IMPORTANCE OF RIGHT SPECIFICATION FOR FIRESTOPPING SYSTEM



Welcome to today's webinar! We will start shortly

OUR PRESENTER FOR THIS WEBINAR



MODERATOR

Engr. Richmond Olaya
Hilti Philippines, Inc.
Technical Marketing Manager



SPEAKER

Engr. John De Ocampo
Hilti Philippines, Inc.
Specification Engineer – Architectural Trade

FEW HOUSEKEEPING REMINDERS…



Ask Questions & Upvote
Type in your questions, upvote other questions and we will answer them in the Q/A section



We will have **Polls Questions** in between discussion to confirm understanding on topics



Session is **live** and will be **Recorded**

IMPORTANCE OF RIGHT SPECIFICATION FOR FIRESTOPPING SYSTEM



LEARNING OBJECTIVES

1. Understand and refresher on what **firestopping** is and why it's needed;
2. Know the applicable **code requirements** related to firestop, and understand firestop system testing and listing for penetrations, joints, and perimeter fire barriers; and
3. Discussion about how firestopping fits into the **specification, design, and construction process**



AGENDA

1.0 Importance of fire safety in buildings

2.0 How to reduce loss due to fire?

3.0 Introduction to passive fire protection and firestopping

- 3.1 Concept
- 3.2 Codes and standards
- 3.3 Applications

4.0 Improvement on Specifying Firestop Systems

5.0 Key Takeaways and Hilti Support

40,000

Source: CTIF (International Association of Fire and Rescue Service), Report n. 26 - World Fire Statistics 2019

INTRODUCTION TO “FIRE IN BUILDINGS”

“Fires” are nightmares in the Philippines!

Year	No. of Fire Incidents	Fatalities	Injuries	Total Amount of Damages
2021	14,420	253	668	3.291 bPHP
2022	12,850	326	790	4.187 bPHP

Source:
Investigation and Intelligence Division, BFP National Headquarter, Feb 2022

Remark/s:

- Non-structural and vehicular fires are not included, only structural fires are considered.



FIRE AT UP DILIMAN CAMPUS

Location: Manila, Philippines

Fire Event: 1 April 2016

Description: A fire broke out UP Faculty Center located at Diliman, Quezon City reaching fifth level alarm. Fire started at 3rd floor and spread to lower floor. Authorities said faulty electrical wiring could have caused the blaze.

Fire duration: 3 ~ 4 hours

Fire Damage: PHP 3 Million financial loss (approx.)

Construction Type: Built 1960s, the structure is made of concrete with only wooden walls separating offices.

Death/ injury: 1 Fireman injured

Source: Fire breaks out at UP Diliman campus (cnnphilippines.com)

Fire breaks out at UP Diliman campus

By CNN Philippines Staff

Published Apr 1, 2016 12:00:52 PM

Like Share Sign Up to see what your friends like.



Metro Manila (CNN Philippines) — A fire broke out at the University of the Philippines (UP) Diliman campus in Quezon City early Friday (April 1).

FIRE AT THE WATERFRONT MANILA PAVILION

Location: Manila, Philippines

Fire Event: 18 March 2018

Description: The fire was burning intensely throughout the 2nd and lower floors with firefighters reporting that several floors of the hotel were totally damaged.

Fire duration: 24 hours .

Fire Damage: P 3 Million financial loss (approx.)

Construction Type: Concrete building with typical drywall partitions

Death/ injury: 5 Deaths, 23 Injured

Investigation: High-temperature electric discharge of a wiring inside the ceiling near the slot machine area, which resulted in short circuit accompanied by massive electrical ignition.

Source: Philippine News Agency; 2018 Manila Pavilion Hotel fire – Wikipedia; Manila Pavilion hotel fire accidental - BFP



WHAT IS THE LEADING KILLER IN FIRES?

3/4 of all fire deaths are caused by smoke inhalation.

Source: Hall, Jr. John R. NFPA Fire Analysis & Research, Quincy, MA. “Burns, Toxic Gases, and other Hazards”.

Visibility: **47%** of survivors caught in a fire could not see more than 12 feet.

Source: NFPA Fire Protection Handbook, 18th Ed. Table 1-1P. Pg.1-15.

Approximately **57%** of people killed in fires are not in the room of the fire’s origin.

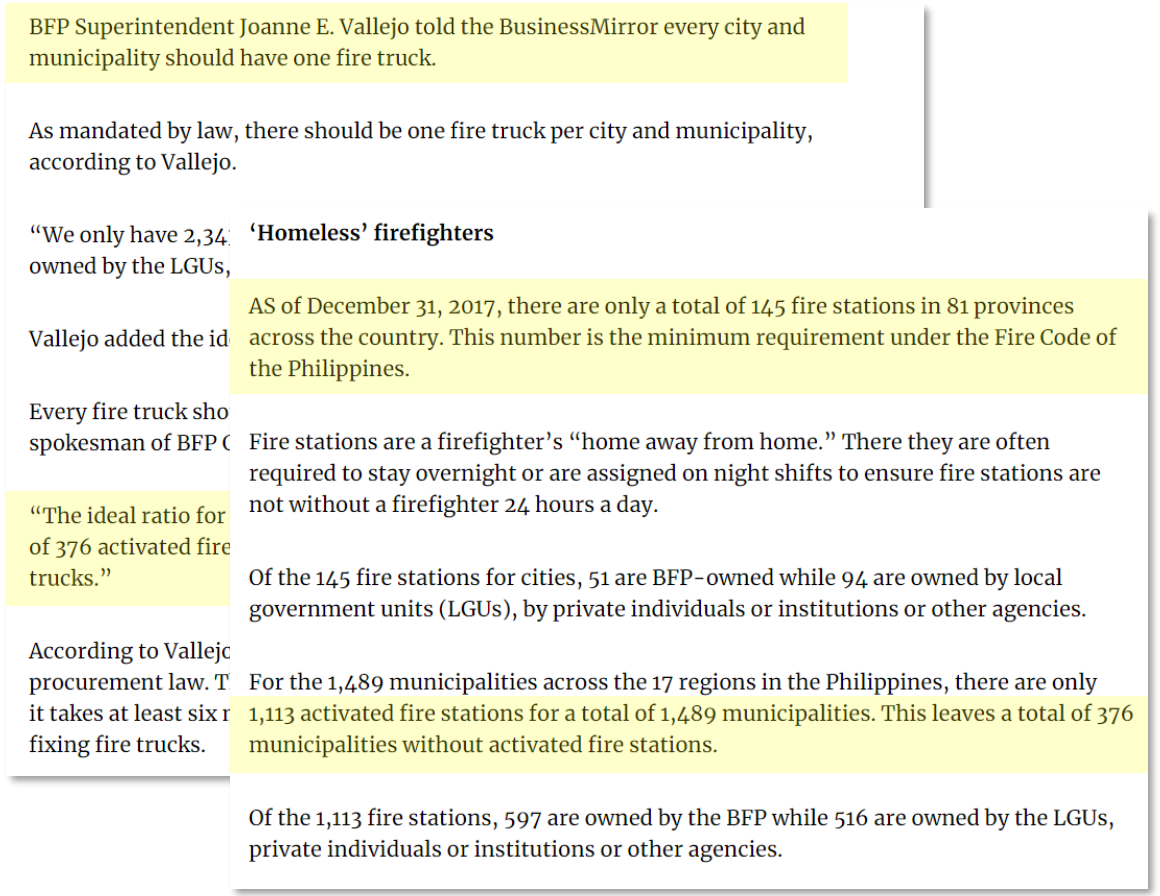
Source: NFPA Fire Protection Handbook, 18th Ed. Table 8-1P. Pg. 8-17.

Smoke travels **120-420** feet per minute under fire conditions

Source: Estimate based upon ceiling jet velocity calculations for typical ceiling heights and heat release rates.



TIME IS OF ESSENCE IN ANY FIRE RESCUE OPERATION



BFP Superintendent Joanne E. Vallejo told the BusinessMirror every city and municipality should have one fire truck.

As mandated by law, there should be one fire truck per city and municipality, according to Vallejo.

"We only have 2,34
owned by the LGUs,

Vallejo added the id

Every fire truck sho
spokesman of BFP (

"The ideal ratio for
of 376 activated fire
trucks."

According to Vallejc
procurement law. T
it takes at least six r
fixing fire trucks.

'Homeless' firefighters

AS of December 31, 2017, there are only a total of 145 fire stations in 81 provinces across the country. This number is the minimum requirement under the Fire Code of the Philippines.

Fire stations are a firefighter's "home away from home." There they are often required to stay overnight or are assigned on night shifts to ensure fire stations are not without a firefighter 24 hours a day.

Of the 145 fire stations for cities, 51 are BFP-owned while 94 are owned by local government units (LGUs), by private individuals or institutions or other agencies.

For the 1,489 municipalities across the 17 regions in the Philippines, there are only 1,113 activated fire stations for a total of 1,489 municipalities. This leaves a total of 376 municipalities without activated fire stations.

Of the 1,113 fire stations, 597 are owned by the BFP while 516 are owned by the LGUs, private individuals or institutions or other agencies.

Some of the hurdles in rescue operations:

- Increased response time due to :
  - delay in intimation,
  - traffic,
  - far location etc.
- Rapid spread of fire due to modern construction practices (use of more combustible material for finishing and decoration)
- Rapid spread of smoke (50-100m per min)
- Faulty/shortage of water supply etc.

Source: Tragedy of fires: Death and destruction in the Philippines | IFSEC Philippines

MORE TIME TO RESCUE CAN BE BOUGHT BY ADOPTING DIFFERENT ELEMENTS OF FIRE PROTECTION



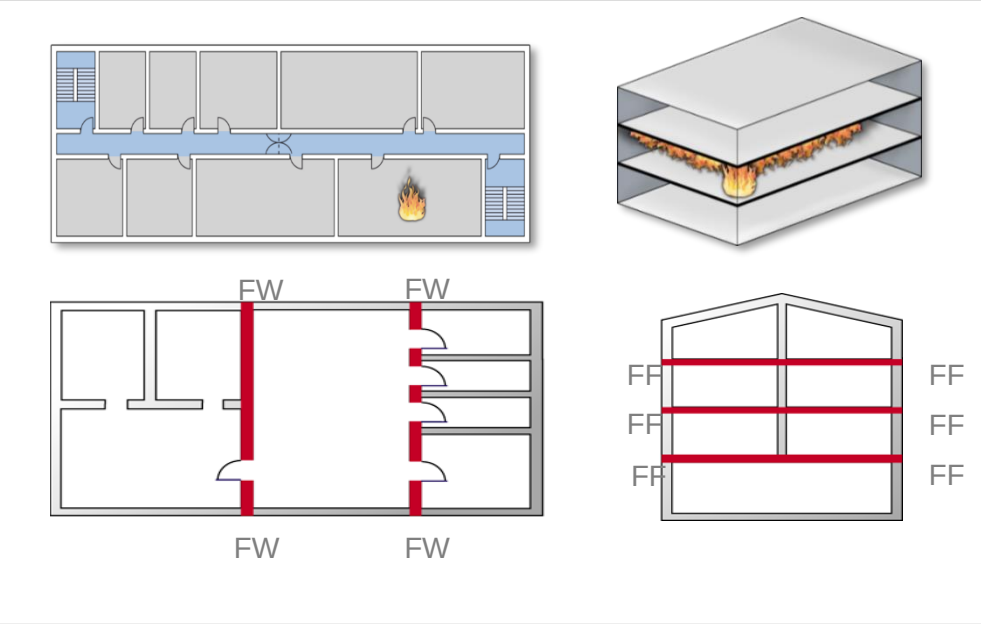
Prevention

- ✓ Training
- ✓ Fire drills
- ✓ Periodic audits etc.

