Importance of firestop in mission critical facilities

Matteo Moccia
Hilti Italia S.p.A.
matteo.moccia@hilti.com

Introduction

What is firestop and why is it especially important when designing cable runs in critical facilities?

How can firestop affect:

- **server contamination** from dust during cabling changes?
- **spread of airborne disease** in a hospital?
- **patient recovery time** as a result of noise?

What do designers need to understand?

To answer these questions we must first understand some basics…

Fire statistics in Italy

Every year

- **30-50.000** fires
- **152 deaths (in 2012)**
- **200 M€ in property damage**

A fire department responds to a fire **every 44 seconds**

More than **6 out of 10** civilian deaths caused by fire were due to fires in buildings

Sources:
Nucleo Investigativo Antincendi Roma, ''*Gli incendi di natura elettrica*'', 2017
Corpo Nazionale Vigili del Fuoco, ''*Statistiche sulle vittime di incendi ed esplosioni*'', 2012

Why passive fire protection is so important for data centers?

7.000 €/min

Most non-home fires (78 %) begin with electronic equipment

Sources:
Research published by Ponemon institute in Dec 2013
John R Hall report – Issues Mar 2012
National Fire Protection Association (NFPA) Report

Why Smoke & Fire are key concerns?

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

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

47% of survivors caught in a fire **could not see** more than 3.5 metres.

Smoke travels **0.6 - 2.2 meters per second** under fire conditions

Sources:
Hall, Jr. John R. NFPA Fire Analysis & Research, Quincy, MA. "Burns, Toxic Gases, and other Hazards".
NFPA Fire Protection Handbook, 18th Ed. Table 8-1P. Pg. 8-17
NFPA Fire Protection Handbook, 18th Ed. Table 1-1P. Pg.1-15.
Estimate based upon ceiling jet velocity calculations for typical ceiling heights and heat release rates.

How do we reduce the risk of fires in buildings?

REDUCE THE RISK OF FIRE

Reduce the frequency:
PREVENTION

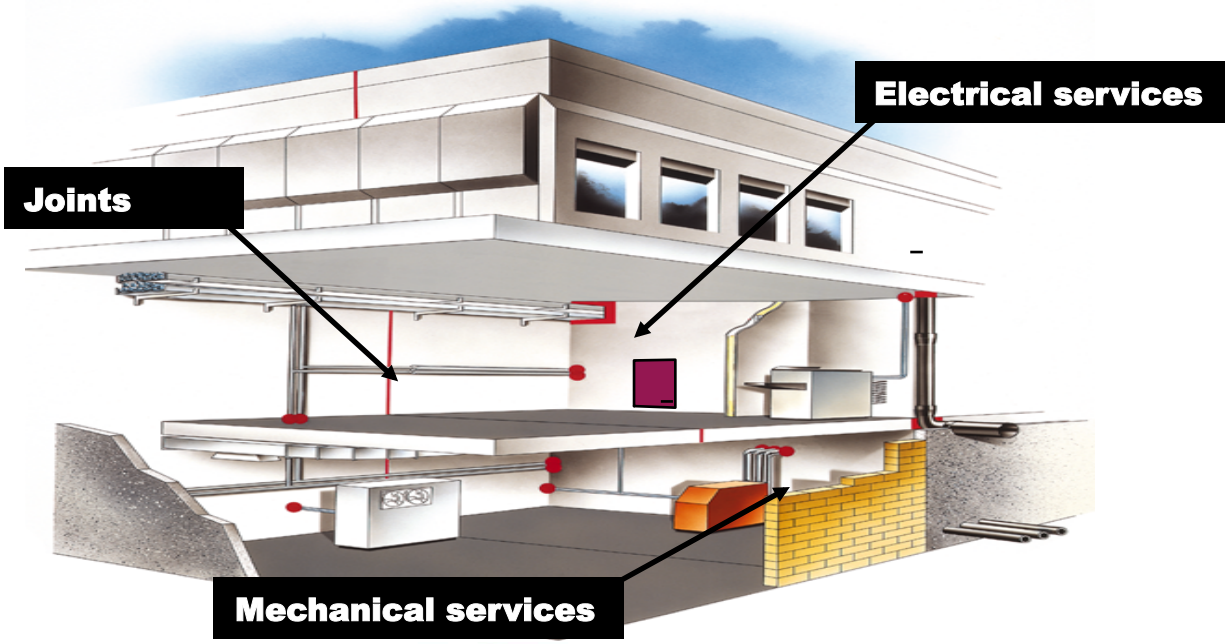
Reduce the effects:
PROTECTION

ACTIVE: it requires an activation by a human or sustem (sprinkler, extinguisher, ecc...)

