FCIA
Firestop Contractors International Association

Stop the Spread

FIRESTOPPING FROM DESIGN TO SPECIFICATION

Objectives

1. Recognize conditions where firestopping is required by the building code.
2. Interpret building code requirements applicable to firestopping.
3. Identify the locations where firestopping requirements should be located/found in the contract documents.
4. Interpret the contract documents to determine the scope of firestopping.
5. Describe the benefits of requiring experienced firestopping installers on a project.

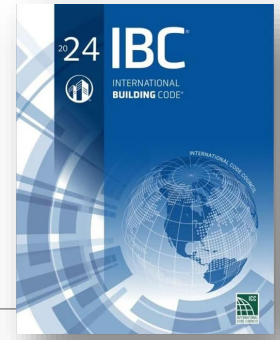
FCIA
Firestop Contractors International Association

FCIA
Firestop Contractors International Association

Building Code Requirements

WHERE IT ALL BEGINS

Fire-Resistive Assemblies



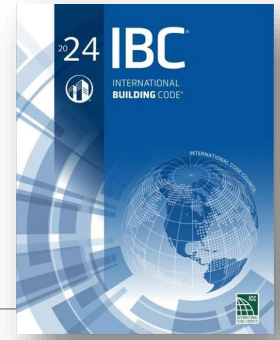
There are five different fire-resistive assemblies:

- Fire walls — 2 to 4 hours
- Fire barriers — 1 to 4 hours
- Fire partitions — 1 hour
- Smoke barriers — 1 hour
  - Smoke partitions — 0 hours
- Horizontal assemblies — 1 to 3 hours

Fire-resistance-rated walls, ceilings, or roofs that have protected openings to restrict the spread of fire

FCIA
Firestop Contractors International Association

Fire-Resistive Construction



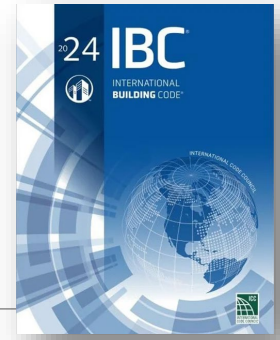
There are two types of fire-resistive construction:

- Exterior walls
  - Openings are only required to be protected if a wall is required to be fire-resistance-rated and openings exceed the allowable area for unprotected openings
  - Openings include joints and penetrations
- Interior bearing walls
  - Openings, including joints and penetrations, are not required to be protected

Fire-resistance-rated walls, ceilings, or roofs that are required to be protected per IBC Tables 601 and 705.5

FCIA
Firestop Contractors International Association

IBC Section 714 – Penetrations



Two Main Locations for Requirements:

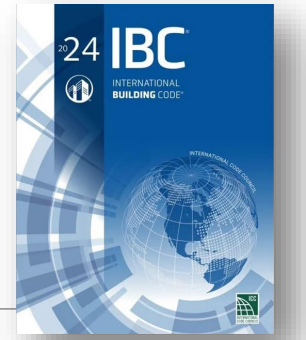
- Section 714.4 – Requirements for fire-resistance-rated walls
- Section 714.5 – Requirements for horizontal assemblies

Two Options:

- Use assemblies as tested per ASTM E814 or UL 1479
  - Walls: F-rating equal to or greater than the fire-resistance rating of the wall assembly
    - Membrane Penetrations other than Electrical Boxes: F- and T-ratings ≥ rating of wall
  - Horizontal Assemblies: F- and T-ratings not less than one hour, but not less than the rating of the floor
- Use assemblies as tested in the approved fire-resistance-rated assembly

FCIA
Firestop Contractors International Association

IBC Section 714 – Penetrations



Two Main Locations for

- Section 714.4 – Requirem ce-rated walls
- Section 714.5 – Requirem ssemblies

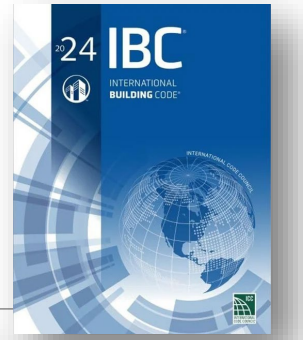
"Standard Test Method For Fire Tests Of Penetration Firestop Systems"

Two Options:

- Use assemblies as tested per ASTM E814 or UL 1479
  - Walls: F-rating equal to or greater than the fire-resistance rating of the wall assembly
    - Membrane Penetrations other than Electrical Boxes: F- and T-ratings ≥ rating of wall
  - Horizontal Assemblies: F- and T-ratings not less than one hour, but not less than the rating of the floor
- Use assemblies as tested in the approved fire-resistance-rated assembly

FCIA
Firestop Contractors International Association

IBC Section 714 – Penetrations



Two Main Locations for Requireme

- Section 714.4 – Requirements for fire- ls
- Section 714.5 – Requirements for hori

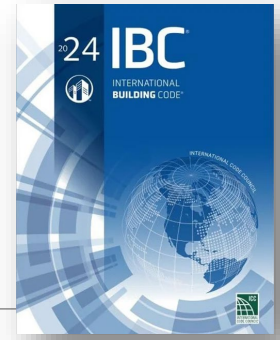
"Standard For Fire Tests Of Penetration Firestops"

Two Options:

- Use assemblies as tested per ASTM E814 or UL 1479
  - Walls: F-rating equal to or greater than the fire-resistance rating of the wall assembly
    - Membrane Penetrations other than Electrical Boxes: F- and T-ratings ≥ rating of wall
  - Horizontal Assemblies: F- and T-ratings not less than one hour, but not less than the rating of the floor
- Use assemblies as tested in the approved fire-resistance-rated assembly

FCIA
Firestop Contractors International Association

IBC Section 714 – Penetrations

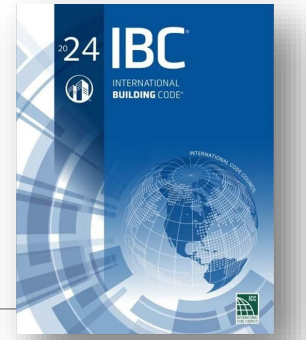


Smoke Barriers (§ 714.5.4):

- Firestop systems tested for air leakage per UL 1479
- L-Rating: Comply with one of the following…
  1. 5.0 cfm per square foot of penetration opening for each through-penetration firestop system
  2. Total cumulative leakage of 50 cfm for any 100 square feet of wall or floor area.

FCIA
Firestop Contractors International Association

IBC Section 714 – Penetrations

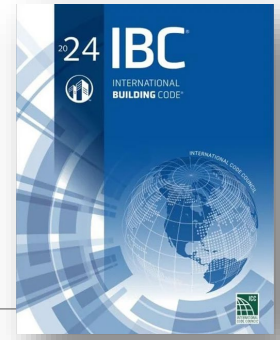


Non-Fire-Resistance Rated Floor & Floor/Ceilings (§ 714.6):

- Noncombustible Penetrating Items:
  - Connect not more than 5 stories
  - Annular space filled to resist the free passage of flame and products of combustion with:
    - An *approved* noncombustible material; or,
    - A tested through-penetration firestop system
- Any Penetrating Items:
  - Connect not more than 2 stories
  - Annular space filled with an *approved* material to resist the free passage of flame and products of combustion

FCIA
Firestop Contractors International Association

IBC Section 715 – Joints and Voids



Section 715.3 – Fire-Resistance-Rated Assembly Intersections

- Applies to joints in or between fire-resistance-rated walls, floors or floor/ceiling assemblies, and roofs or roof/ceiling assemblies
- Protected by an *approved* fire-resistant joint system
- Firestop rating must be equal to or greater than the rating of the fire-resistance-rated assemblies

FCIA
Firestop Contractors International Association

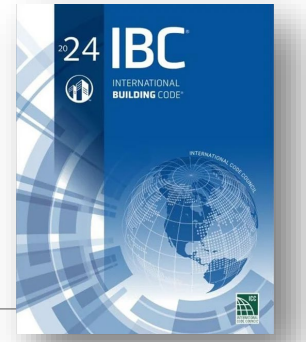
IBC Section 715 – Joints and Voids

Section 715.4 – Exterior Curtain Wall/Fire-Resistance-Rated Floor Intersections

- Protected by an *approved* perimeter fire containment system per ASTM E2307 "Standard Test Method For Determining Fire Resistance Of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus"
- F-rating equal to or greater than the floor or floor/ceiling assembly