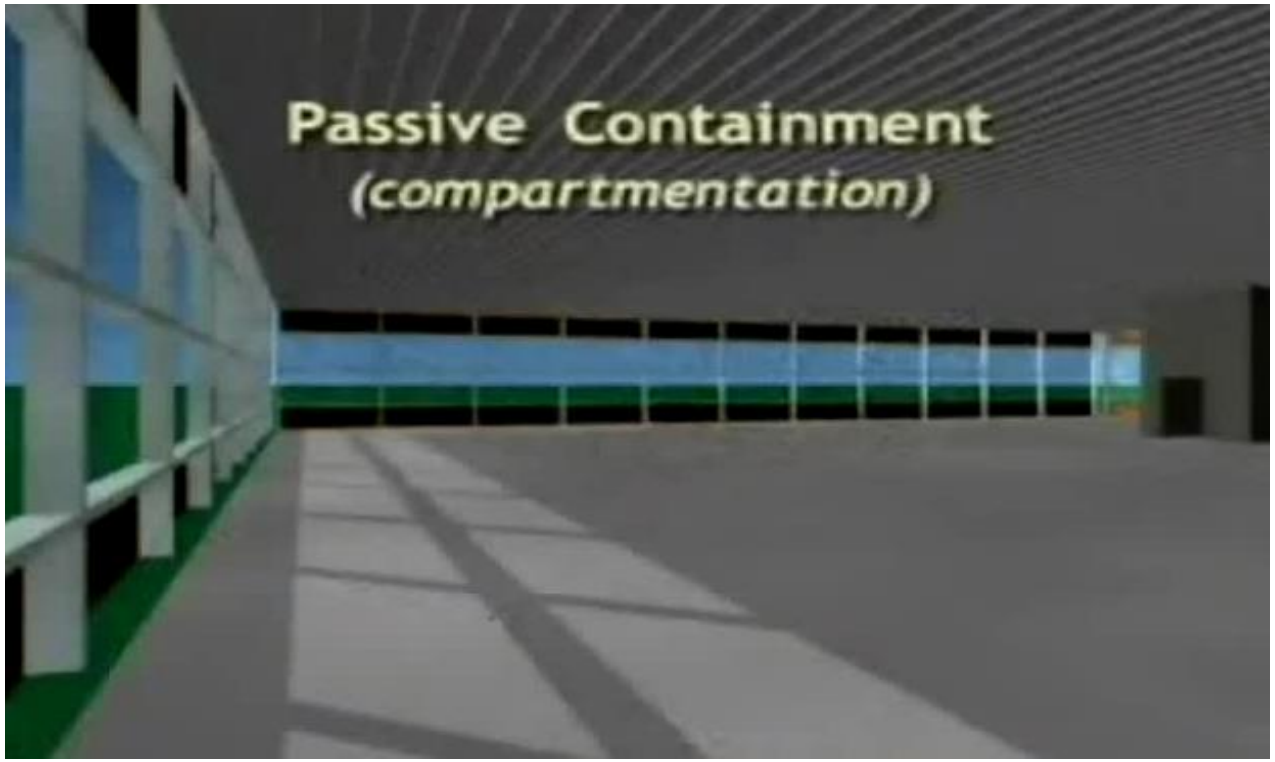
All aspects are integral for proper fire protection, one cannot work without the other! **We will focus on containment in this presentation.**

SO, WHAT IS COMPARTMENTATION?

- It is the process of dividing the building into a series of fire tight boxes termed compartments which will form a barrier to the products of combustion; smoke, heat and toxic gases.
- The intention is to limit the severity of the fire which in turn should help the occupants to evacuate the building and assist fire and rescue service personnel with fire-fighting and rescue operations.



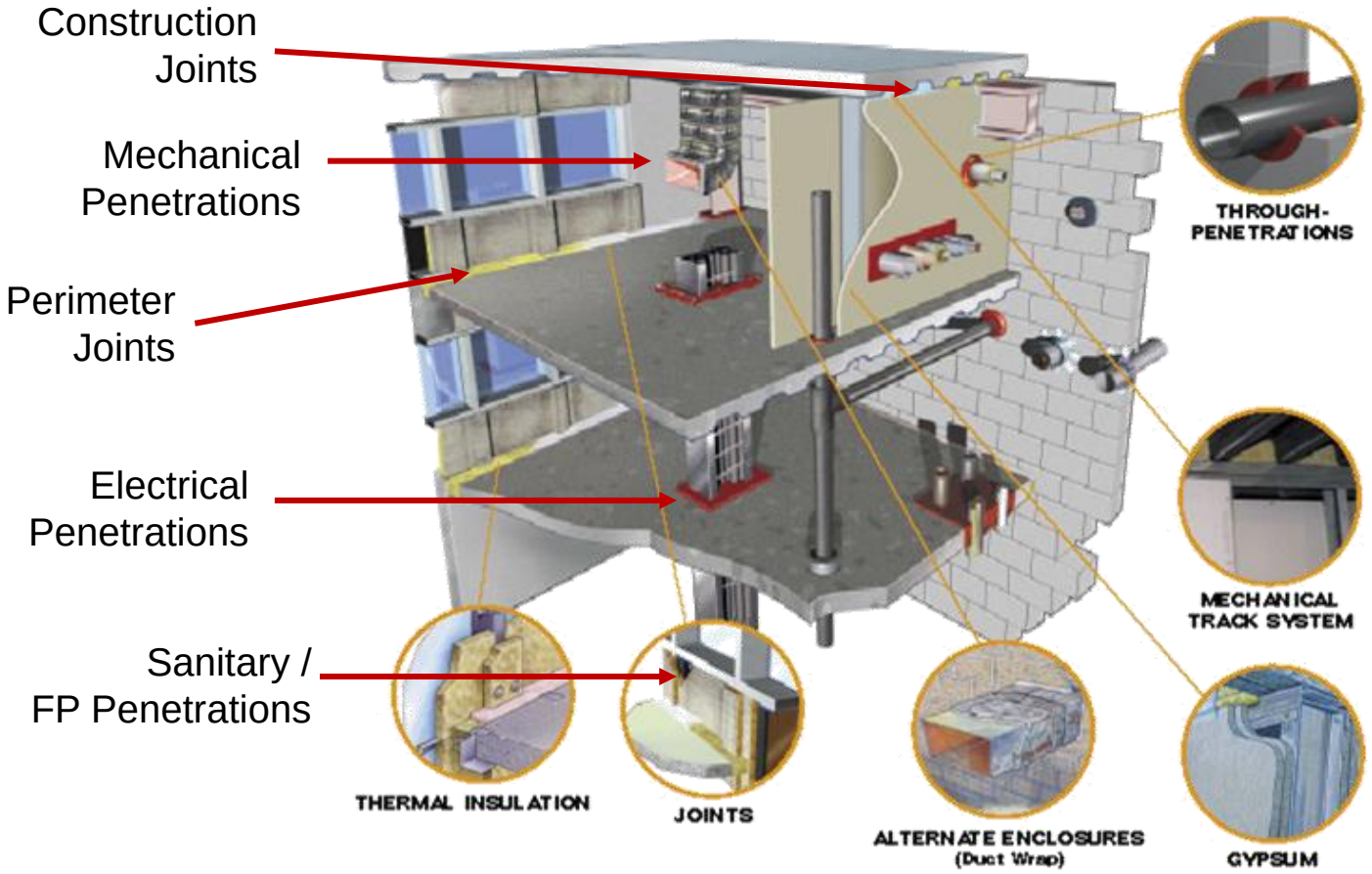
Fire-rated walls and floors



THE OPENING IN THESE BARRIERS (IF ANY) SHOULD BE PROPERLY SEALED USING FIRESTOP ASSEMBLIES

Fire rated partitions should **impede** the passage of smoke and flames between compartments.

The **fire rating** of a partition is rendered **zero** if there is an opening on it or a **weak point**.



DESIGN AND QUALIFICATION OF PASSIVE FIRE PROTECTION SYSTEM

1. **Firestop Application**
2. **Quantitative parameter for firestopping**
3. **Select the design code or standard to use**
4. **Product selection**
5. **Obtain product approval report**

- Construction joints
- Through penetration
- Perimeter Joint

- Fire (F) Rating
- Temperature (T) Rating
- Leakage (L) Rating

ICC INTERNATIONAL CODE COUNCIL®

ASTM INTERNATIONAL Standards Worldwide


Firestop sealant


Firestop foam

Speed spray


Firestop block


Wrap strip


Firestop collar


Firestop mortar

Underwriters Laboratories

OMEGA POINT LABORATORIES

Exova Warringtonfire

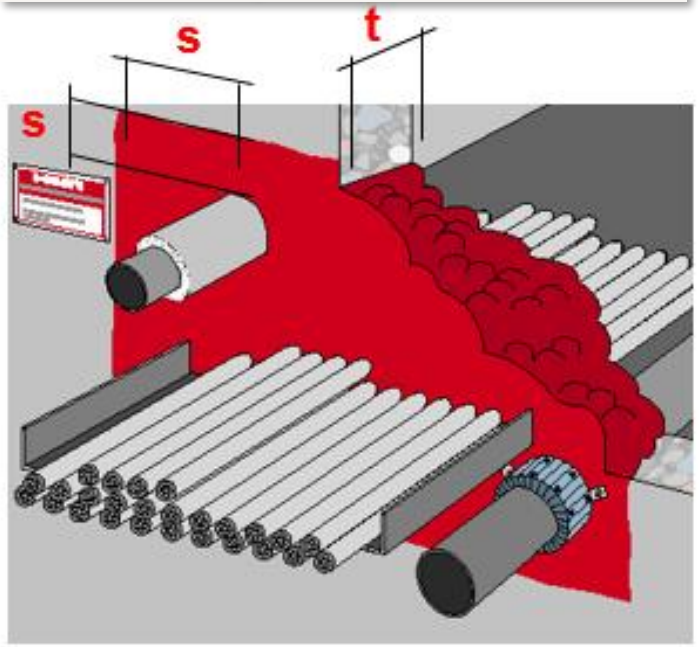
FM APPROVED

Warnock Hersey

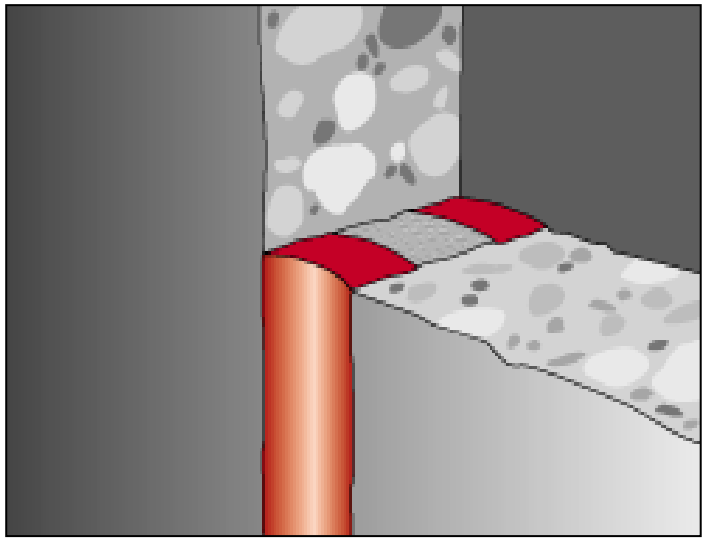
SO, WHAT IS A FIRESTOP ASSEMBLY?

Fire Protective Assembly – an assembly incorporated in the structure designed to prevent the spread of fire, such as dampers, curtain boards, fire stoppers, and the like. *(Fire Code of the Philippines 2019)*

