop containment worker.

iv. Who might attend firestop inspections and or close out meetings?
1. Attendees of the final inspection might be the Building Owner’s Representative, General Contractor, Construction Manager, Firestop Contractor, Firestop Manufacturer’s Representative, Firestop Inspection Agency, Building Owner and Manager, Facility Engineer responsible for the building after occupancy.
2. Firestop Product Manufacturer is an option, but not required.
3. Building Owner’s representative might want to attend an inspection.
4. General Contractor or Construction Manager might also want to attend, but sometimes relies on the Special Inspection Agency for this work.
5. Authority Having Jurisdiction, (AHJ). Some AHJ’s want to be part of the first inspection.
6. Architect and/or Owners Representative.

Reporting—Timely reporting is critical to the success of the project. Below are items to include in the process:

• Reported Deviations to systems and manufacturers installation instructions.
  i. Summaries of percentages compliant or non-compliant for the installations inspected.
  ii. Other deviations as discovered.
  iii. Variances shall be in writing in addition to verbal communication as agreed by the Firestop Contractor and Firestop Inspection Agency.
  iv. Distribution List as agreed by the Firestop Contractor and Firestop Inspection Agency.

• FCIA’s position is that written report distribution type is to be immediate, and sent via one or more communication tools:
  i. Fax.
  ii. E-mail with pictures or images.
  iii. Mobile text with pictures or images.
  iv. Written paper documentation.
  v. Combination of above listed methods.

• Firestop Contractor—The Firestop Contractor(s) personnel receiving the report shall communicate inside their company to provide a quick response to the issues identified.
• Final Report—What is included in the report document.
  i. Written report.
  ii. Drawing indicating location concerns.
  iii. Electronic or physical photographs.

**Deficiencies and Discrepancies**—Actual discovered deficiencies are to be communicated quickly to the installing Firestop Contractor and immediately is the best scenario. Immediate is also required when the IBC is mandating Firestop Special Inspection.

The ASTM E 2174 and ASTM E 2393 Standards state to report deficiencies or variances within one day of the observed deficiency. As stated earlier in this document, the International Building Code (IBC) states that the contractor shall be notified immediately upon discovery of deficiencies.

Below is the statement from the IBC Chapter 17 that covers deficiency reporting. This passage describes reports and the time allowed for reporting deficiencies to the Firestop Contractor.

**1704.2.4 Report requirement.** Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge. Reports shall indicate that work inspected was or was not completed in conformance to approved construction documents. **Discrepancies shall be brought to the immediate attention of the contractor for correction.** If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon prior to the start of work by the applicant and the building official. [IBC 2015, 1704.2.4]

Other items to consider including in reports from the Inspection Agency to the Firestop Contractor might be:

• Report identification—This would be a description of the report’s function.
• Report contents—With clear communication that reflects jobsite actions.
• Response time expectations for repairing deficient item(s), if not IBC required.
• Method of notifying the Inspection Agency that the deficient item has been repaired.
• Re-inspection timing and reporting to the Firestop Contractor of the inspection.
Firestop Inspection Agency Quality Inspection Program Company and Individual Qualifications

When the International Building Code mandates inspection by Chapter 17, there are two levels of approval by the authority having jurisdiction (AHJ).

The first level is that the Firestop Inspection Agency needs to be approved by the AHJ. The second approval is that the Individual Firestop Inspector needs to be approved by the AHJ. Each AHJ sets their own procedures to approve both entities—the Firestop Special Inspection Agency and the Firestop Special Inspector.

The following paragraphs describe how a Firestop Inspection Agency and Firestop Inspector can show competence required by the code to the AHJ. This can also be used on projects where inspection is not mandated by the building code, but instead specified.

**Firestop Exams**

The FM or UL Firestop Exams prove firestopping competence for the individual inspectors that work for Firestop Inspection Agencies. The International Firestop Council (IFC) also has an exam to evaluate the Firestop Inspector’s competence. All firestop exams, including the FM, UL and IFC’s Firestop Exam, quantifiably evaluates firestopping technical, process and protocol knowledge that the individual possesses.

In addition to the firestop exams, there is a program from Intertek that verifies the Firestop Inspector’s recordkeeping. While it is good to focus on documentation, FCIA believes that the program has a weakness. The records, documentation, might not stay with the individual Firestop Inspector. If the Firestop Inspector leaves the firestop Inspection Agency Company, the records stay with the company. With nothing to verify that the individual Firestop Inspector is complying with requirements, how is Intertek to know that the Firestop Special Inspector is performing firestop inspection and documenting it properly?

**Firestop Inspection Agency Qualifications**

**Accreditation—IAS AC 291**

There are programs that focus on the quality of the Firestop Inspection Company Management System. For Firestop Inspection Agencies, the programs are International Accreditation Services, (IAS) Accreditation Criteria, IAS AC 291 and others.