FCIA
Firestop Contractors International Association

IBC Section 715 – Joints and Voids



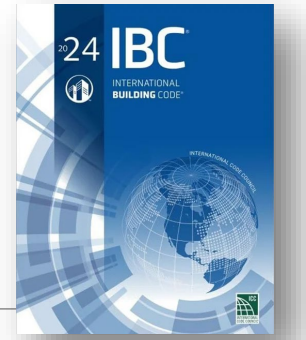
Voids at the intersection of exterior curtain wall assemblies and the following are required to be filled with an *approved* material or system to retard the interior spread of fire and hot gases:

- Nonfire-resistance-rated floor or floor/ceiling assemblies (§ 715.5)
- Fire barriers and nonfire-resistance-rated roofs (§ 715.6)

Joints in smoke barriers must use systems with L-ratings of not more than 5 cfm/ft. at 0.30 inches water per UL 2079

FCIA
Firestop Contractors International Association

IBC Section 717 – Ducts and Air Transfer Openings

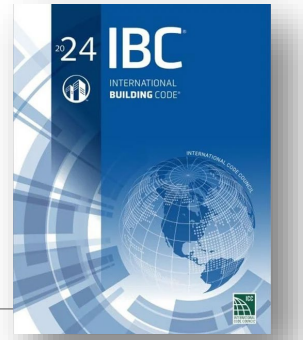


Section 717.1.2 – Ducts that Penetrate Fire-Resistance-Rated Assemblies **Without Dampers**

- Walls: Comply with Sections 714.3 through 714.4.3 for through- and membrane-penetrations
- Horizontal Assemblies: When not enclosed in a shaft, comply with Sections 714.5 through 714.6.2 for through- and membrane-penetrations
  - Nonfire-Resistance-Rated Floor Assemblies:
    - Combustible Floors: Connect not more than two stories with annular space filled
    - Noncombustible Floors: Connect not more than three stories with annular space filled

FCIA
Firestop Contractors International Association

IBC Section 1705 – Required Special Inspections and Tests



Section 1705.18 – Fire-Resistant Penetrations and Joints

- Applicable to the following types of buildings:
  - High-rise buildings
  - Buildings in Risk Categories III and IV
  - Group R occupancies with occupant loads > 250
- Special inspections must be conducted by an *approved agency* in accordance with the following:
  - Penetration Firestops: Per ASTM E2174 “Standard Practice For On-Site Inspection Of Installed Firestops”
  - Fire-Resistant Joint Systems: Per ASTM E2393 “Standard Practice For On-Site Inspection Of Installed Fire Resistive Joint Systems And Perimeter Fire Barriers”

FCIA
Firestop Contractors International Association

Selecting Firestop Assemblies

Things you need to know before selecting a firestop system:

- What is the type of fire-resistance-rated assembly?
- What is the fire-resistance rating of the assembly?
  - What is the required F-rating (for walls and horizontal assemblies)?
  - What is the required T-rating (for horizontal assemblies and membrane penetrations)?
- Is an L-rating required (for smoke barriers)?
- What is the penetrating item or items?

NOTE: Refer to Chapter 2 of the *FCIA Firestop Manual of Practice* for a detailed discussion.

FCIA
Firestop Contractors International Association

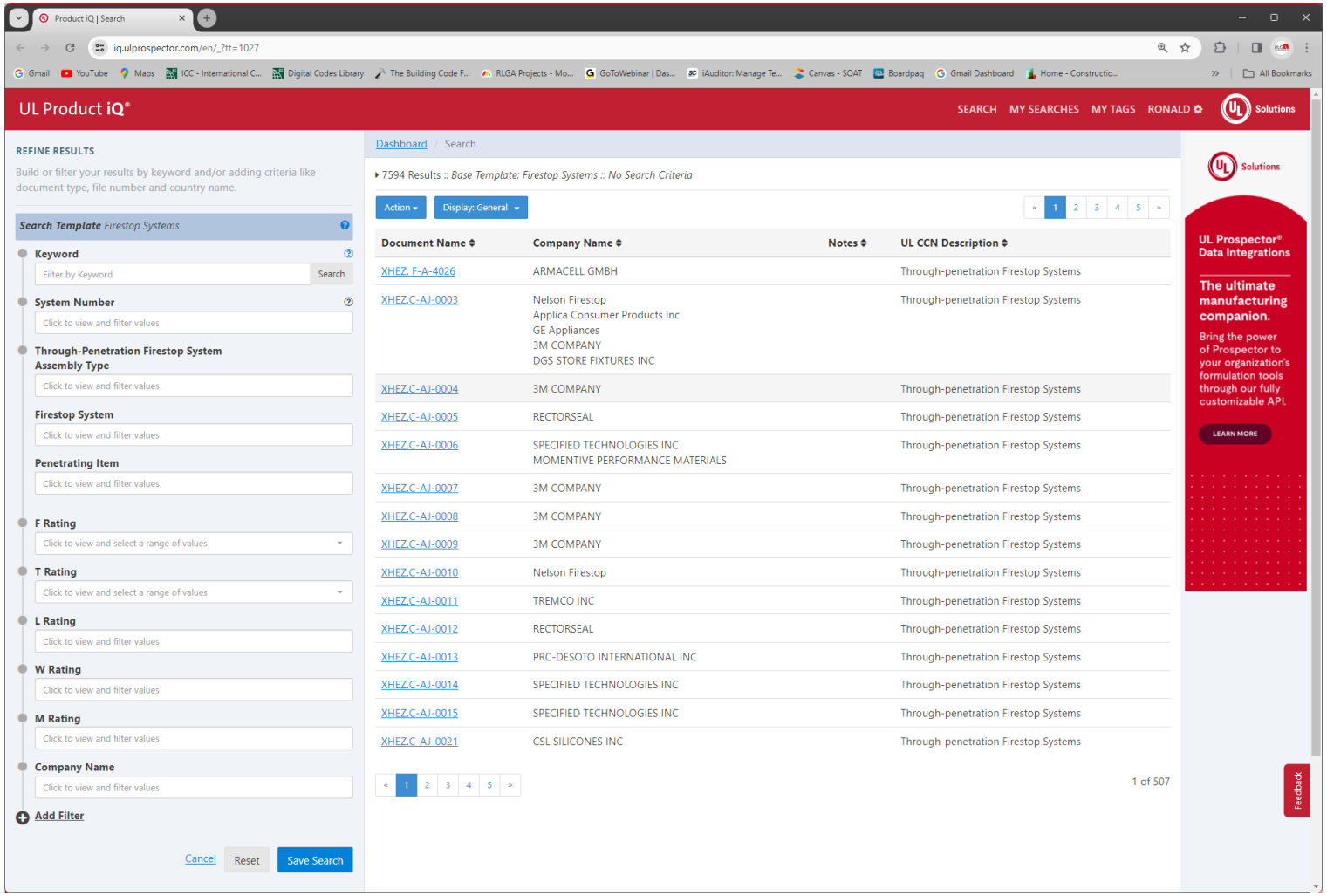
Selecting Firestop Assemblies (cont.)

Things you need to know before selecting a firestop system:

- What is the opening size?
- What is the opening shape?
- What is the maximum width for joints, perimeter fire containment, and other gaps?
- What is the construction of the fire-resistance-rated assembly?
- What is the thickness of the fire-resistance-rated assembly?