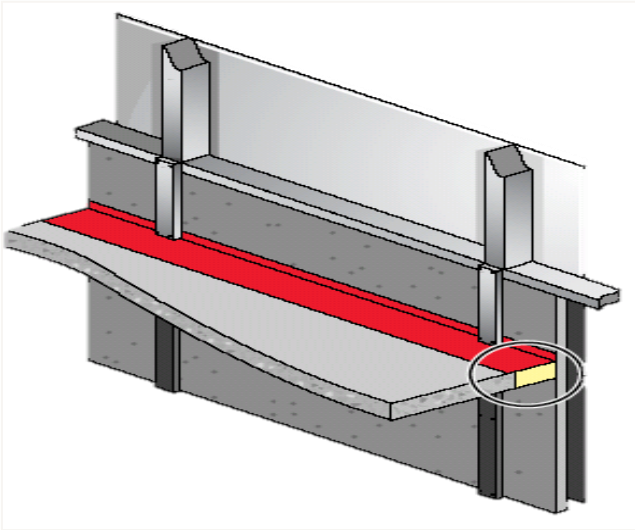
Through - Penetration



Construction Joint



Perimeter Barrier

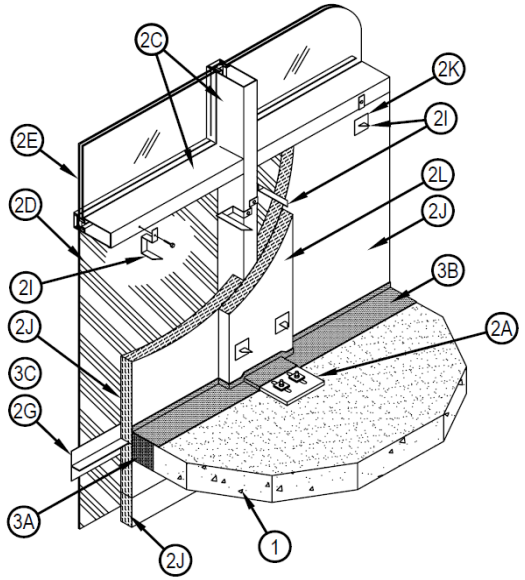


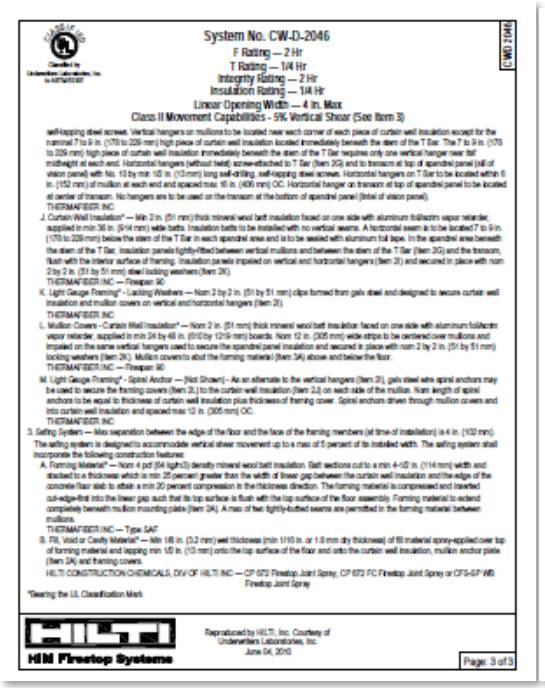
Source: Hilti –Fire Protection

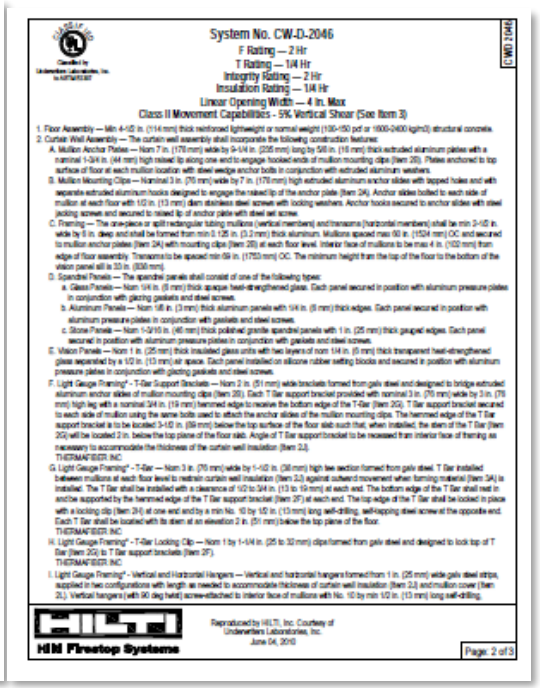
This information is readily available in test report/listings!

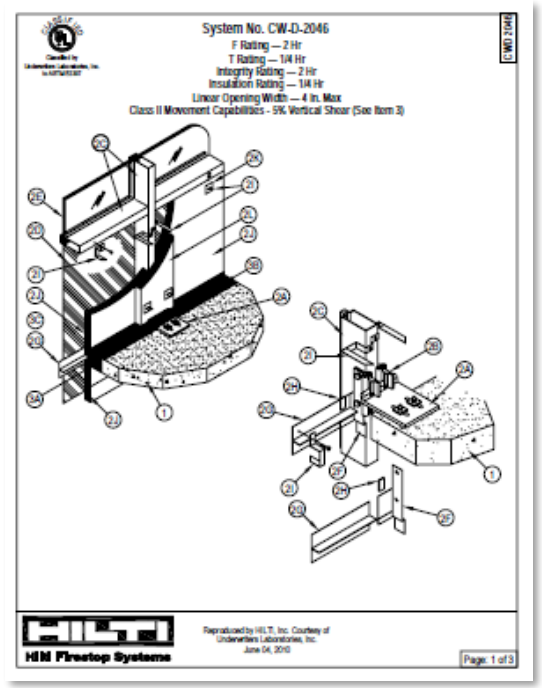
WHEN A TESTED SYSTEM IS APPROVED FOR USE, EACH COMPONENT MUST MATCH WITH THE PROJECT DESIGN

Tested System can have numerous specified components




System No. CW-D-2046
F Rating — 2 Hr
T Rating — 1/4 Hr
Integrity Rating — 2 Hr
Insulation Rating — 1/4 Hr
Linear Opening Width — 4 In. Max
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)
HILTI
HIN Firestop Systems
Page: 3 of 3


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HILTI
HIN Firestop Systems
Page: 2 of 3


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HIN Firestop Systems
Page: 1 of 3

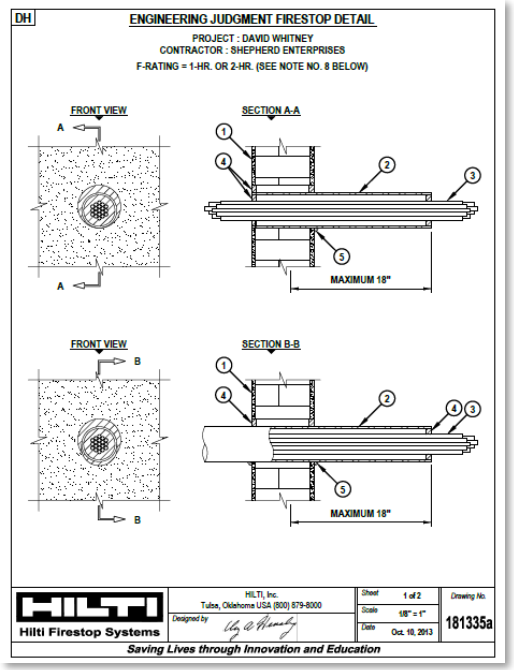
If the project design does not exactly match a tested system, an **Engineering Judgment (EJ)** must be created to address the project design differences.

IN ABSENCE OF TESTED SYSTEM, ENGINEERING JUDGEMENT (EJ) MAY BE USED

An engineering judgment, or EJ as they are commonly known, is a drawing or group of drawings typically generated by a firestop manufacturer for a customer's site-specific application. They are recommended as a solution when a customer's site condition deviates from a tested firestop design/system.

Key fundamentals

- Use tested systems in lieu of EJs when available
- Issued only by qualified technical personnel
- Based upon interpolations of previously tested firestop systems and are referenced on the form
- Based on the expectation that the recommended firestop system will perform as designed if subjected to the appropriate firestop test standard for the required fire-rated time period
- Limited only to the specific conditions upon which it was rendered
- Site specific; Not transferrable


DH

ENGINEERING JUDGMENT FIRESTOP DETAIL

PROJECT : DAVID WHITNEY
CONTRACTOR : SHEPHERD ENTERPRISES
F-RATING = 1-HR. OR 2-HR. (SEE NOTE NO. 8 BELOW)

FRONT VIEW

SECTION A-A

MAXIMUM 18"

FRONT VIEW

SECTION B-B

MAXIMUM 18"

Hilti Firestop Systems

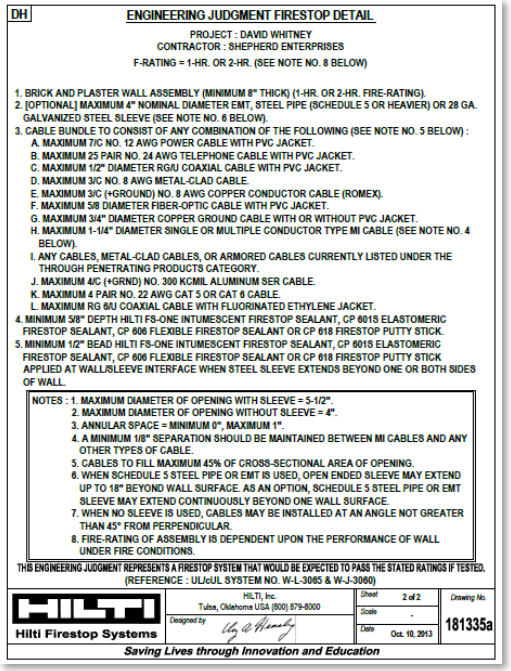
HILTI, Inc.
Tulsa, Oklahoma USA (800) 879-8000

Designed by

Sheet 1 of 2
Scale 1/8" = 1"
Date Oct. 10, 2013

Drawing No. 181335a

Saving Lives through Innovation and Education


DH

ENGINEERING JUDGMENT FIRESTOP DETAIL

PROJECT : DAVID WHITNEY
CONTRACTOR : SHEPHERD ENTERPRISES
F-RATING = 1-HR. OR 2-HR. (SEE NOTE NO. 8 BELOW)

1. BRICK AND PLASTER WALL ASSEMBLY (MINIMUM 8" THICK) (1-HR. OR 2-HR. FIRE-RATING).
2. [OPTIONAL] MAXIMUM 4" NOMINAL DIAMETER EMT, STEEL PIPE (SCHEDULE 5 OR HEAVIER) OR 28 GA. GALVANIZED STEEL SLEEVE (SEE NOTE NO. 6 BELOW).
3. CABLE BUNDLE TO CONSIST OF ANY COMBINATION OF THE FOLLOWING (SEE NOTE NO. 5 BELOW) :
   A. MAXIMUM 7/C NO. 12 AWG POWER CABLE WITH PVC JACKET.
   B. MAXIMUM 25 PAIR NO. 24 AWG TELEPHONE CABLE WITH PVC JACKET.
   C. MAXIMUM 1/2" DIAMETER RG/U COAXIAL CABLE WITH PVC JACKET.
   D. MAXIMUM 3/C NO. 8 AWG METAL-CLAD CABLE.
   E. MAXIMUM 3/C (+GROUND) NO. 8 AWG COPPER CONDUCTOR CABLE (ROMEX).
   F. MAXIMUM 5/8 DIAMETER FIBER-OPTIC CABLE WITH PVC JACKET.
   G. MAXIMUM 3/4" DIAMETER COPPER GROUND CABLE WITH OR WITHOUT PVC JACKET.
   H. MAXIMUM 1-1/4" DIAMETER SINGLE OR MULTIPLE CONDUCTOR TYPE MI CABLE (SEE NOTE NO. 4 BELOW).
   I. ANY CABLES, METAL-CLAD CABLES, OR ARMORED CABLES CURRENTLY LISTED UNDER THE THROUGH PENETRATING PRODUCTS CATEGORY.
   J. MAXIMUM 4/C (+GRND) NO. 300 KCMIL ALUMINUM SER CABLE.
   K. MAXIMUM 4 PAIR NO. 22 AWG CAT 5 OR CAT 6 CABLE.
   L. MAXIMUM RG 6/U COAXIAL CABLE WITH FLUORINATED ETHYLENE JACKET.
4. MINIMUM 5/8" DEPTH HILTI FS-ONE INTUMESCENT FIRESTOP SEALANT, CP 601S ELASTOMERIC FIRESTOP SEALANT, CP 606 FLEXIBLE FIRESTOP SEALANT OR CP 618 FIRESTOP PUTTY STICK.
5. MINIMUM 1/2" BEAD HILTI FS-ONE INTUMESCENT FIRESTOP SEALANT, CP 601S ELASTOMERIC FIRESTOP SEALANT, CP 606 FLEXIBLE FIRESTOP SEALANT OR CP 618 FIRESTOP PUTTY STICK APPLIED AT WALL/SLEEVE INTERFACE WHEN STEEL SLEEVE EXTENDS BEYOND ONE OR BOTH SIDES OF WALL.

NOTES : 1. MAXIMUM DIAMETER OF OPENING WITH SLEEVE = 5-1/2".
2. MAXIMUM DIAMETER OF OPENING WITHOUT SLEEVE = 4".
3. ANNULAR SPACE = MINIMUM 0", MAXIMUM 1".
4. A MINIMUM 1/8" SEPARATION SHOULD BE MAINTAINED BETWEEN MI CABLES AND ANY OTHER TYPES OF CABLE.
5. CABLES TO FILL MAXIMUM 45% OF CROSS-SECTIONAL AREA OF OPENING.
6. WHEN SCHEDULE 5 STEEL PIPE OR EMT IS USED, OPEN ENDED SLEEVE MAY EXTEND UP TO 18" BEYOND WALL SURFACE. AS AN OPTION, SCHEDULE 5 STEEL PIPE OR EMT SLEEVE MAY EXTEND CONTINUOUSLY BEYOND ONE WALL SURFACE.
7. WHEN NO SLEEVE IS USED, CABLES MAY BE INSTALLED AT AN ANGLE NOT GREATER THAN 45° FROM PERPENDICULAR.
8. FIRE-RATING OF ASSEMBLY IS DEPENDENT UPON THE PERFORMANCE OF WALL UNDER FIRE CONDITIONS.

THIS ENGINEERING JUDGMENT REPRESENTS A FIRESTOP SYSTEM THAT WOULD BE EXPECTED TO PASS THE STATED RATINGS IF TESTED. (REFERENCE : UL/cUL SYSTEM NO. W-L-3065 & W-J-3060)

Hilti Firestop Systems

HILTI, Inc.
Tulsa, Oklahoma USA (800) 879-8000

Designed by

Sheet 2 of 2
Scale -
Date Oct. 10, 2013

Drawing No. 181335a

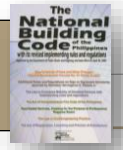
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THESE FIRE SAFETY CONCEPTS ARE EMBEDDED IN OUR NATIONAL CODES AND STANDARDS.