PASSIVE: non richiede l'intervento di un operatore o di un impianto (compartimentazione)

What is Firestop?

- **Firestop systems** (if installed correctly), help **restore the integrity** of a floor or wall as it is penetrated by an object or joint and resist the spread of smoke and fire.
- **Firestop** is part of the **life safety plan** in building structures.



Codes and standards by location

- Codes in most countries require firestopping to be tested, designed and installed per a **testing standard**.

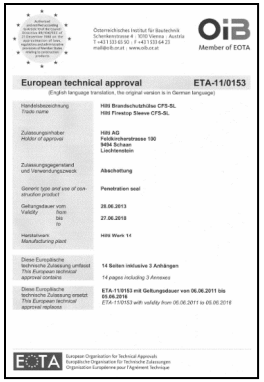
- Firestop systems are tested according to international standards such as:

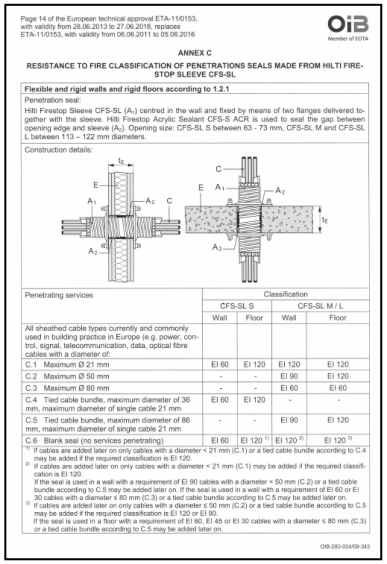
Europe: EN 1363, DIN 4102

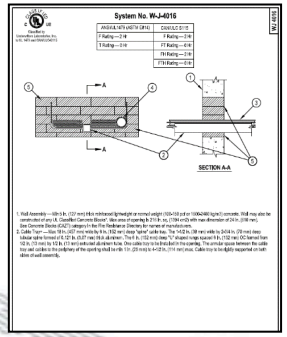
USA: ASTM E 814 / UL 1479

Canada: CAN/ULC S-115

- A successful test yields an **approval** or firestop listing.


European technical approval ETA-11/0153


ANNEX C
RESISTANCE TO FIRE CLASSIFICATION OF PENETRATIONS SEALS MADE FROM HILTI FIRE-STOP SLEEVE CFS-SL

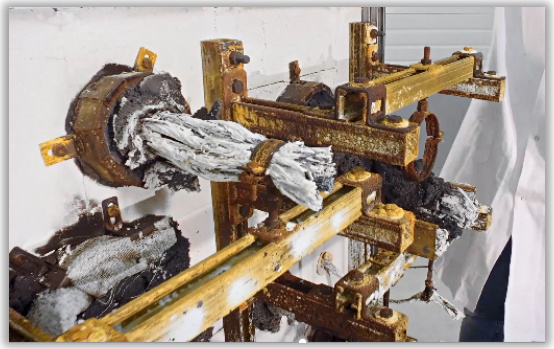

System No. W-J-4016

Steps in fire test procedure

1. Assembly is placed on furnace.

2. Assembly is exposed to fire test.

3. Assembly is subjected to hose stream test (if required)



4. Assembly results after hose stream.

UL

Intertek

FM APPROVED

Warnock Hersey

Bicsi

Officially approved systems

The **ETA** (European Technical Assessment) is the official document granted to a manufacturer based on third-party tests.

UL

Intertek

FM APPROVED

Warnock Hersey

UL INTERNATIONAL (UK) LTD
Wonersh House, Building C,
The Guildway,
Old Portsmouth Road,
Guildford. GU3 1LR.
United Kingdom.