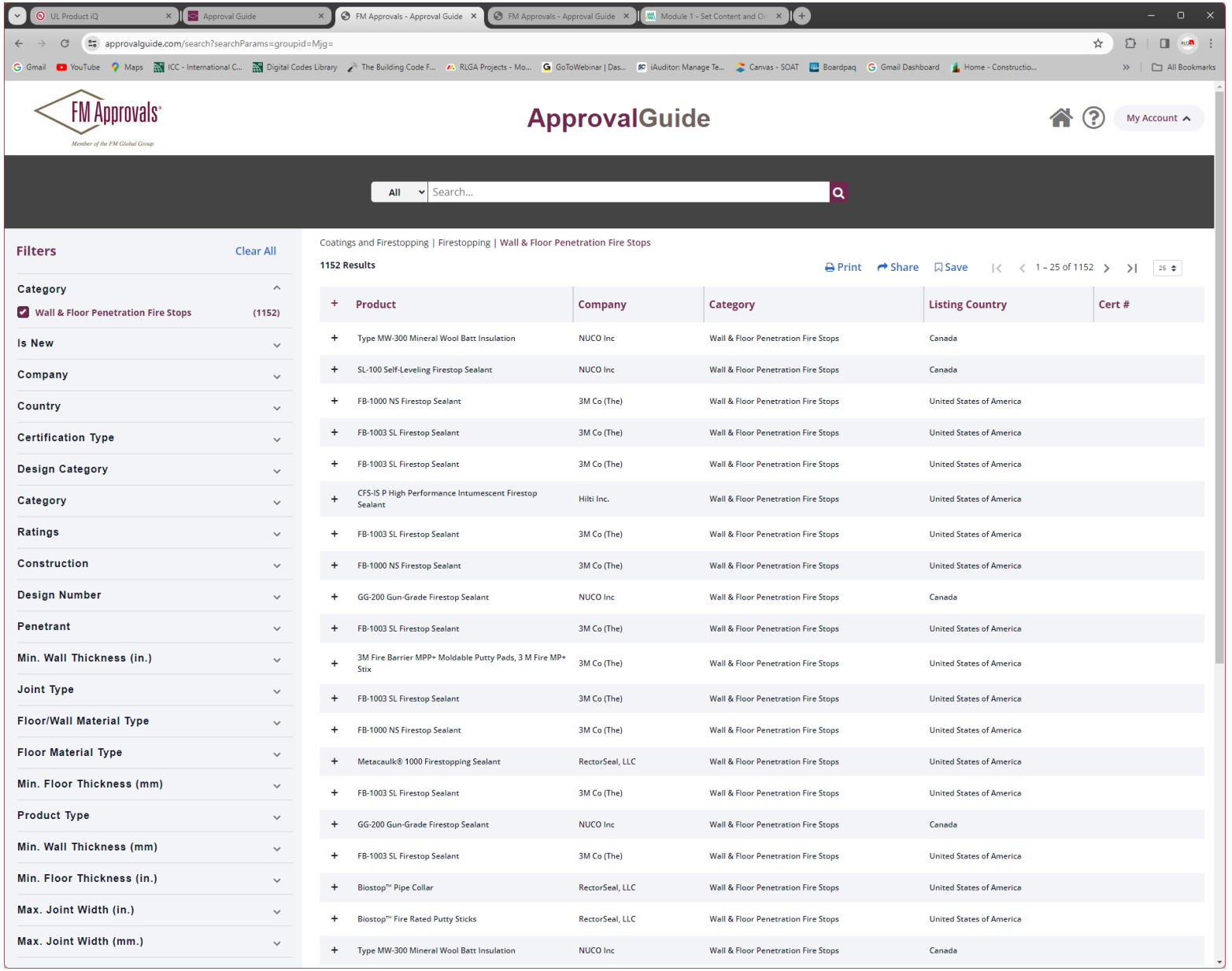
NOTE: Refer to Chapter 2 of the *FCIA Firestop Manual of Practice* for a detailed discussion.

FCIA
Firestop Contractors International Association



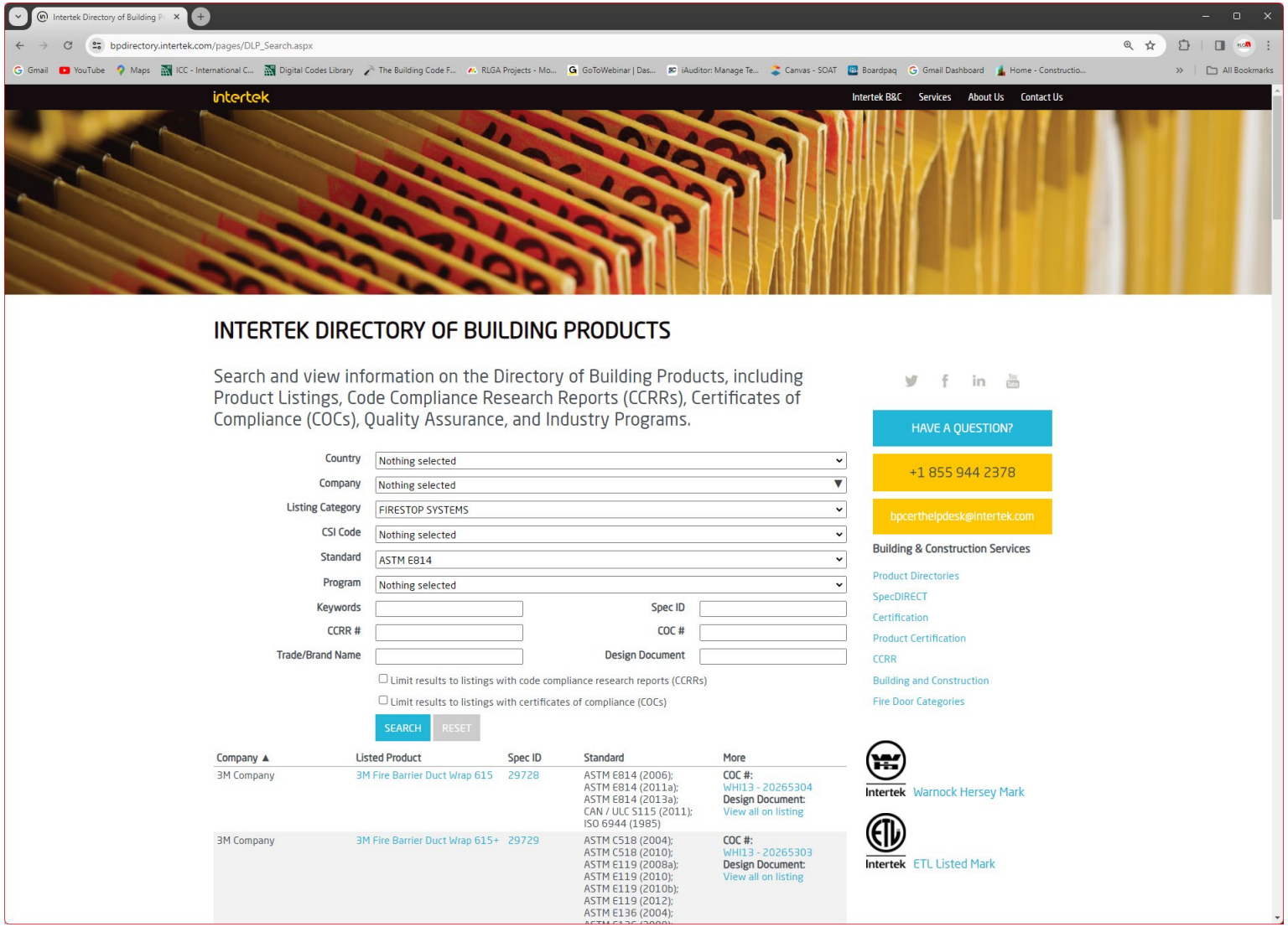
UL Product iQ: UL Firestop System Listing Search