PHILIPPINE CODES AND APPROVAL LANDSCAPE AND SITUATION

CODE

National Building Code of the Philippines (P.D NO. 1096 and IRR)



Fire Code of the Philippines (RA 9514)



ENFORCEMENT

National Building Code Development Office (NBCDO DPWH)

Bureau of Fire Protection (BFP)

City Building Official (City/Fire Marshall)

The **National Building Code of the Phils.** serves as the mother code; subcode is the **Fire code of the Phils** and the **enforcement agency** is the **Bureau of Fire Protection**

The **UA&P, IIEE and PSME** respectively are the official organization responsible for Architectural, Electrical and MEFP code writing.

DESIGN SCOPE

Architectural & Facade

Electrical

Mechanical & Plumbing

REFERRAL CODE

Architectural Code (RA 9266)



National Building Code of the Philippines

- ✓ Section 604 (Floors, Walls, Ceilings) – Fire Tests and Fire-resistive assemblies

Fire Code of the Philippines

- ✓ Division 5 – Firestopping concealed spaces

Philippine Electrical Code (2009)



- ✓ Section 3.0.1.21 – Spread of Fire or Products of Combustion
  Openings around electrical penetration through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating.

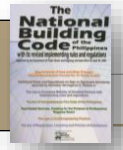
Philippine Mechanical Engineering Code (2012)



- ✓ Chapter 9.B – Firestop Protection
  - 915.0 – Plans and Specifications
  - 917.0 – Penetration Firestop System
  - 917.2 – F-Rating
- ✓ Standard for Equipment and Materials
  ASTM E814 / UL 1479

LOCAL FIRE CODE (RA 9514) REQUIRES COMPARTMENTATION

National Building Code of the Philippines
(P.D NO. 1096 and IRR)



Fire Code of the Philippines
(RA 9514)



CODE

National Building Code Development Office (NBCDO DPWH)

Bureau of Fire Protection
(BFP)

City Building Official
(City/Fire Marshall)

ENFORCEMENT

Division 5. Means of Egress B. Protective Enclosure of Exit

1.b. The separation shall have at least two **(2) hours fire resistance rating** when the exit connects **four (4) or more storeys**, whether above or below the floor of discharge.

It shall be constructed of **noncombustible materials** and shall be supported by construction having at least a **two-hour (2-hr) fire resistance rating.**

Division 6. Sec. 10.2.6.1 Construction and Compartmentation

A. Construction and **compartmentation shall apply to new, existing, permanent or temporary buildings.**

B. The design and construction of fire walls and fire barrier that are required to separate the buildings or subdivide the building to prevent the spread of fire shall comply with **Section 602** Fire Resistive Standards of the latest edition of NBCP, and NFPA 5000.

D. In high rise buildings and healthcare occupancy building, a quality assurance program for devices and systems installed to protect penetration and joints in accordance with **ASTM E2393.**

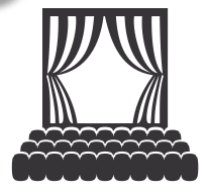
J. A certification of fire stopping in accordance with any of the following promulgated rules and regulations of **PD 1096, NBCP NFPA 251, Standard** Method of Test of Fire Resistance of Building Construction and **ANSI/UL 263,** Standard for Fire Tests of Building Construction and Materials; and **ASTM E119**, Standard Test Methods for Fire Tests of Building Construction and Materials, if available, from the third party shall be submitted to the C/MFM having jurisdiction.

Division 6. Sec 10.2.6.5. Protective Enclosure of Exit

1.c. Vertical openings between the open fire area storey and the storeys above shall be **enclosed with construction having two-hour (2-hr) fire resistance rating**.

2.c. Vertical openings between the open fire area storey and the floors below shall be enclosed with a construction having two-hour (2-hr) fire resistance rating

AS PER THE FIRE CODE OF PH 2019, 13 CATEGORIES HAVE BEEN DEFINED FOR CLASSIFICATION OF BUILDINGS

1. 
Assembly

2. 

Educational

3. 

Day care

4. 
Health care

5. 
Residential board & care

6. 

Detention

7. 
Residential

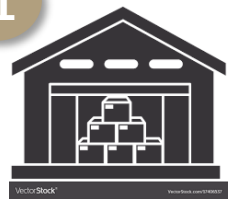
8. 

Mercantile

9. 

Business

10. 
Industrial

11. 
Storage

12. 
Mixed occupancy

13. 
Special structures

This classification is based on different level of hazard / fire safety required

HAZARD OF OCCUPANCY TYPE IS DETERMINED PRIMARILY ON THE BASIS OF FIRE LOAD

Hazard of occupancy or the **degree of hazard** shall be defined as *"the relative danger of the start and spread of fire, the generation of smoke or gases, and the danger of explosion or other occurrences potentially endangering the lives and safety of the occupants of the building or structure due to the nature of the contents or processes/operations therein."*

SECTION 10.2.4.2 CLASSIFICATION OF HAZARD OF CONTENTS

The hazard of contents of any building or structure shall be classified as follows:

A. **Low Hazard**

Those of such low combustibility that no self-propagating fire therein can occur and that, consequently, the only probable danger requiring the use of emergency exits will be from panic, fumes or smoke or fire from some external source.

B. **Moderate Hazard**

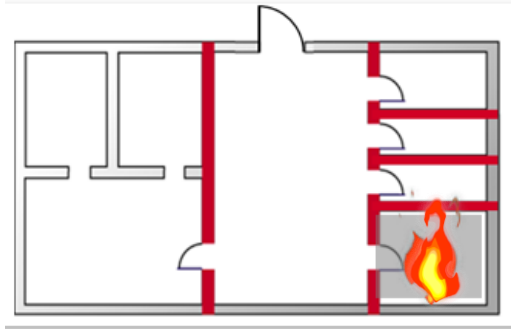
Those which are liable to burn with moderate rapidity or to give off a considerable volume of smoke but from which neither poisonous fumes nor explosions are to be expected in the event of fire.

C. **High Hazard**

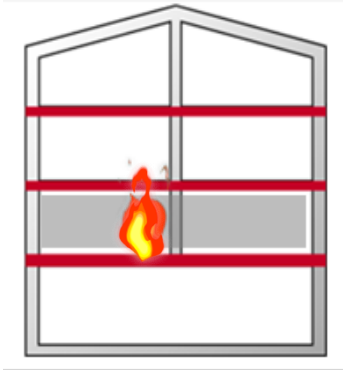
Those which are liable to burn with extreme rapidity or from which poisonous gases or explosions are to be expected in the event of fire.

COMPARTMENTATION REQUIREMENTS FOR HAZARD SEGREGATION IN AN OCCUPANCY

Vertical Compartmentation



Horizontal Compartmentation



*Excerpts from "**The Fire Code of the Philippines 2019**"*

Fire Compartment. A space within a building that is enclosed by fire barriers on all sides, including the top and bottom.

Fire Barrier. A continuous membrane or a membrane with discontinuities created by protected openings with a specified fire protection rating, where such membrane is designed and constructed with a specified fire resistance rating to limit the spread of fire, that also restricts the movement of smoke.

Fire Barrier Wall. Interior wall that extends from floor to floor or floor to roof, including concealed and interstitial spaces. They are designed to sub-divide portions of the building, and can be supported by structures, such as roofs, columns or floors. All support structures should have a fire-resistance rating no less than that of the fire barrier they support. Fire barriers restrict the initial flow of heat within the area of origin, which provides building occupants with adequate time to evacuate to safe areas. These walls shall have at least three (3) hours fire resistance rating.

Detailed information found in Division 6 – Features of Fire Protection, Section 10.2.6.1 Construction and Compartmentation

NBCP uses terms like "*The secretary shall prescribe standards…on testing…..fire resistive assemblies for protection of openings…*"

THE FIRE CODE OF PH PROVIDES GUIDANCE ON COMPARTMENT AREA AND FIRESTOP APPLICATIONS

SECTION 10.2.6.5 PROTECTION OF VERTICAL OPENING AND COMBUSTIBLE CONCEALED SPACES

F. **Fire Stopping**

1. In new construction, any concealed space, in which materials having a flame spread rating greater than Class A as defined in Section 10.2.6.4 of this RIRR are exposed, shall be effectively fire-stopped as provided below, with approved materials, unless the space is sprinklered in accordance with this Section.
   a. Every exterior and interior wall and partition shall be fire-stopped at each level, at the top storey ceiling level, and at the level of support for roofs.
   b. Every unoccupied attic space shall be subdivided by fire stops into areas not to exceed two hundred eighty square meters (280 m^2).
   c. Any concealed space between the ceiling and the floor or roof above shall be fire-stopped for the full depth of the space along the line of support of the floor or roof structural members and, if necessary, at other locations to form areas not to exceed ninety-three square meters (93 m^2) for any space between the ceiling and floor, and two hundred eighty square meters (280 m^2) for any space between the ceiling and the roof.
2. In every existing building, fire stopping shall be provided as required by the provisions of Divisions 8 through 20 of this Chapter.
3. Penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a fire stop system or device.

More details are available in trade specific codes and standards.

The fire code talks about the need for **sealing opening** in fire barriers created **due to Mechanical, Electrical, Plumbing installations and Communication systems.**

Lets look at some of these applications!

CABLE TRAY AND CABLE SEALING APPLICATION

Electrical Application: Through-Penetration



Traditional Solution



Sealing of single or bundled cables



Sealing of multiple penetration



Permanent sealing of electrical cable trays



Modern solutions

*Excerpt from "**National Electrical Code of Philippines**"*

3.0.1.21 Spread of Fire or Products of Combustion. Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations through fire-resistant–rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating.

DUCTS / PIPES SEALING APPLICATION

Mechanical Application: Through-Penetration











Traditional Solution



Modern solutions

*Excerpt from "**Philippine Mechanical Engineering Code (2012)**"*

915.1 Plans and specifications shall indicate with sufficient detail how penetrations of fire resistance rated assemblies shall be fire stopped prior to obtaining design approval.

918.3 Penetrations shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 119 or ASTM E 814, with a minimum positive pressure differential of 0.01 inch of water. Systems shall have an F rating of at least 1 hour but not less than the required fire resistance rating of the assembly being penetrated. Systems protecting floor penetrations shall have a T

RISERS & SHAFT SEALING APPLICATION

Mechanical Application: Through-Penetration









*Excerpt from "**Philippine Mechanical Engineering Code (2012)**"*

918.0 Combustible Piping Installations.

918.1 Combustible piping installations shall be protected in accordance with the appropriate fire resistance rating requirements in the Building Code that list the acceptable area, height, and type of construction for use in specific occupancies to assure compliance and integrity of the fire resistance rating prescribed.

918.2 When penetrating a fire resistance rated wall, partition, floor, floor ceiling assembly, roof ceiling assembly, or shaft enclosure, the fire resistance

rating of the assembly shall be restored to its original rating.

THE CODE REQUIRES OPENINGS TO BE SEALED/PROTECTED USING FIRESTOP ASSEMBLIES

917.0 Definitions.

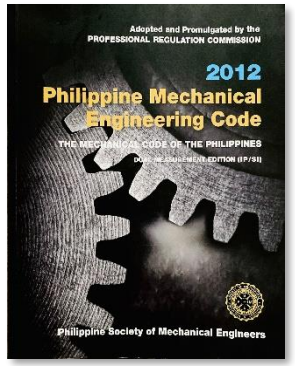
917.1 Penetration Firestop System. A specific assemblage of field assembled materials, or a factory made device, which has been tested to a standard test method and, when installed properly on penetrating piping materials, is capable of maintaining the fire resistance rating of assemblies penetrated.

917.2 F Rating. The time period that the penetration firestop system limits the spread of fire through the penetration, when tested in accordance with ASTM E 814.

917.3 T Rating. The time period that the penetration firestop system, including the penetrating item, limits the maximum temperature rise of 325°F above its initial temperature through the penetration on the non-fire side when tested in accordance with ASTM E 814.