In 2008, FCIA recognized that there should be a way for Firestop Inspection Agency Companies to show they are competent enough to provide firestop inspectors that inspect firestopping to the ASTM E 2174 and ASTM E 2393 Standards. This resulted in a search for an accreditation for Firestop Special Inspection Agencies.

The FCIA idea was to build a recognized, credible and reachable way to have a Firestop Inspection Agency Firm display their capabilities in a quantified way. The intent was to create better quality and reliability of the installed firestop systems using the quality process.
through quality inspection in addition to using quantifiably qualified FM 4991 Approved and UL/ULC Qualified Firestop Contracting Companies.

FCIA found that the International Accreditation Services (IAS) already had program, Accreditation Criteria AC 291, Criteria for Accreditation of Special Inspection Agencies. The IAS AC 291 was suited for both large Firestop Special Inspection Agencies and very small, sole proprietor Firestop Inspection Agencies and seemed the right choice for Inspection to assure that the quality of the firestop inspection is adequate for the AHJ.

The IAS AC 291 Accreditation is a Firestop Inspection Agency Quality Management System based program where the Special Inspection Agency writes a management system manual with procedures that reflect their operations. IAS’ personnel then audit the Firestop Special Inspection Agency to see if the firm does as it says it does in its procedure manual at the agency offices. The program and management system are as applicable to a one-person firestop special inspection agency firm as they are to a conglomerate.

As part of the IAS requirements, the IAS AC 291 Accredited Inspection Agency company must employ at least one person on staff that has passed the FM or UL Firestop Exam or the IFC Firestop Inspector Exam. The person who passes the exam can be appointed as a responsible person in the IAS AC 291 Accreditation Criteria. The FM and UL Firestop Exams are a great source for evaluation of the person’s knowledge of systems selection, analysis, for products and protocol used in the firestopping industry.

Once the FM or UL Firestop Exam, or IFC Firestop Inspector Exam is successfully completed and the firm passes the Special Inspection Agency office and project site location audit, the firm becomes IAS AC 291 Accredited. The firms that have become IAS AC 291 Accredited can be found at www.FCIA.org and www.IASonline.org.

The IAS AC 291 Program has requirements for Firestop Special Inspection Agencies to comply:

- Firestop Inspection Firm qualifications in IAS AC 291 include, but are not limited to, the following.
  - Firestop inspection firm with a person that has passed the FM or UL/ULC Firestop Exam, or IFC Firestop Inspector Exam, is required of all inspectors, in all cases, and,
  - Firestop Inspection Agency Firm meets AHJ requirements, and,
  - Firestop Inspection Agency Firm has insurance coverage to meet local regulations, (General Liability and Workers Compensation, Errors and Omissions requirements,), and,
  - Firestop Inspection Agency Firm meets purchaser requirements, and,
  - Firestop Inspection Agency Firm has procedures in place to carry out the above listed processes.

- According to the IAS AC 291, the Firestop Inspection Company employs Firestop Inspector personnel who have;
  - Passed the FM Approvals, UL Firestop Exam or IFC Firestop Inspector Exam, and
  - Maintain continuing education hours.
i. FCIA Note: The IAS AC 291 does not state how many hours are required for continued approval. The number of hours required is the responsibility of the management system of the Firestop Inspection Agency Company Quality Management System Manual policies or a Certification Organization.

- Other important qualifications.
  - It is critical that the Firestop Inspection Agency and Inspector not be a competitor, supplier or relation to Installing Firestop Contractor Firm, as shown in Section 6, Conflict of Interest of ASTM E 2174 & ASTM E 2393, and in the IBC’s Chapter 17, as shown earlier in this document.

FCIA worked with IAS to develop the Firestop Section of the IAS AC 291 Special Inspection Agency Accreditation Program for Firestop Inspection agencies. FCIA worked with IAS rather that going into the Inspection Agency or inspector accreditation business for an important reason. With independence and separation comes objectivity and credibility.

The FCIA Standards Committee and Board decided that third party accreditation programs would be more valuable to the Specifier, Building Code Official or Fire Marshal (AHJ) plus Building Owner and Managers rather than an association (FCIA) managed program.

This is because the Firestop Inspection Agency is evaluated by a firm that is 3rd party, removed from any business relationship, and has the objectivity needed to conduct an accreditation audit. IAS is a very well-respected auditing firm and a key organization that brings credibility to the companies being accredited.