FCIA
Firestop Contractors International Association



FM Approval Guide: FM Firestop System Listing Search

FCIA
Firestop Contractors International Association



Intertek Directory of Building Products: Firestop System Listing Search

FCIA
Firestop Contractors International Association

FCIA
Firestop Contractors International Association

Firestopping & the Construction Documents

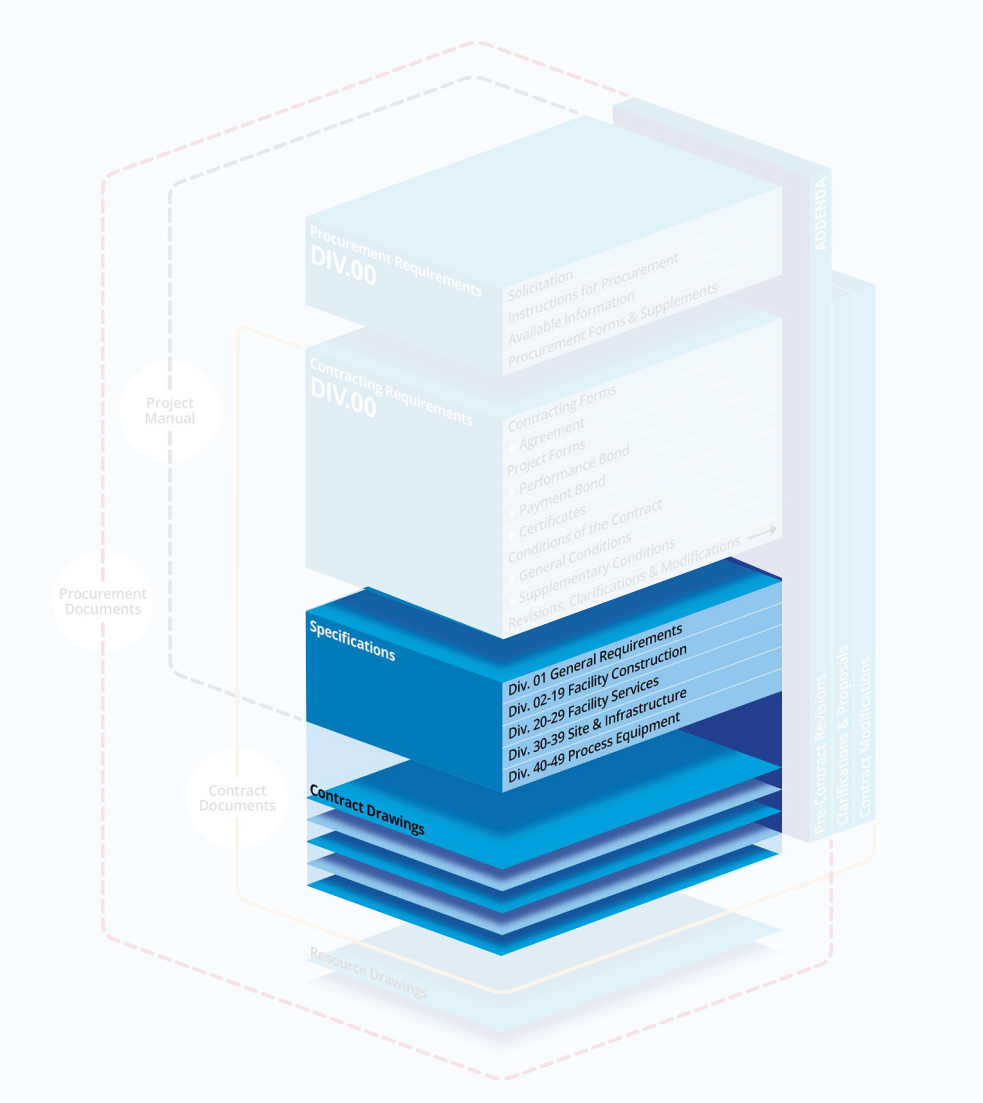
WHAT THE PROJECT REQUIRES

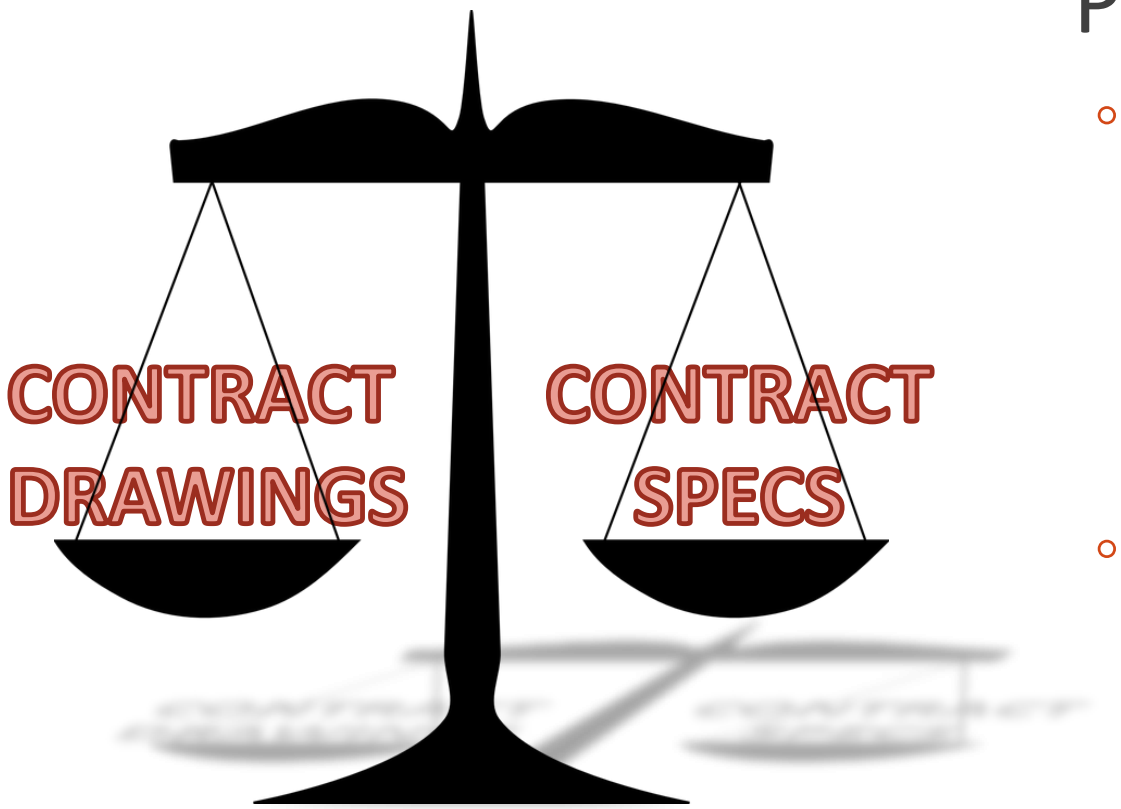
What are Construction Documents?

Illustration from:

Project Delivery Practice Guide, 3rd Edition

Construction Specifications Institute, 2020





Precedence:

- Most general conditions of the contract consider the contract documents to be "complementary"
  - "What is required by one shall be as binding as if required by all" (AIA A201)
- However, in situations of conflicting documents, legal interpretations will likely give precedence to the more specific
- Some contracts may establish a predefined precedence

FCIA
Firestop Contractors International Association

The Contract Drawings

Drawings indicate relationships between building elements and may show the following for materials, assemblies, components, equipment, and accessories:

- Location
- Identification
- Dimension and size
- Details/diagrams of connections
- Shape and form

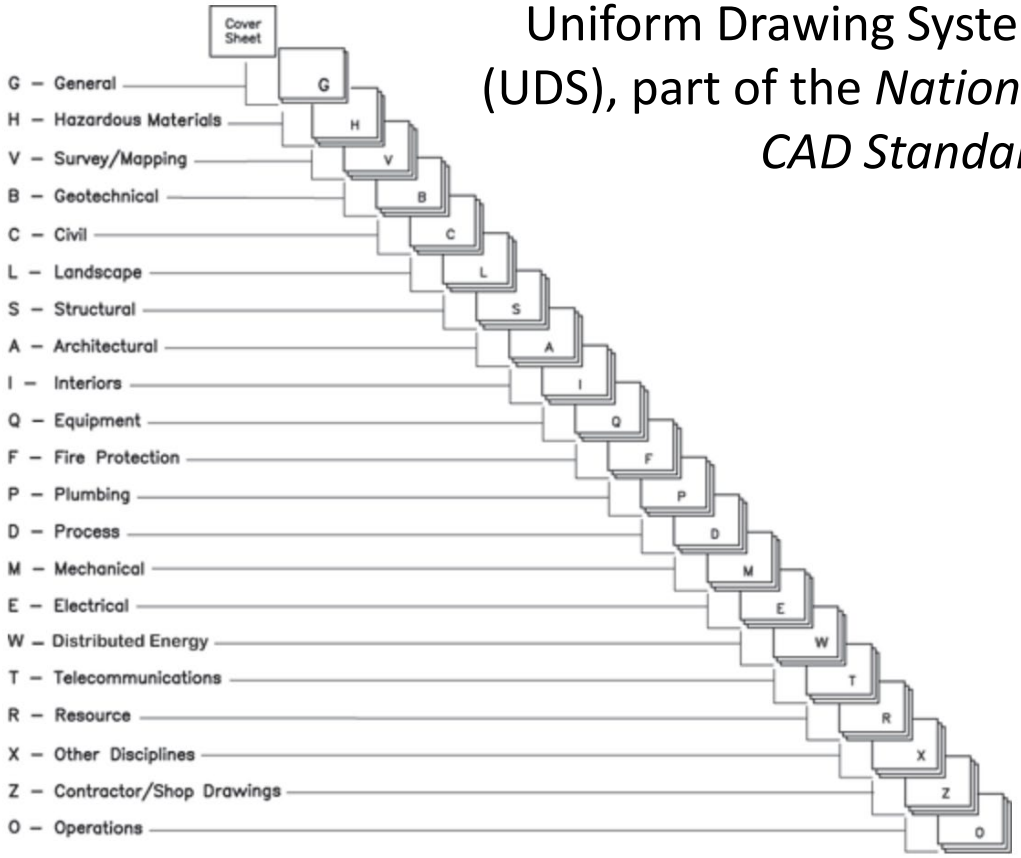
FCIA
Firestop Contractors International Association