"Philippines Mechanical Engineering Code (2012)" *excerpt*

Appendix D
Standards for Equipment and Materials

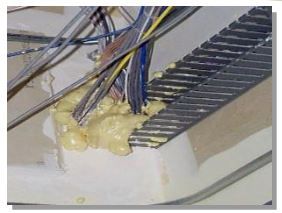


Standard Number	Standard Title	Application
ASTM E814 – 2006	Fire Tests of Through-Penetration Fire Stops	Certification: Fire Testing building Materials, Fire Testing-Hose Stream Test, Structural Analysis / Application
UL 1479 - 2003	Fire Tests of Through-Penetration Firestops	Firestops

TRADITIONALLY, FIRESTOP IS CURRENTLY CONSIDERED AT THE END OF A PROJECT CAUSING ONSITE PROBLEMS

Workflow steps	**Design**	**Build**	**Operate**
Stakeholders	**Owner** **Architect** **Specifier** **Engineers** **General Contractor** **Subcontractor** **Operator**		
Activity flow	**Design and Specifications**	**Procurement**	**Delivery, Construction & Handover** / **Maintenance, Repair & Operations**
Key Challenges	• Awareness and compliance to standards is low • **Weak Specs - No Contractor guidance**	• **Wrong Budget provision –** go for the cheapest solutions • Re-submit alternative brand/solution • **Wrong installation and improper selection of products**	• Maintenance is a challenge – provision for additional piping and cables • Building performance and efficiency is at risk







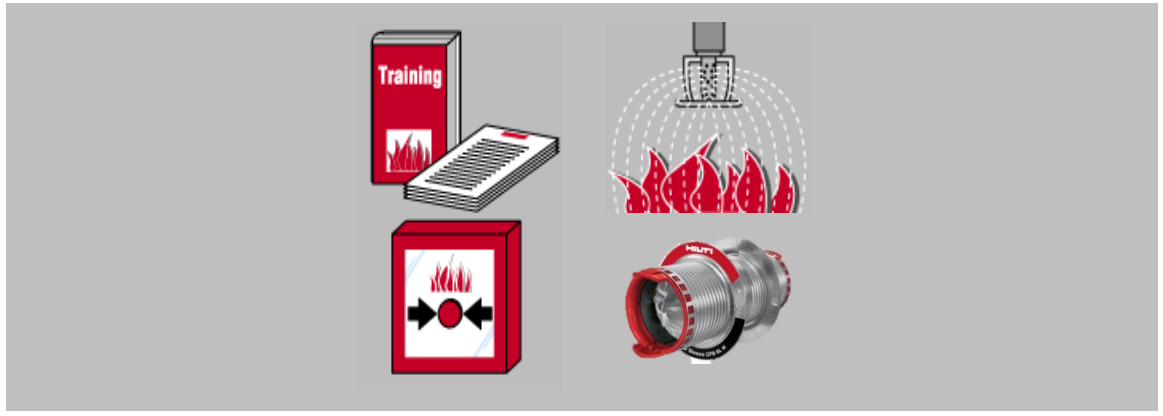
WHY IS FIRE PROTECTION SPECIFICATIONS IMPORTANT?

WHY SPECIFY FIRESTOP?

Saving Lives & Protecting Assets



Compliance & Responsibility



Direct consequences

- Death casualties and injured people are one the main consequences of a fire.
- In average, around 45 thousand people die every year due to fires worldwide.
- Losses due to the 3,8 million fires that occur per year worldwide are extremely high.

Indirect consequences

- Reworks due to lack of firestop planning
- Reworks due to lack of installer knowledge in firestop
- Reworks due to non-compliance with codes
- Not budgeted extra costs for firestop
- Fire-related consequences

Peace of mind!

WHY BE SPECIFIC ON YOUR DRAWINGS/ TEXT SPECS?

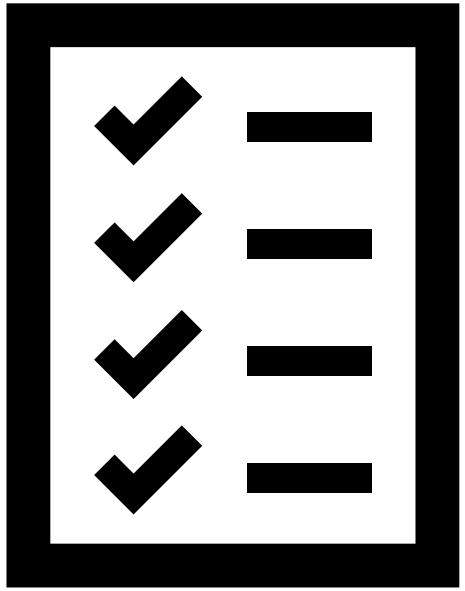
- **Code conformance** – According to your building code, “Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code.” This holds true for firestop systems in the drawings as well as the project specifications book.

- **Contractor guidance** – Directing the contractor towards the appropriate firestop system not only supports the installer in doing their job right, but it helps prevent additional change requests during construction activities. Both sides benefit in this mutual relationship.

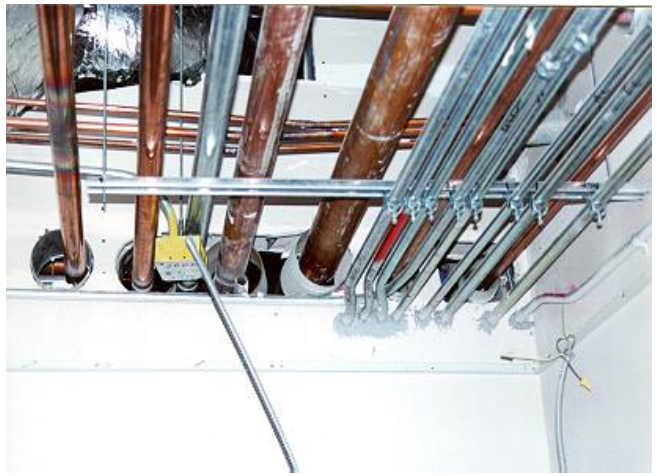
- **QA/QC measures** – Help ensure that firestopping is performed correctly by proactively specifying the appropriate systems (quality assurance). In turn, the specified firestop systems hold as a guide to code conformance when observing installed assemblies (quality control and inspection), aiding you to act in the owner’s best interest and paving the way towards quality management.

- **Reduced risk of liability** – Due diligence in the design of firestop systems helps cover the designer’s responsibility, not to mention minimizing unforeseen events in the future.

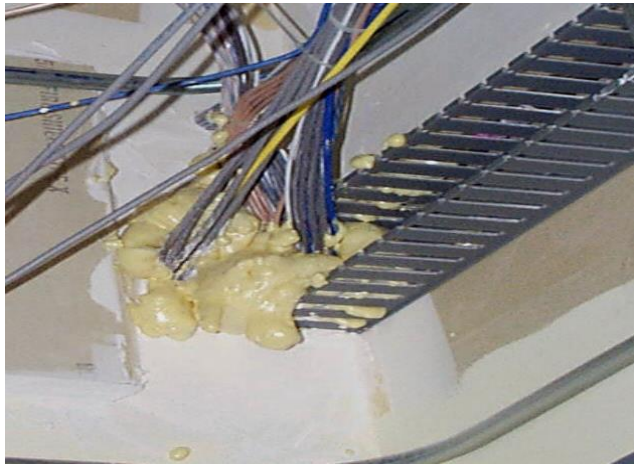
- **Added reassurance** – It’s one less thing to worry about during Construction Contract Administration.



FIRESTOP PENETRATION NEEDS TO BE PLANNED TO AVOID WRONG PRACTICES ON SITE





CHALLENGES IN CODE ENFORCEMENT AND POSSIBLE CONSEQUENCES FOR NON-COMPLIANCE

Challenges:

- Limited comprehensive approach on the importance of **Passive Firestop Systems**
- Most owners are aware of the standards of a Passive Fire Protection System. However, the importance are **less prioritized.**
- For most years, **passive firestop system** are incorporated at the last stages of a project - whereas **if life safety is a priority, then it should be integrated during the planning stage.**

Non-compliance to codes and standards may lead to:

- Major risks with evacuation of occupants when a fire incident happens
- **Compromised integrity** of a building
- More **expensive recuperation costs**
- **Higher compensation on damages** than those with properly installed Passive Fire Protection
- **Higher number of casualties** than in a controlled environment (*compartmentation*)







00:15

POLL # 1

HOW DO YOU SPECIFY THE FIRE STOPPING REQUIREMENTS ON YOUR PROJECTS?

HOW TO SPECIFY FIRESTOP SYSTEMS?

LET’S HAVE A LOOK AT YOUR SPECIFICATIONS

SAMPLE SPECIFICATIONS – WEAK OR STRONG SPECS?

6. SLEEVES

h. Provide sleeves when penetrating beams, floors and walls. Pipe sleeves shall be B.I. pipe Sch. 40 ERW, ASTM AA53 or A120. Annular space shall be filled with rockwool insulation materials with minimum density of 48 kg/cu.m. and intumescent fire sealant by "HILTI FS ONE ", "TREMCO " ,"SPECSEAL " or approved equal at both ends

34.0
34.1
34.2
34.3
34.4
34.5
34.6

i. Seal pipe
fire separ
be asbestos-free. Used of

The system shall require r
side. No derating whatsoe
sealant.

Wall and floor assemblies
products shall match the
certified by the manufactu

Acceptable manufacturers
or approved equal.

h. All sanitary and fire protection pipe penetration passing through fire rated walls and floor partitions shall be provided with intumescent firestop products that have been tested and approved in accordance with ASTM E814 and UL 1479.

1. For PVC pipe maximum 2" nominal diameter refer to UL System No. C-AJ-2167.
2. For PVC pipe maximum 3"-6" nominal diameter, refer to UL System No. C-AJ-2271.
3. For Large Opening/ Multiple Penetration, refer to UL System No. C-AJ-8096

ay/cable/ladder as indicated on drawings.
d on drawings.
formed sheet steel and reinforced sheet steel, with screw
ckouts.
aked enamel over lead primer
terial

pper
nds

steel pipe sleeves. Extend sleeves in floors slabs 75mm (3 inches)

enetration passing through fire walls and floor partitions shall be
nt firestop products that have been tested and approved in
-814 and UL 1479.

The penetration seal materials must be unaffected by moisture and must maintain the integrity of the wall or floor assembly for its rated time period when tested in accordance with ASTM E814 (UL 1479). The system shall be UL listed classified for up to and including three (3) hours.

WHAT COMPOSES A COMPREHENSIVE SPECIFICATION?
COMPREHENSIVE SPECIFICATION TEXTS

Weak Specification Text

Penetrations and joints in fire rated elements should assure same fire rating as the element they go through.

General specification text example.



Strong Specification Text

For large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, Hilti Firestop Block (CFS-BL) is to be used. CFS-BL is a pre-formed block made from intumescent polyurethane material fire tested according to EN 1366-3 and presenting acoustic (Rw (C; Ctr) = 51 (–1; –5) dB, acc. to EN ISO 140-3), seismic and mold and mildew test reports. Suitable for use in openings in concrete, aerated concrete, masonry and drywall. Fire rating of EI60 to EI120 depending on the application. Check relevant approval for more details and instructions for use.

Comprehensive specification text example.



Consequences:

- No detail in the specification, open to interpretation from the installer.
- High exposure to risks of non compliant installation and future additional costs due to reworks.
- Higher potential of adequacy of design being questioned.

Consequences:

- Detailed specification with clear guidance on the product to install, its respective field of application and referral to the documentation where more information can be found for details or instructions for use.
- Reduced risks of noncompliance and additional costs.

WHERE DO I GO FIRST? – FIRESTOP SPECIFICATIONS

Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.

N. Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:

1. Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
2. Hilti Firestop Sleeve (CFS-SL SK)
3. Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
4. Hilti Gangplate (CFS-SL GP) for use with multiple cable management devices.
5. Hilti Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.