The results of this strategic choice—third party accreditation programs for both contractor and inspection companies—have proven correct. There are over 140 Firestop Contractor Companies who have chosen to become FM 4991 Approved Firestop Contractors (http://fcia.org/fm4991approval.php) or UL/ULC Qualified Firestop Contractors (http://fcia.org/ulapproval.php). Many Firestop Inspection Personnel have taken the FM, UL Firestop Exams or IFC Firestop Inspector Exam. IAS AC 291 Accredited Inspection Agencies accredited to the IAS AC 291 exist in the USA, Canada and Middle East (http://www.fcia.org/memberlists.php?select=consultant). As demand starts growing for special inspection due to the Chapter 17 IBC, we believe that the number of IAS AC 291 Accredited Special Inspection Agencies will increase as well.

**Special Inspection and Contractor Quality**

Inspection or Installation? What does the Building Owner and Manager want to pay for? The answer is the right mix of both installation and inspection.

While special inspection is a great benefit to getting firestopping installed to the tested and listed SYSTEM, if contractors don’t understand the proper installation processes, then the cost of inspection skyrockets to the Building Owner and Manager because of all the errors and extra time to correct the errors in addition to the delays.

Or, if an Inspection Agency employing inspectors who do not understand the importance of accuracy to the tested and listed firestop SYSTEM design is hired, then life safety risks increase.
Firestopping’s objective is to maintain continuity of the floor or wall fire resistance rating and smoke resistant properties through breaches, voids, gaps and openings. An incorrectly installed firestop SYSTEM means a breach in that continuity of fire-resistance and smoke-resistant properties and a fire and life safety risk.

**Firestop Inspection Agency Qualifications—Summary**

FCIA believes in the concept of firestop inspection. It is part of the proper D-Design, I-Installation, I-Inspection and M-Maintenance–Management (DIIM) for firestopping.

FCIA also believes that Firestop Inspection Agencies and the employee Firestop Inspectors of the agency need to be knowledgeable about firestop SYSTEMS at a minimum, have equal knowledge as the Firestop Contractor.

Firestop SYSTEMS are defined as *an assemblage of materials designed to prevent the spread of fire through penetrations and joints.*

The assemblage consists of several components:

- Barrier or Fire Separation—Fire-Resistance-Rated and or Smoke-Resistant Assemblies.
- Breach, Gap, Joint, Opening, Void or Intersection in the Barrier—or assembly.
- Breach, Gap, Joint, Void or Breach, Opening Size.
- Penetrating item size, type, orientation and coverings.
- Annular space size and shape.
- Floor or wall assembly type and rating.
- Firestop materials required.
- Installing firestop materials exactly as described in tested and listed system results in a FIRESTOP SYSTEM.

The assemblage of materials installed to the tested and listed system is what makes the firestop SYSTEM. It’s not the product material alone, nor the wall or floor that make the rating. It’s the SYSTEM that carries the fire resistance rating. Without the system, there is only “red-caulk” or some type of materials installed. The operative word is SYSTEMS. The request for firestopping needs to be for a SYSTEM and not “fire caulking”.

Understanding the SYSTEMS is the key to firestop special inspection. If the Firestop Inspector and Firestop/Containment Worker do not understand the SYSTEMS concept, then it is only by luck that a firestop SYSTEM is installed. If the Firestop Inspection Agency does not have the understanding that SYSTEMS need to be found during both destructive and observations, then potential waste of resources and breach in fire resistance is created. The International Building Code gives some guidance as to what is required to perform special inspections.

**Firestop Inspection and the IBC—Some Final Thoughts**

The requirements for code mandated firestop inspection are stated in the IBC’s Chapter 17, Special Inspections, **Section 1703.** Below are specific passages that pertain to all inspections including firestopping:
1703.1 Approved agency. An approved agency shall provide all information as necessary for the building official to determine that the agency meets the applicable requirements. [ICC’s IBC 1703.1] (Bold is FCIA emphasis added)

FCIA Note: The Approved Agency must meet applicable requirements such as independence of the company and inspectors to the contractors, calibrated equipment and experienced personnel educated in . . .

1703.1.1 Independence. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed. [ICC’s IBC 1703.1.1]

1703.1.2 Equipment. An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated. [ICC’s IBC 1703.1.2]

1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections. [ICC’s IBC 1703.1.3]

To meet the International Building Code requirements above and approve the Special Inspection Agency, there are three parts.

The Firestop Special Inspection Agency needs to be approved and so do the individual Firestop Inspectors that will review the firestopping. The Firestop Special Inspector also needs to show education, experience and competency. The Firestop Special Inspection Agency must display experience and equipment in special inspections, and that they are employing Special Inspectors.

A company may be in the form of many different entities. A sole proprietorship is a company. A Limited Liability Company (LLC), Limited Liability Partnership (LLP), Sub-Chapter S Corporation, or C Corporation are also ‘companies’. These constitute the “Approved Agency”.