The Contract Drawings

Drawing set organization is not consistent among A/E firms

The location of firestopping requirements in the drawings is not consistent (if provided at all).

Uniform Drawing System (UDS), part of the *National CAD Standard*



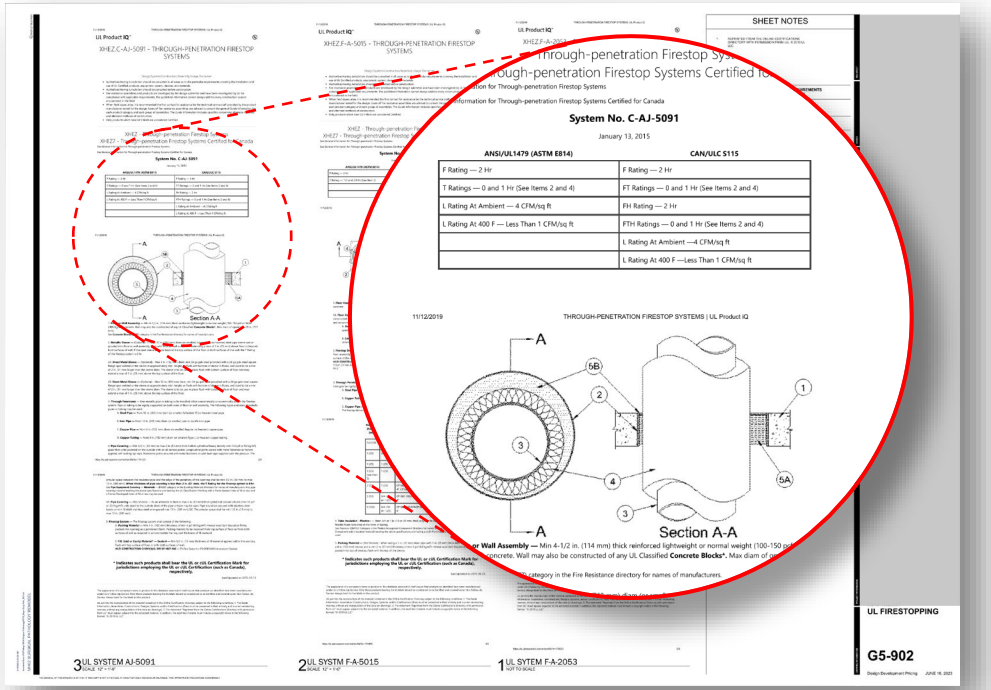
UDS Figure 1.2.1-1 *Illustration of a typical drawing set.*

FCIA
Firestop Contractors International Association

The Contract Drawings

Drawing areas to review:

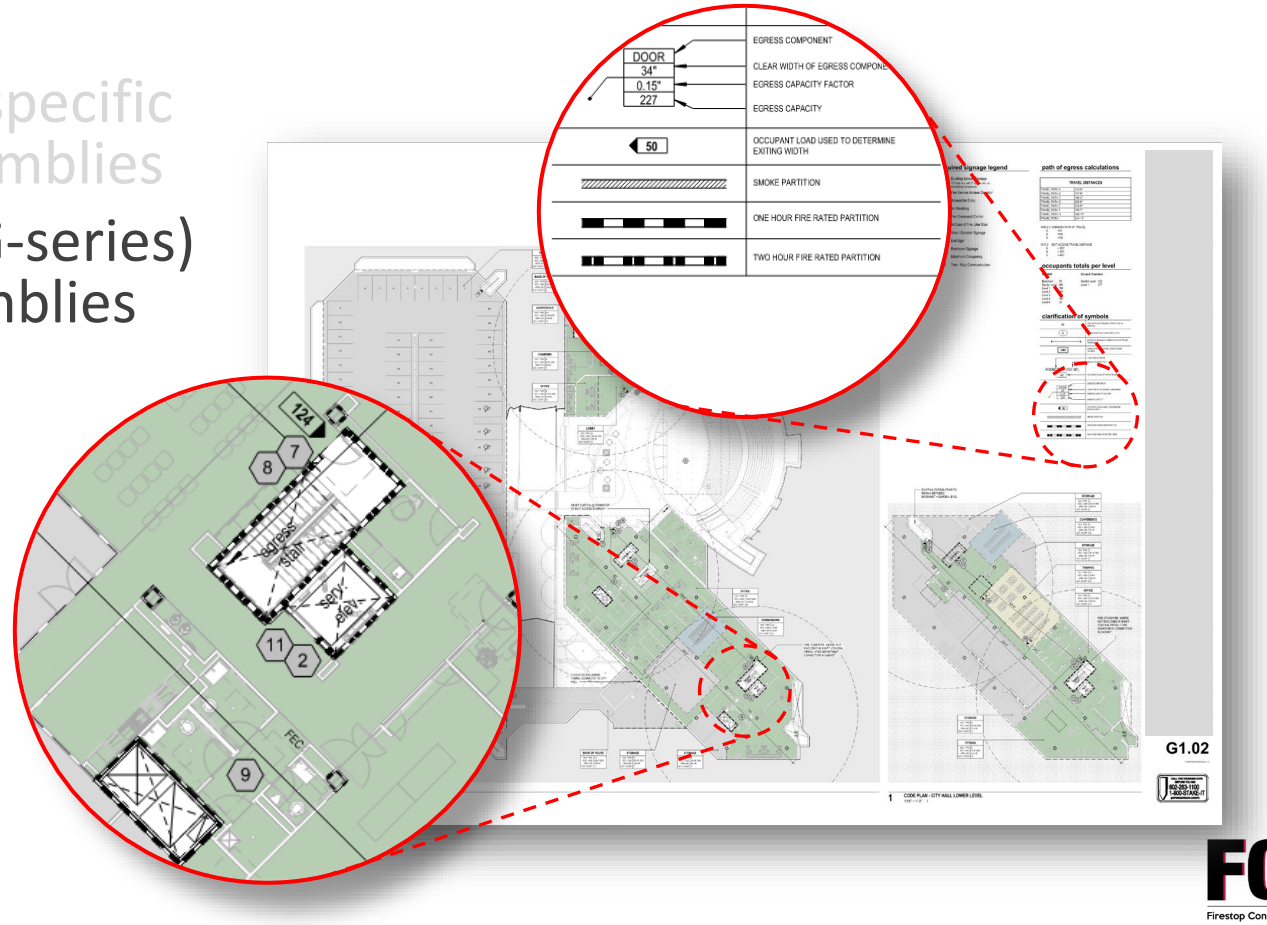
- G-series or A-series sheets for specific or basis-of-design firestop assemblies



The Contract Drawings

Drawing areas to review:

- G-series or A-series sheets for specific or basis-of-design firestop assemblies
- Code drawings (usually in the G-series) for locations of fire-rated assemblies