FM 4991 Approved Contractor
UL Approved Contractor
Hilti Accredited Fire Stop Specialty Contractor

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma
800-879-8000
www.us.hilti.com

2. Substitution requests shall be considered in accordance with contract provisions.

1.) Engineering Judgement

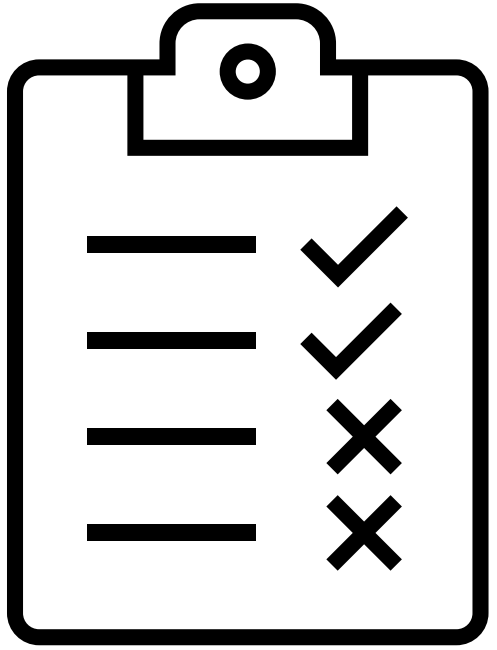
2.) List Products by Name

3.) Accredited Fire Stop Specialty Contractor

4.) Basis for Product Substitution

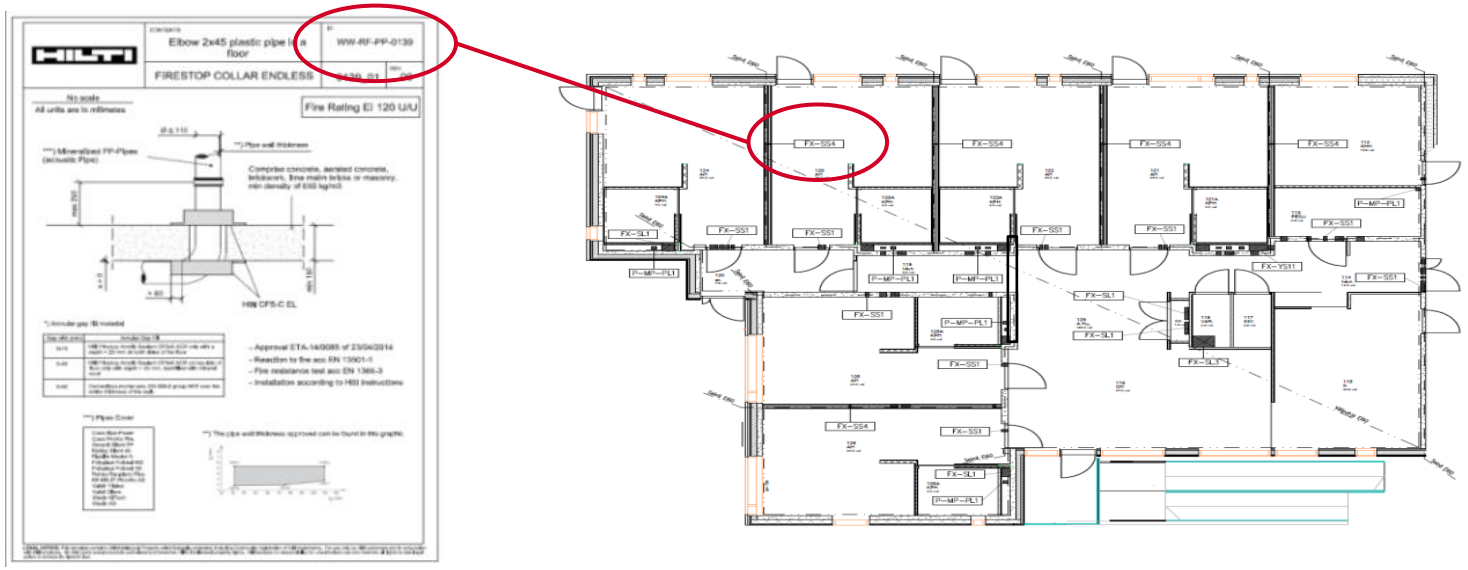
GUIDELINE FOR FIRESTOP SPECIFICATIONS

- ☑ **Reference Standard / Local code reference – State Requirements (F/T- Ratings, Attributes) as needed!**
- ☑ **Specify areas and field of application – Be Specific!**
- ☑ **Specify brands / Product type / IFU**
- ☑ **Others: provision for Engineering Judgements, Documentation, Certified installer, Inspection, No Substitution clause or basis for substitution**



UL listed systems should be our MAIN GOAL!.
Always mention the supporting products depending on the application field

WHAT COMPOSES A COMPREHENSIVE SPECIFICATION? DETAILED TECHNICAL DRAWINGS (CAD / BIM)



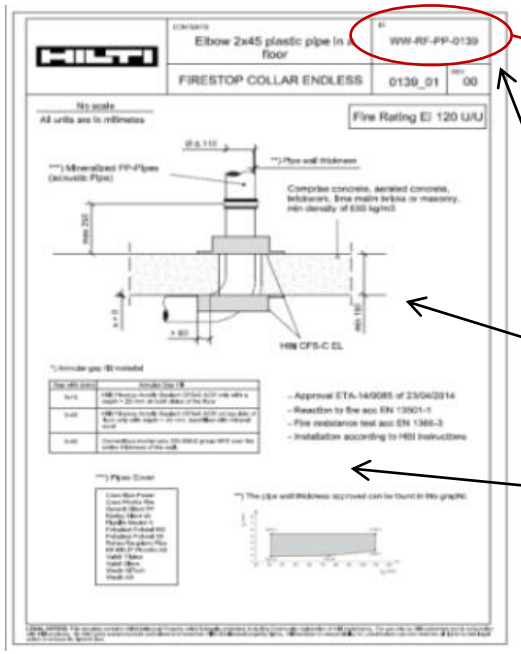
Detailed technical drawing

Reference in general floor plan.

Aside from text specs, detailed technical drawings (CAD / BIM) and references in the general plans will help installers to have a smooth implementation while giving you peace of mind.

GO FOR REFERENCES IN FLOOR PLANS AND IN THE SPECIFICATIONS DOCUMENT

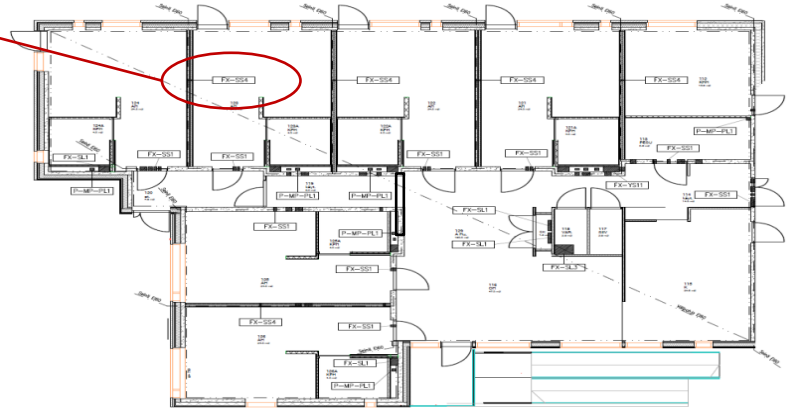
Full support for pre-designed planning for the MEP specifier
Hilti Firestop details: easy and fast – reliable and compliant



Reference number of detail

Technical drawing pdf/dwg

Technical data and tables



Floorplan

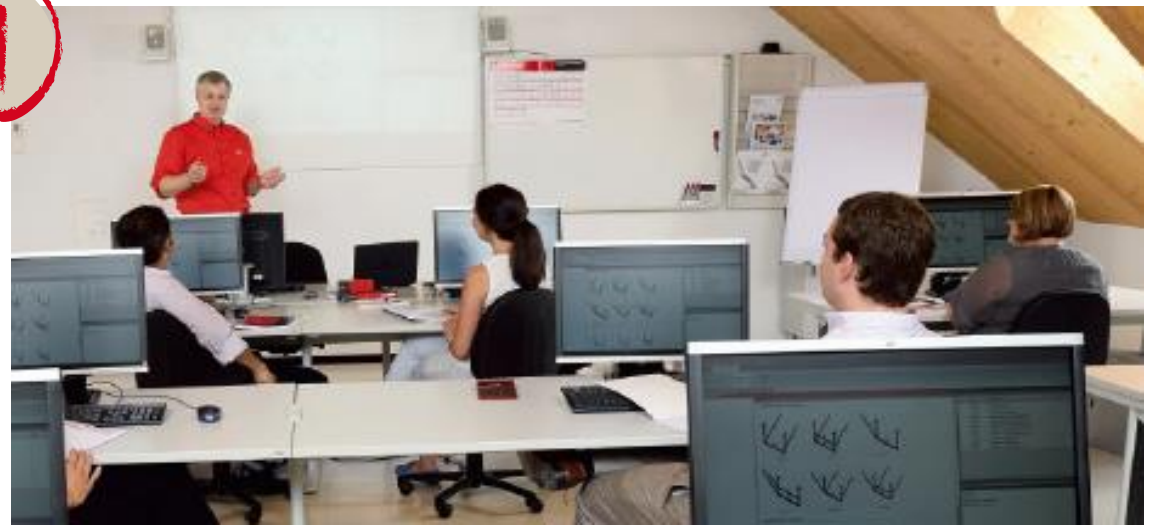
- Significant time saving
- Professional specifications
- Drawings and specification text
- Clear references
- Good documentation
- Piece of mind coordination with subcontractors
- Smooth implementation and approval process
- Ensure legal responsibility

HOW CAN WE HELP YOU ACHIEVE GOOD FIRESTOPPING IN YOUR PROJECTS?

HOW CAN WE HELP YOU ACHIEVE GOOD FIRESTOPPING IN YOUR PROJECTS?

DEDICATED FIELD ENGINEERS

1



Coverage

- A dedicated Field Engineer to provide technical consultation and assistance in your Fire Stopping application
- Provides technical expert advise to provide additional knowledge to different external stakeholders in achieving good and reliable Firestop system.

Technical Consultation & Assistance







WE HAVE SPECIFICATION TEMPLATES AVAILABLE… YOU NEED TO LOCALIZE HOW TO FIT SPECIFIER NEEDS

Note to specifier: This specification section covers only "Through-Penetration Firestop Systems." Most projects require protection of "Fire-resistive construction joints" as well; a companion section 07842 "Fire-resistive Construction Joints" should be issued in addition.

SECTION 07841
THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

B. Blank openings through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

C. Openings and penetrations in fire-rated partitions or walls containing fire doors.

D. Openings around structural members which penetrate floors or walls.

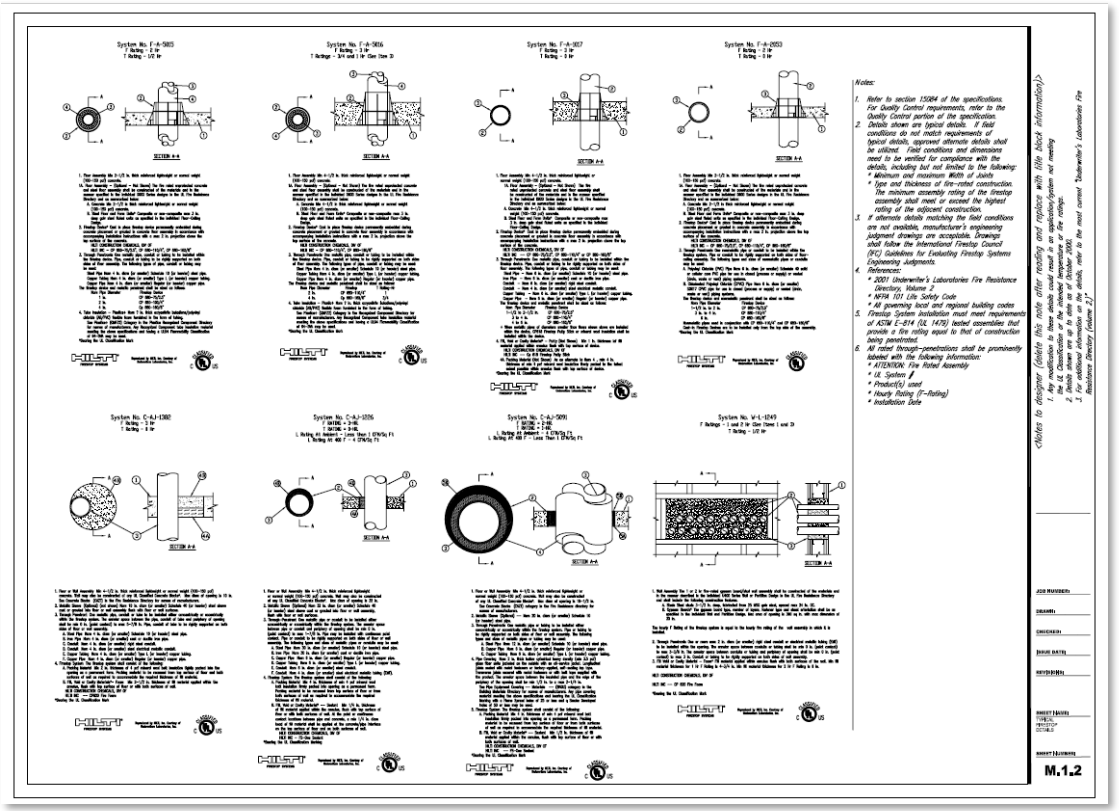
1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 03300 - Cast-In-Place Concrete
2. Section 04200 - Masonry Work
3. Section 07842 – Fire-resistive joint systems
4. Section 07900 - Joint Sealers
5. Section 09200 - Lath and Plaster
6. Section 09250 - Gypsum Drywall Systems
7. Section 13080 - Sound, Vibration and Seismic Control
8. Section 13900 - Fire Suppression and Supervisory Systems
9. Section 15050 - Basic Mechanical Materials and Methods
10. Section 15250 - Mechanical Insulation
11. Section 15300 - Fire Protection
12. Section 15400 - Plumbing
13. Section 16050 - Basic Electrical Materials and Methods

Through Penetration Firestop Systems 07841-1

General Specification
Text format

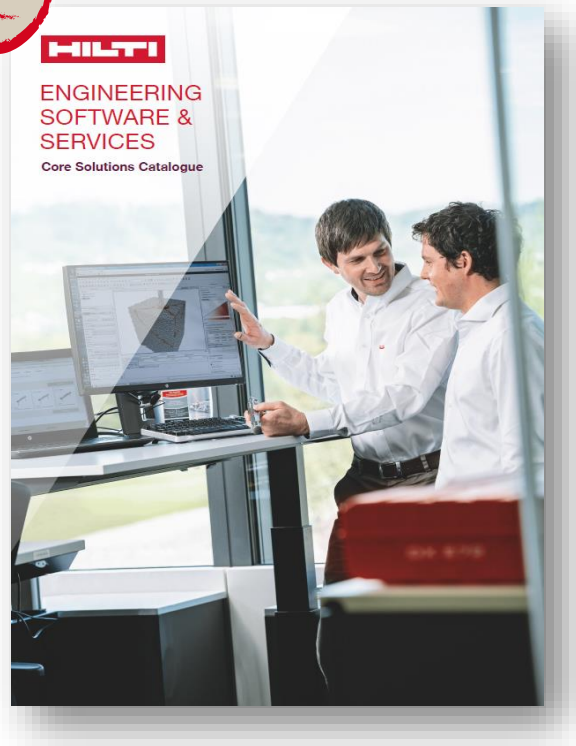


Typical system drawings
(Ref. to approval listings)

HOW CAN WE HELP YOU ACHIEVE GOOD FIRESTOPPING IN YOUR PROJECTS?