To meet the IBC’s 1703.1, above, the Firestopping Section in the IAS AC 291 Accreditation Criteria for Special Inspection Agencies exists. The company accreditation gives proof to the Authorizing Agency and Authority Having Jurisdiction that the inspection firm complies with 1703.1.

In IBC 1703.1.2, the Firestop Inspection Agency needs to have the equipment required to perform the required tests.

For the IBC’s 1703.1.3 requirement, the individual education, experience and the FM & UL Firestop Exams, IFC’s Firestop Inspector Exam, are used as part of IAS AC 291 Accreditation for the individuals inspecting.

Either the FM or UL Firestop Exam, or both, prove to AHJ’s who approve both the “Agency” and “Individual Special Inspectors” that Personnel are educated, and meet requirements in 1703.1.3. This exam is a great way to prove this knowledge.
Special Inspector Approval—The FM & UL Firestop Exam
The FM & UL Firestop Exams are currently the only 3rd party administered exams separated from an association that test the knowledge of the individual inspector to prove to the AHJ that the person’s understanding of the industry can provide educated inspection. These individuals may become appointed as a responsible person by the Special Inspection Agency Company. FM & UL provide the unbiased ability to grade these exams fairly. Success is gauged by passing the exam with a score of 80% or better. The International Firestop Council Firestop Inspector Exam is also accepted as an alternative to the FM or UL Firestop Exam.

FCIA’S Firestop MOP
FCIA’s Firestop Manual of Practice (MOP) is the industry resource document for those who want know lots of details about the Firestopping Practice (http://fcia.org/articles/mop.htm). With over 1,000 pages of valuable firestop knowledge, the FCIA MOP is the study document for the FM & UL Firestop Exams. Systems analysis and firestop industry knowledge are big parts of both exams and critical to both inspectors and contractors. Both topics are covered widely in the FCIA Firestop MOP.

FCIA’s MOP is offered FREE to Governmental Building Code Officials, Fire Marshals, and Specifiers with Design Firms, including, but not limited to Certified Construction Specifiers by the Construction Specifications Institute, (CCS) or Registered Specification Writers by Construction Specifications Canada (RSW). Others, FCIA Members or not, can buy the document.

FCIA believes that those who earn a living from the firestop industry need to buy the document. The reason is that the document is an important reference book that should be in every special inspector’s collection. While the FCIA Firestop Manual of Practice is not a legal binding document, it can be used as a reference.

Firestop Special Inspection
Firestopping inspection is part of the DIIM of Firestopping—the proper D-Design, I-Installation, I-Inspection and M-Maintenance and Management of the assemblies. Firestop inspection can help Building Owners and Managers and General Contractors get the correct value for their firestop construction dollar. The I & I, Installation and Inspection, only happens when a quality Firestop Contractor . . . ideally, a FCIA Member, FM 4991 Approved, UL/ULC Qualified Firestop Contractor, is used and an Accredited Firestopping Inspection Agency with competent Firestop Inspectors, is hired to do this work.

Why have company accreditation for Inspection Agencies and Contractor Companies plus individual competencies evaluated instead of just ‘certified inspectors’?

The company hires individuals to perform work. This is for both the Firestop Contractor or firestop Special Inspection Agency. It is the company that instructs the employee to “install that assemblage of materials to the tested and listed firestop SYSTEM design and manufacturers installation instructions”, or “inspect that firestop installation to the tested and listed SYSTEM design and installation instructions”. Individuals do need to be knowledgeable about firestop SYSTEMS, but they also need to be given the correct direction to keep the SYSTEMS discipline in all firestopping. The company is responsible for direction.
Conclusion
FCIA believes strongly in the DIIM strategy for firestopping.

Proper Design by a Registered Professional (CCS or RSW, tested and listed systems and manufacturers installation instructions by FCIA Member manufacturers.

Installation completed by FCIA Member, FM 4991 or UL/ULC Qualified Firestop Contractors to the listings and manufacturers installation instructions.

Inspection to ASTM E 2174 and ASTM E 2393 Inspection standards by FCIA Member Accredited Firestop Inspection Agencies with Firestop Special Inspectors who have the education and experience to understand the firestop systems analysis—to the SYSTEMS and Installation instructions—completely.

Firestopping then must be Maintained and Managed for the building life cycle for fire and life safety.

By following the FCIA’s DIIM Philosophy, the Firestopping function when called upon by fire.
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Supplements to This Section on Firestop Inspection:
International Firestop Council (IFC) Documents

IFC Recommended Guidelines for Performing Destructive Testing for Installed Penetration Firestop Systems, Fire-Resistive Joint Systems, or Perimeter Fire Barrier Systems


Inspection Guidelines

http://www.firestop.org/inspection-guidelines.html