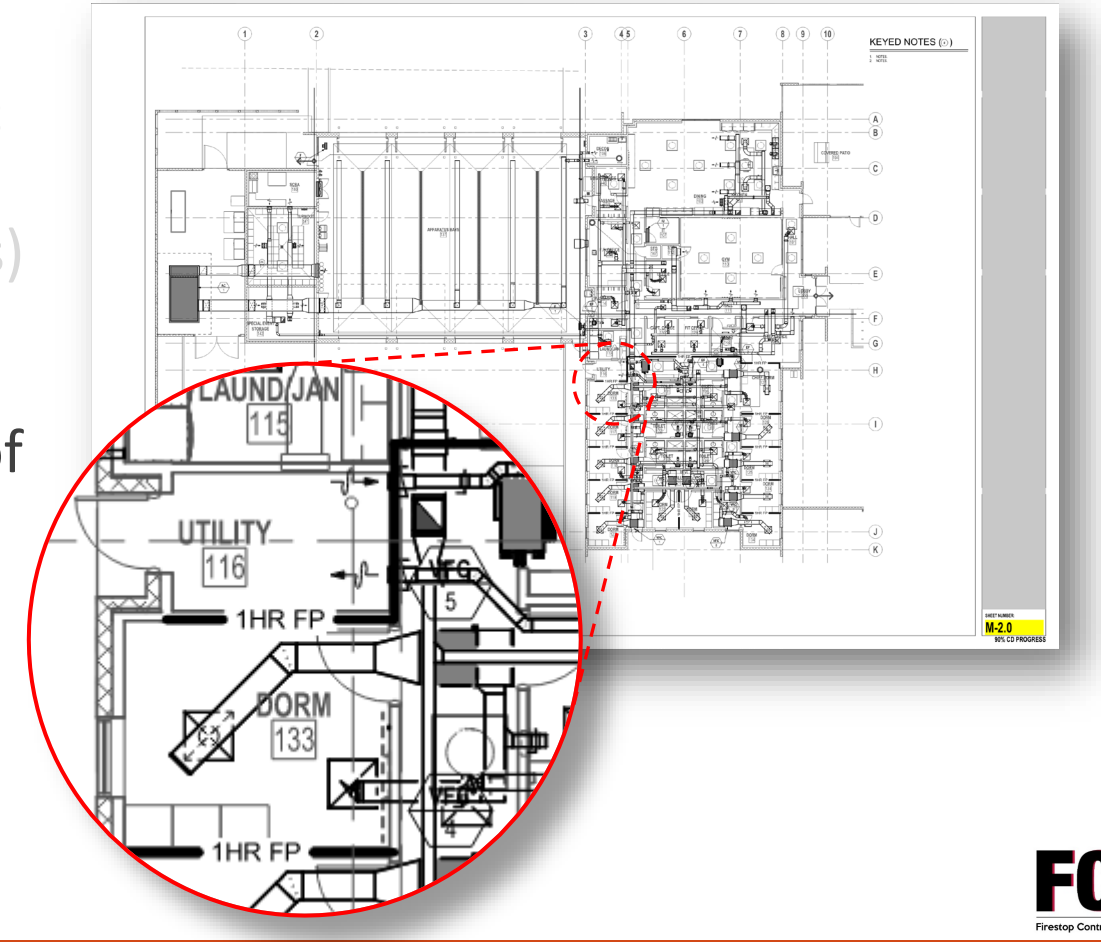


FCIA
Firestop Contractors International Association

The Contract Drawings

Drawing areas to review:

- G-series or A-series sheets for specific or basis-of-design firestop assemblies
- Code drawings (usually in the G-series) for locations of fire-rated assemblies
- Mechanical, electrical, plumbing, and special systems drawings for routing of ducts, conduit, piping, cabling, etc. through fire-rated assemblies

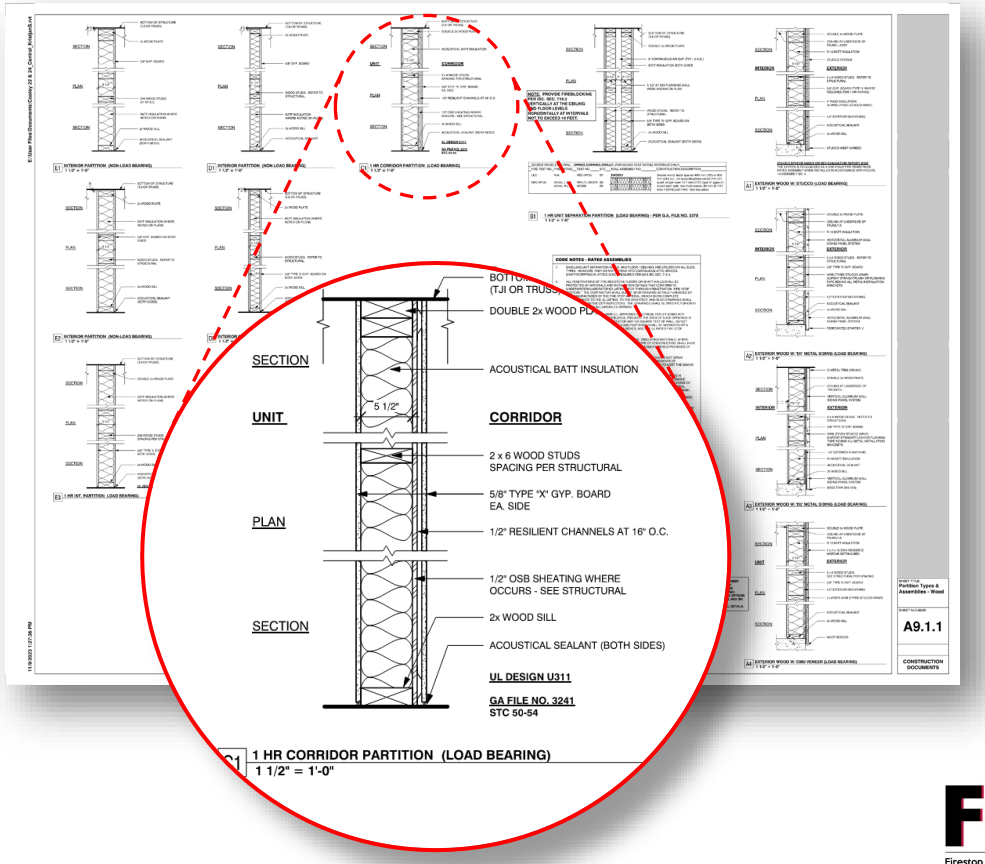


FCIA
Firestop Contractors International Association

The Contract Drawings

Drawing areas to review:

- G-series or A-series sheets for specific or basis-of-design firestop assemblies
- Code drawings (usually in the G-series) for locations of fire-rated assemblies
- Mechanical, electrical, plumbing, and special systems drawings for routing of ducts, conduit, piping, cabling, etc. through fire-rated assemblies
- Wall, floor, and roof types to determine construction of assemblies