HILTI ENGINEERING SERVICES

2



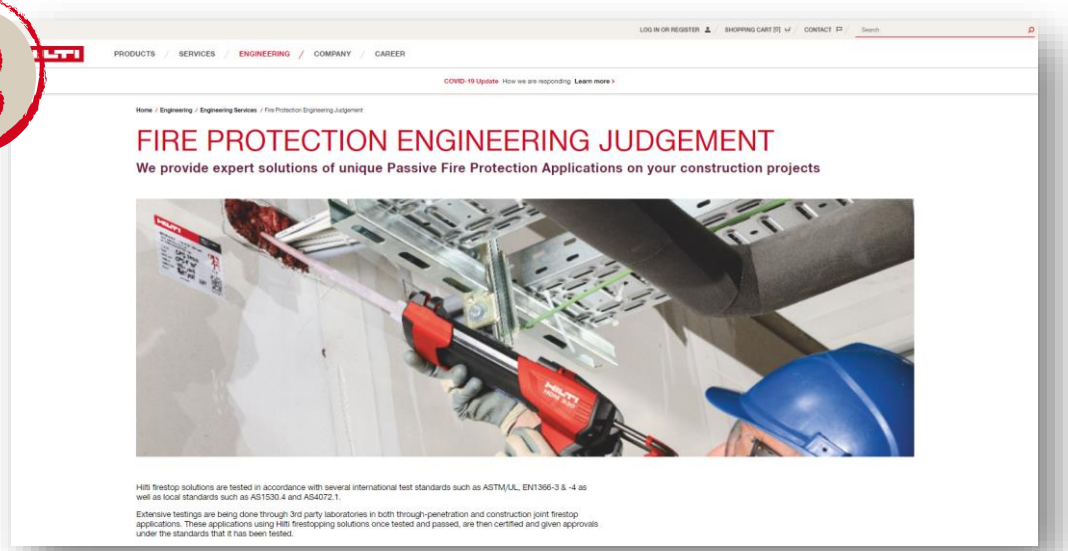


- ✓ **Engineering Software and Services**
  - Office and Project Site Technical Seminars
  - Product Submittals
  - On-site Technical Seminars and Installer trainings
- ✓ **Request Process / Coverage**
  - A centralized email for all FS relevant requests
  - Committed to respond and get the best engineering service within 24-48 hours
  - Provides technical expert advise to provide additional knowledge to different external stakeholders in achieving good and reliable Firestop system.

HOW CAN WE HELP YOU ACHIEVE GOOD FIRESTOPPING IN YOUR PROJECTS?

ENGINEERING COMPETENCE CENTER (ECC) - FS Engineering Judgment

3

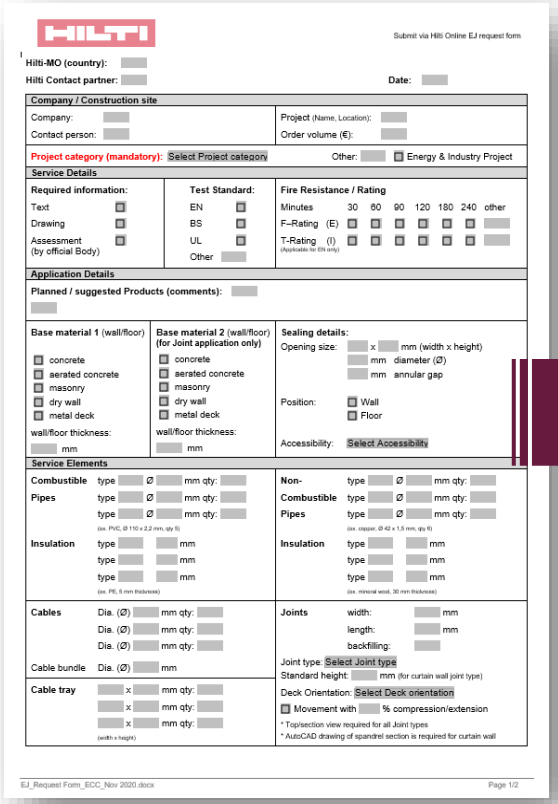


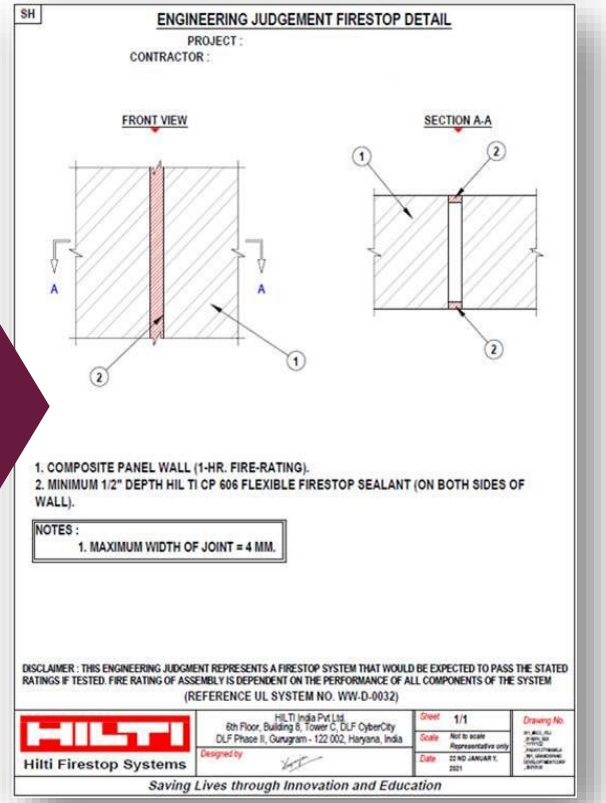
Engineering Judgment for Unique Application is Selected Projects

- Engineering Judgement for application beyond the usual FS Application system

Request Process / Coverage

- ❑ Provides relevant UL System to the specific customer requirements i.e., application details, service elements/ type of penetrants etc.

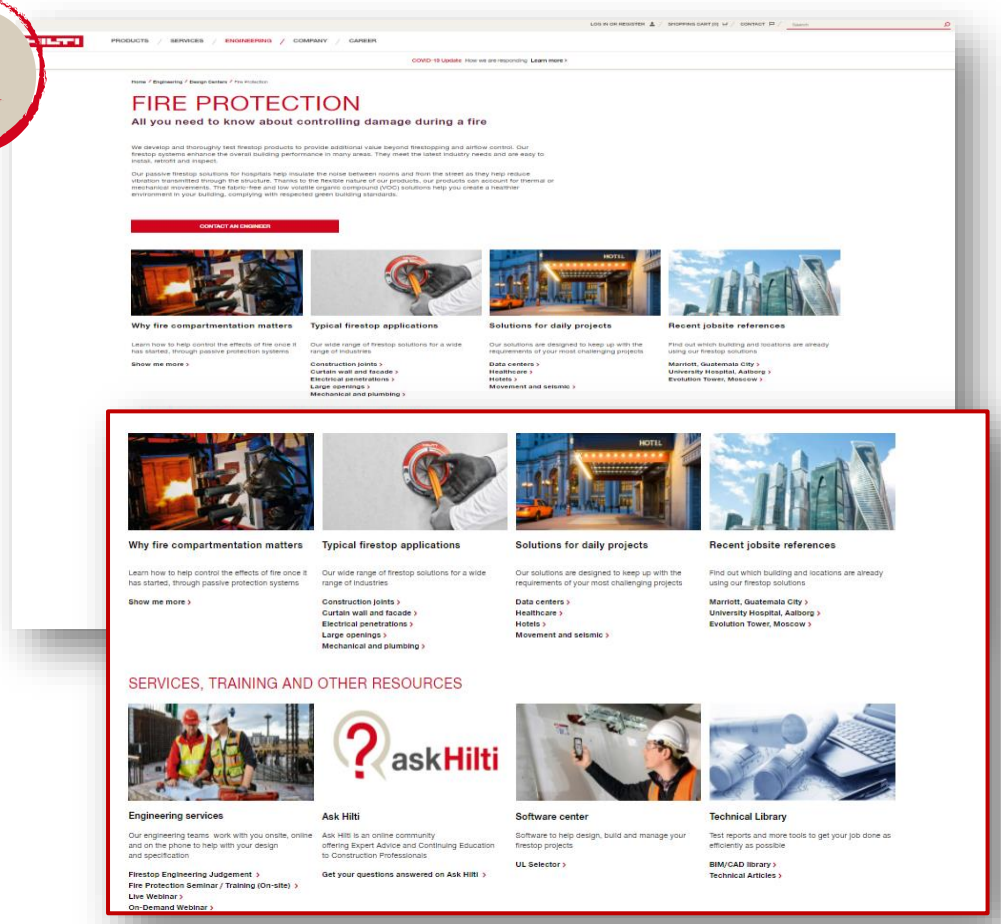


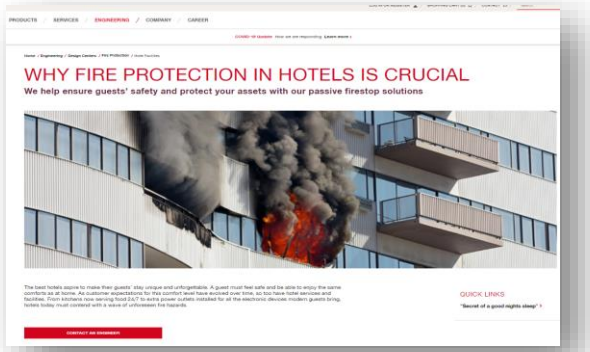


HOW CAN WE HELP YOU ACHIEVE GOOD FIRESTOPPING IN YOUR PROJECTS?