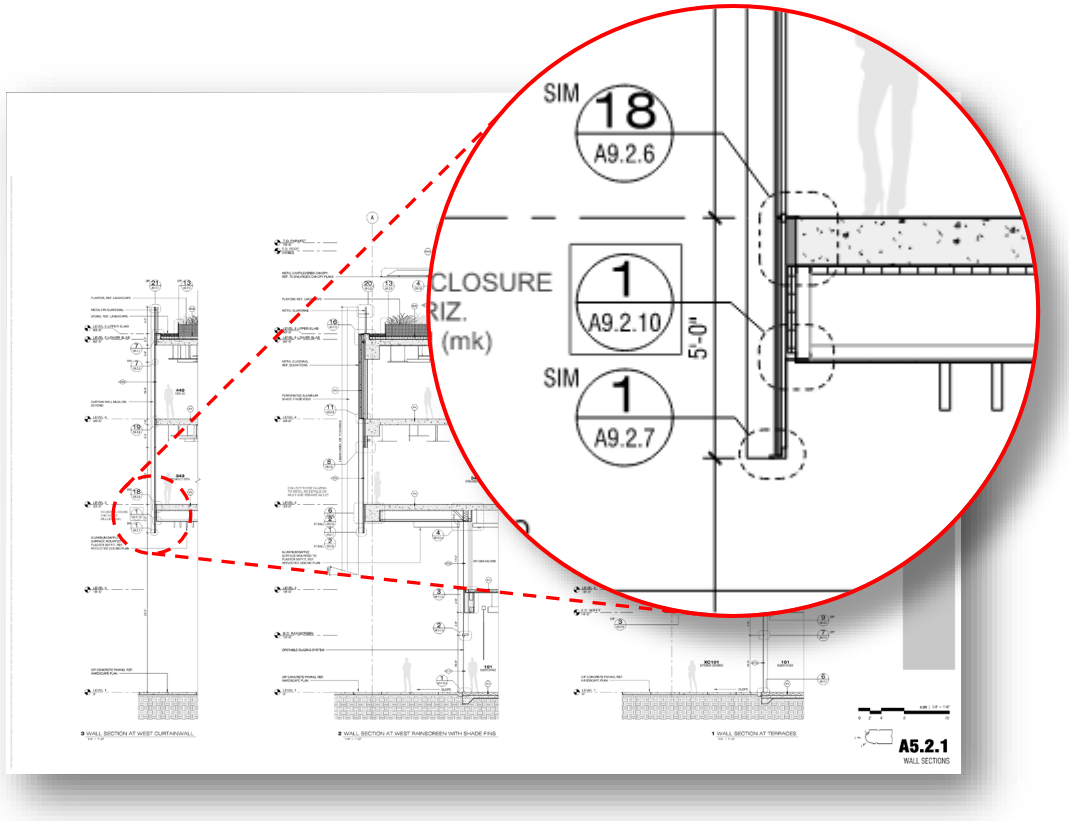


FCIA
Firestop Contractors International Association

The Contract Drawings

Drawing areas to review:

- G-series or A-series sheets for specific or basis-of-design firestop assemblies
- Code drawings (usually in the G-series) for locations of fire-rated assemblies
- Mechanical, electrical, plumbing, and special systems drawings for routing of ducts, conduit, piping, cabling, etc. through fire-rated assemblies
- Wall, floor, and roof types to determine construction of assemblies
- Wall sections for perimeter fire-containment system conditions



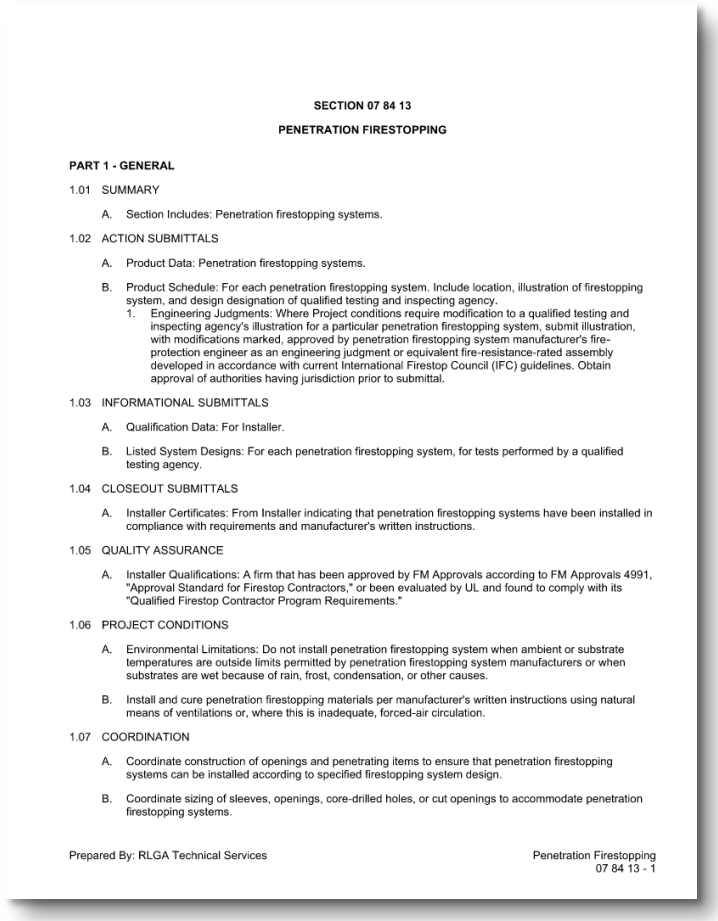
FCIA
Firestop Contractors International Association

The Contract Specifications

Specifications detail the qualitative requirements for products, materials, and equipment

There are four methods of specifying:

- Performance
- Descriptive
- Reference standard
- Proprietary



SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Penetration firestopping systems.

1.02 ACTION SUBMITTALS

A. Product Data: Penetration firestopping systems.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.04 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.07 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

Prepared By: RLGA Technical Services

Penetration Firestopping
07 84 13 - 1

FCIA
Firestop Contractors International Association

The Contract Specifications

In many cases, a firestop specification will utilize all four of the methods:

- **Performance:**

  "F-Rating: Not less than the fire-resistance rating of the wall penetrated."
- **Descriptive:**

  "Provide components for each penetration firestopping system that do not contain ethylene glycol."
- **Reference Standard:**

  "Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479."
- **Proprietary:**

  "Manufacturers: Subject to compliance with requirements, provide products by one of the following:

  "ABC Company.

  "LMNOP Inc.

  "XYZ International."

FCIA
Firestop Contractors International Association

The Contract Specifications

Firestopping requirements are specified in Division 07 in the following possible sections:

- 07 84 00—Firestopping
  - 07 84 13—Penetration Firestopping
  - 07 84 43—Joint Firestopping *(may include building perimeter firestopping)*
  - 07 84 53—Building Perimeter Firestopping

Lesser-known firestop specification sections:

- 07 05 53—Fire and Smoke Assembly Identification
- 07 06 80—Schedules for Fire and Smoke Protection
  - 07 06 80.16—Firestopping Schedule

FCIA
Firestop Contractors International Association

The Contract Specifications

Firestopping requirements may also be found in the following locations:

- Division 21 – Fire Suppression
- Division 22 – Plumbing
- Division 23 – Heating, Ventilating, and Air Conditioning (HVAC)
- Division 26 – Electrical
- Division 27 – Communications
- Division 28 – Electronic Safety and Security

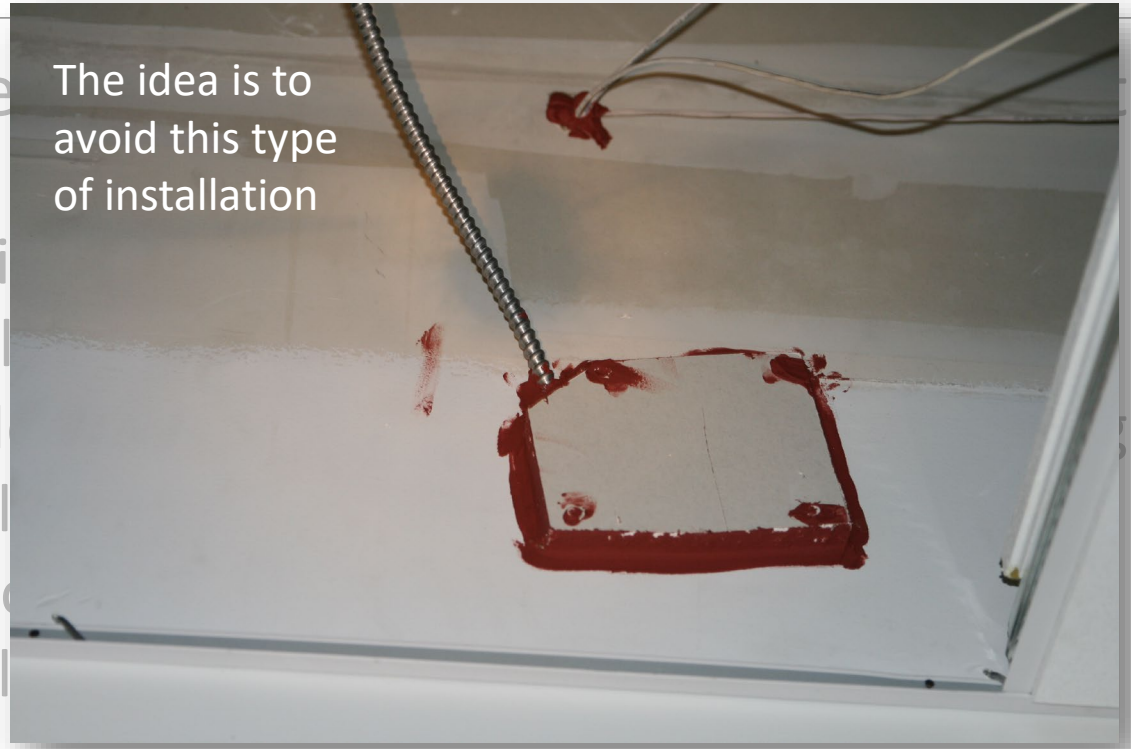
Requirements in the above follow the "*you poke it, you patch it*" concept