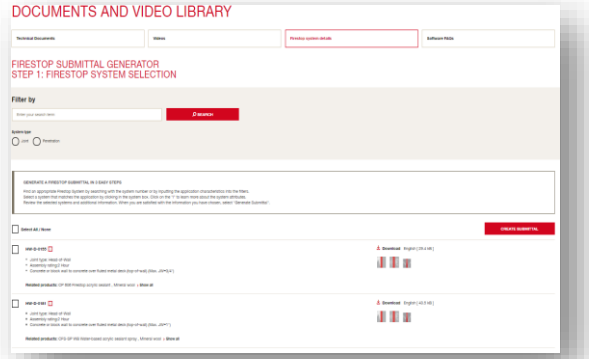
EPIC PAGE: A DEDICATED HOL PAGE FOR FIRESTOP SOLUTION

4

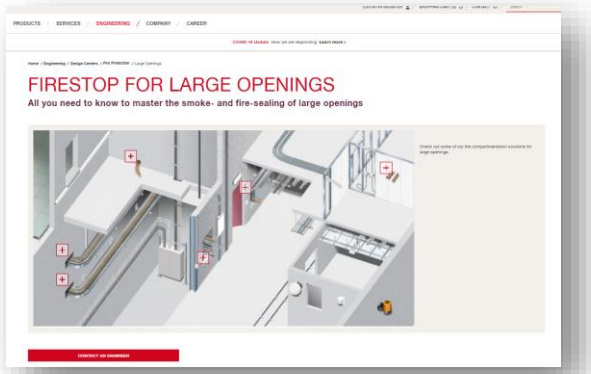




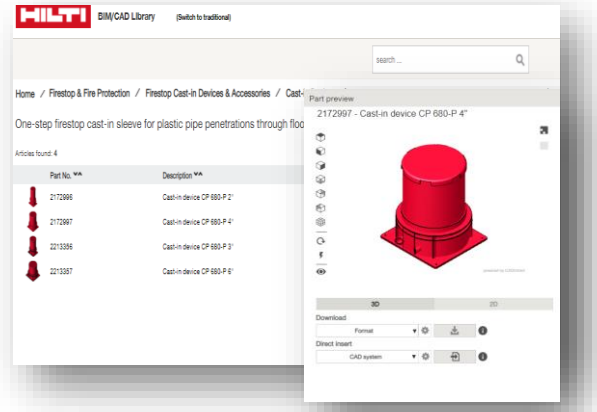
Solutions for daily projects



UL Selector



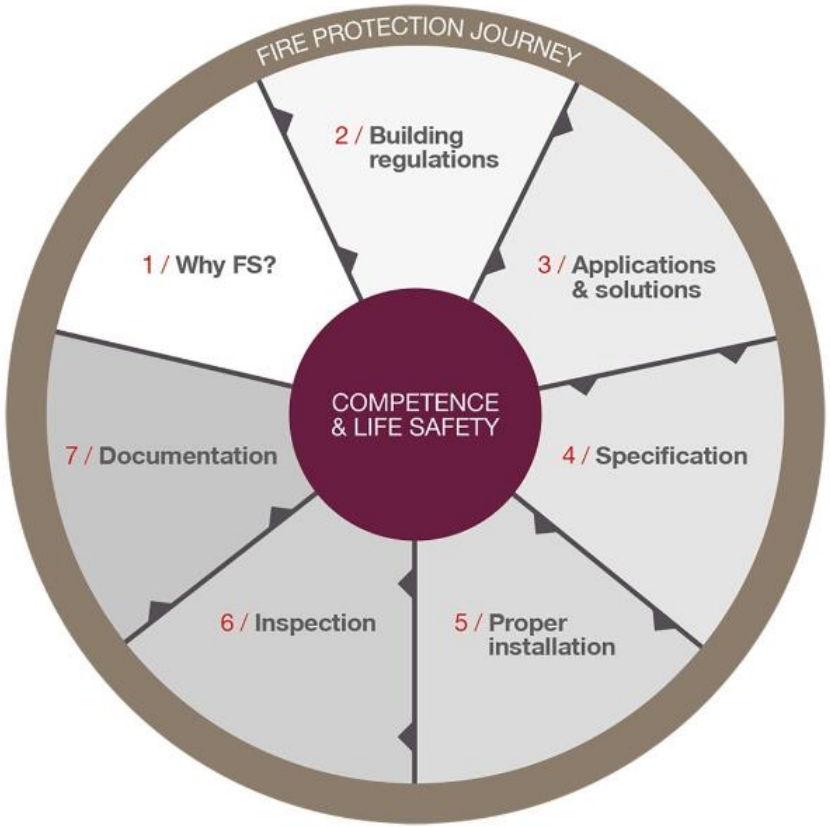
Solutions for daily projects



Technical Library

KEY TAKEAWAYS – FIRE PREVENTION

Fire protection exists in building design to save lives, protect assets, and improve building performance



- Use of appropriate tested firestop assemblies as required by law / codes
  - ✓ Firestop system should be supported by a valid approval report
  - ✓ Engineering judgment must be provided when standard firestop systems are not applicable
- Installation by trained/certified installers
- Fire inspection
- Periodic audits & maintenance
- Proper documentation



- ‘Firestopping in Buildings’ book
- With a message from BFP Fire Chief Director Louie Puracan
- Formally launched last Philippine Fire Protection Summit on May 12

OVERVIEW OF FIRESTOPPING IN BUILDINGS BOOK

Republic of the Philippines
Department of the Interior and Local Government
BUREAU OF FIRE PROTECTION
NATIONAL HEADQUARTERS
Agham Road, Barangay Bagong Pag-asa, Quezon City



MESSAGE

The Bureau of Fire Protection is thankful for our partners in fire safety education and commends the effort of **HILTI Philippines** in putting together this **book "Firestopping in Buildings"**. The agency is grateful for all the efforts to prevent and mitigate destructive fires especially amidst the rise of new buildings and modern facilities.

While the Republic Act 9514 otherwise known as the Fire Code of the Philippines and its Revised Implementing Rules and Regulations remain as the gold standard in fire safety, may this publication serve as additional guide for our practitioners and safety professionals in ensuring safer buildings for all.

DIRECTOR LOUIE S PURACAN, CEO VI
Chief, BFP

PHILIPPINE INTEGRATED FIRE PROTECTION ORGANIZATION
Block 17 Lot 17 Celina Homes 2 Brgy. 168 Deparo Road
Caloocan City, Philippines



MESSAGE

This handbook from HILTI Philippines is your quick guide to ensure that spread of fire and smoke is compartmentalized from source by ensuring fire stops are in place on the areas unseen in your building.

Improper material, installation and maintenance to your passive fire protection system will put your property at risk of damage and loss of life during fire incidents.

MAKE YOUR PASSIVE FIRE PROTECTION SYSTEM RISK FREE WITH PROPER FIRE STOPPING.

Archt. Roland James B. Arimado, UAP, LEED AP BD+C, NFPA, PIFPO
Philippine Integrated Fire Protection Organization
Member - National Board of Trustees
Passive Fire Protection Committee - Chairman

MESSAGE FROM UL SOLUTIONS

Model building, fire and life safety Codes have many requirements relating to firestop systems. Knowledge of and competency in these requirements are essential for building safety stakeholders, including design professionals, plan reviewers, contractors, code authorities, third-party inspectors, and building owners and managers.

Proactive approaches for code-compliant construction and building maintenance play an essential role in occupant safety. Best practices such as preconstruction meetings in which a design team, contractors, installers, building officials, and other stakeholders identify areas of concern and collaborate on potential solutions also play an important part. Utilizing qualified contractors to install firestop systems following the joints and penetrations made in fire-resistance-rated construction by electricians, plumbers or other construction trades is also paramount to a compliant final inspection that avoids unnecessary delays and costs.

Requiring firestop systems to be correctly specified and documented, installed by competent contractors and properly inspected to determine code compliance is essential for a building's passive fire protection to meet or exceed the required minimum level of safety for building occupants.

Using installers without specific firestop installation training or experience may lead to an increased failure rate of fire-stopped penetrations during the code compliance inspection, causing delays, cost overruns or, worse yet, failure during a fire event.

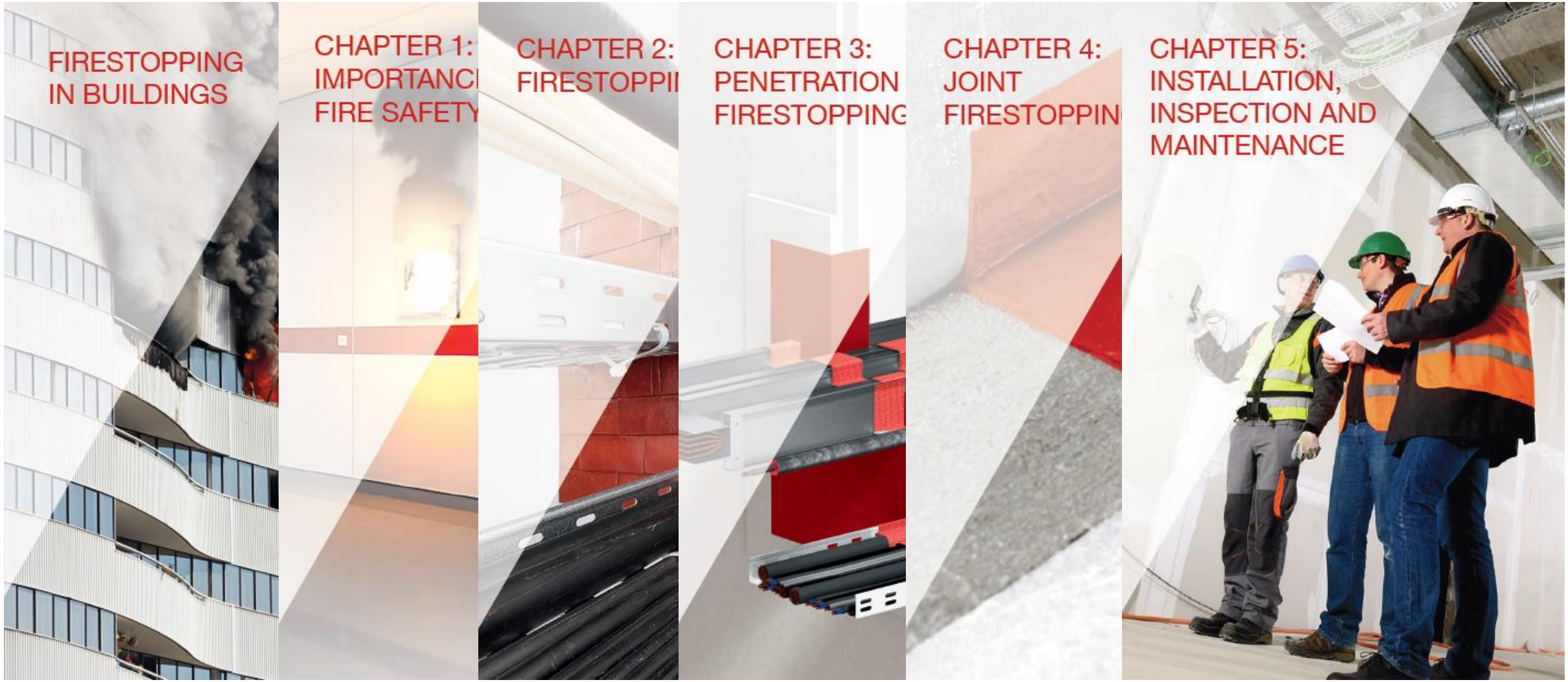
Although these programs and practices can prove challenging to implement, many municipalities have experienced the benefits. It may require some upfront time and effort to initiate these best practices, but once started, they are easy to maintain at a relatively low cost throughout the life of a building. These comprehensive programs and best practices provide confidence that the critical line of defense created by a balance of passive and active fire protection meets code requirements for installation, inspection and maintenance through the useful life of a building.

Underwriters Laboratories

Underwriters Laboratories

Firestopping in Buildings

OVERVIEW OF FIRESTOPPING IN BUILDINGS BOOK



READY TO KNOW MORE ABOUT THE FIRESTOPPING IN BUILDING BOOK?

Visit and download it at
Hilti Firestopping in Building

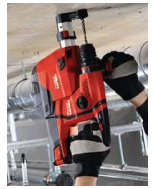


WE OFFER OUR END-TO-END SOLUTIONS → HW, SW & SERVICES ACROSS THE ENTIRE WORKFLOW

Design			Build		Operate
Owner	Architect	EPC: Engineers	EPC: General Contractor	Subcontractor	Operator

Engineering Design	Advance Layout	MEP Support / Fastening	Closing	Documentation
Engineering Services	**Advance Layout Solutions**	**Pipe/Cable support + Fixing solution**	**Firestopping Installation**	**Inspection and Documentation**









- BIM Design
- MEP Design Services
- PROFIS Software
- Eng'g Judgements, Typical
- Anchor, Firestop Selectors
- Submittals

/BIM EXPERIENCE CENTER





- Advance measuring and layout system, FLEET, On!Track
- Pre-fabrication
- BIM to field

- Seismic approved fastening
- Installation System
- Cordless Tool + DRS System
- On-site testing

- Preformed Devices
- Installer training
- **Quality and professional installation**

- Visual Inspections, Joint site-walk through

WHAT IS A HILTI ACCREDITED FIRESTOP SPECIALTY CONTRACTOR (HAFSC)?

A Hilti Accredited Firestop Specialty Contractor (HAFSC) is a professional installer who has been provided specialized training by Hilti; and can provide building owners, general contractors, and subcontractors with a full-service solution for all their firestopping needs.

- ✓ Allow trade contractors to focus on their area of expertise and permit HAFSCs to execute passive fire protection works, leading to **contractor's peace of mind and productivity.**
- ✓ Provide a professional full-service supply and installation solution **Providing a single contractor accountability** for all firestop applications.
- ✓ Promote hassle-free inspection by officials who trust professional installers including compliant specialized documentation.



00:15

POLL #2

DO YOU WISH TO HAVE OUR ENGINEERS TO DISCUSS WITH YOU ABOUT THE RIGHT SPECIFICATION TEXT AND THE RECENTLY LAUNCHED FIRESTOPPING IN BUILDING BOOK?

Q&A SESSION



THANK YOU