FCIA
Firestop Contractors International Association

The Contract Specifications

Firestopping re… …he following locations:

- Division 21 – Fi…
- Division 22 – Pl…
- Division 23 – H… …g (HVAC)
- Division 26 – El…
- Division 27 – Co…
- Division 28 – El…



Requirements in the above follow the *"you poke it, you patch it"* concept

FCIA
Firestop Contractors International Association

The Contract Specifications

Firestopping requirements may also be found in the following locations:

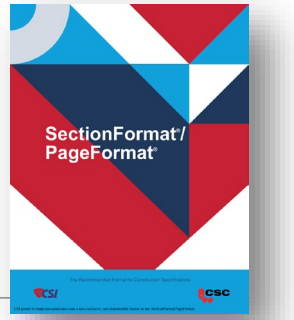
- Division 21 – Fire Su
- Division 22 – Plumb
- Division 23 – Heatin ning (HVAC)
- Division 26 – Electr
- Division 27 – Comm
- Division 28 – Electronic Safety and Security

Best Practice is to keep **all** firestopping requirements in Division 07.

Requirements in the above follow the "*you poke it, you patch it*" concept

FCIA
Firestop Contractors International Association

The Contract Specifications



A specification section is separated into three PARTS:

- PART 1 – GENERAL

  "Describes administrative and procedural requirements unique to the section. Part 1 expands on subjects covered in Division 01, adding information unique to the section."

- PART 2 – PRODUCTS

  "Describes the systems, assemblies, equipment, products, materials, fabrications, and mixes that are to be incorporated into the project."

- PART 3 – EXECUTION

  "Describes field/site installation or application, including preparatory actions and post-installation cleaning and protection. Field/site-built assemblies and field/site-manufactured products and systems are included."

FCIA
Firestop Contractors International Association

The Contract Specifications
PART 1 – GENERAL

Pay particular attention to the following:

- Submittals (Also look at Section 01 33 00—Submittal Procedures)
  - Product data
  - Engineering judgments
  - Qualification data (based on Quality Assurance requirements)
  - Installer certificates
- Administrative Requirements
  - Preinstallation Meetings – May be required; however, whether in the specifications or not, the Appendices in ASTM E2174 and ASTM E2393 state “pre-construction” meetings should be held

FCIA
Firestop Contractors International Association

The Contract Specifications
PART 1 – GENERAL

Pay particular attention to the following: *(cont.)*

- Quality Assurance
  - Installer qualifications – FM-Approved per FM 4991 or UL Solutions Qualified Firestop Contractor Program
  - Mockups – May be required if appearance or quality of installation is important

FCIA
Firestop Contractors International Association

The Contract Specifications
PART 2 – PRODUCTS

Pay particular attention to the following:

- Manufacturers/Products: May be proprietary or descriptive
  - May be limited by assemblies shown on drawings or listed in a schedule
  - Substitutions, if permitted, must comply with Section 01 25 00—Substitution Procedures
- Ratings: As indicated on drawings, as listed in a schedule, or as specified
  - May require ratings not required by code, such as:
    - M-Rating for movement capability per ASTM E3037 “Standard Test Method For Measuring Relative Movement Capabilities Of Through-Penetration Firestop Systems”
    - W-Rating for water resistance per UL 1479

FCIA
Firestop Contractors International Association

The Contract Specifications
PART 3 – EXECUTION

Pay particular attention to the following:

- Identification: Labeling of firestop systems
- Special Inspection: May mention that systems are subject to special inspections
  - Owner-provided and not a requirement of the Installer
  - Inspected according to the following:
    - ASTM E2174 “Standard Practice for On-Site Inspection of Installed Firestops”
    - ASTM E2393 “Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers”
  - Installer must make necessary corrections

FCIA
Firestop Contractors International Association

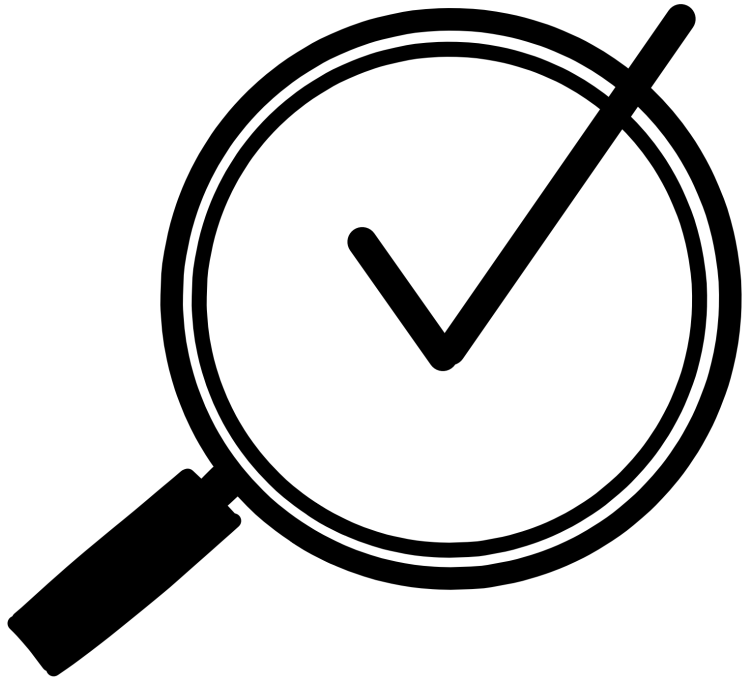
Quality Assurance (QA) & Quality Control (QC)

QA:

"The procedures for guarding against construction defects and deviations from the contract documents before and during the execution of the work."

QC:

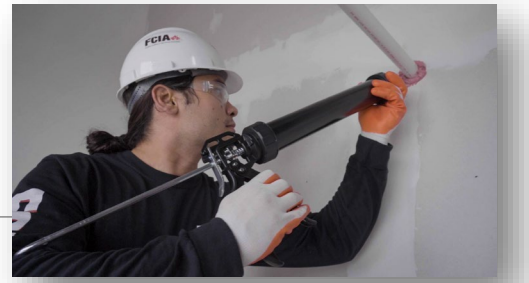
"The procedures for evaluating completed activities and elements of the work for conformance with contract requirements."



FCIA
Firestop Contractors International Association

Quotes are from CSI's *Project Delivery Practice Guide*, 3rd Edition

Quality Assurance/Quality Control



Contractors/Installers:

- FM-Approved Firestop Contractors
- UL Solutions Qualified Firestop Contractor Program

Benefits:

- Breeds an environment where firestop systems are installed correctly the first time and function as intended should they be called upon by fire and/or smoke
- Owners and design professionals have elevated levels of confidence
- Ensures consistency throughout the facility

Quality Assurance/Quality Control

Special Inspection Agency Approval:

- IAS Special Inspector Accreditation

Special Inspector Approval:

- IFC Firestop Inspector Certificate/Premier Certificate
- ICC Firestopping Credential of Learning Achievement (CLA)
  - Applicable for certificants of the following:
    - UL, FM, or IFC programs (also by WABO for Washington state residents)
    - ICC Certified Building Plans Examiner/Inspector, Combo Plans Examiner/Inspector, MCP, or any ICC Special Inspector
    - OSHPD California Inspector Certification

QUESTIONS?

RONALD L. GEREN
FCSI, DISTINGUISHED MEMBER, AIA, CCS, CCCA, CDT, SCIP
OWNER
RON@SPECSANDCODES.COM

RLGA
Technical Services