Member of EOTA
www.eota.eu

designated according to Article 29 of the Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment, www.eota.eu)

European Technical Assessment	ETA 17/0081 of 08/08/2018
Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:	UL International (UK) Ltd
Trade name of the construction product	Hilti Firestop Sleeve CFS-SL GA
Product family to which the construction product belongs	Fire Stopping and Sealing Product: • Penetration Seals
Manufacturer	Hilti AG, Feldkircherstrasse 100 FL-9494 Schaan Liechtenstein Internet: www.hilti.com
Manufacturing plant(s)	HILTI plant 14
This European Technical Assessment contains	24 Pages including 3 Annexes which form an integral part of this Assessment.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 350454-00-1104, September 2017
This version replaces	ETA 17/0081, Dated 21/06/2017

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.
Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

ETA 17/0081 of 08/08/2018

Bicsi

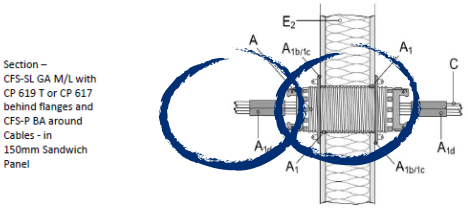
The application must be clearly indicated in the product certification

It contains the **field of application** consisting of:

1. Base material (a fire-rated wall or floor assembly)

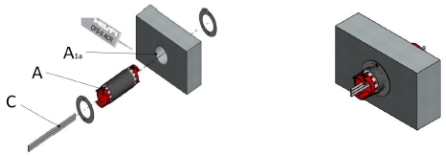
2. A penetrating item or items passing through an opening in the assembly

3. The materials designed to help prevent the spread of fire through the openings.

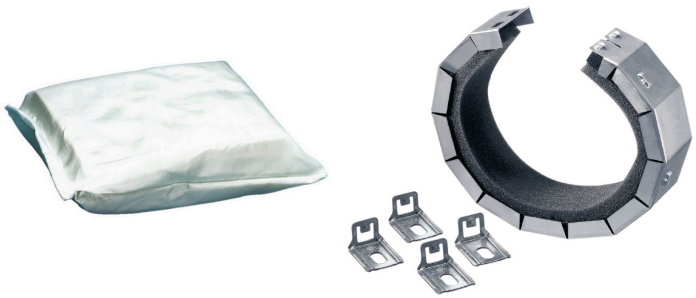


A.4.3 Seal Type 2a Detail:

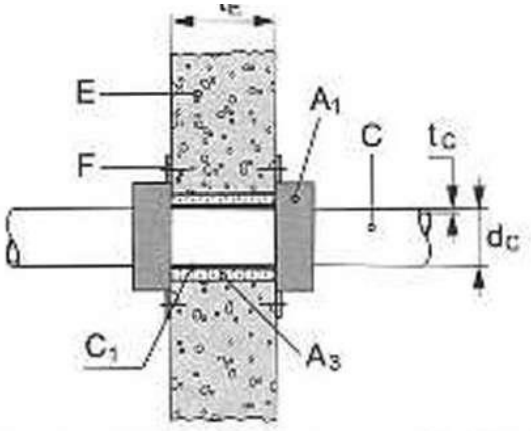
A.4.4 Seal Type 1a Application Information (CFS-SL GA S/M/L and CFS-S ACR)
Flexible and Rigid Walls



What is the average hourly rating of any firestop product?

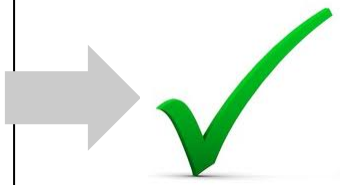
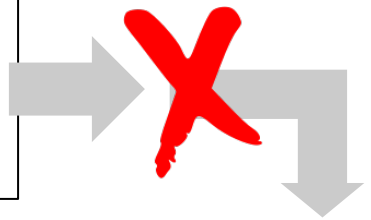


ZERO



Only Firestop Systems have ratings!

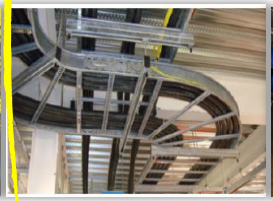
What if the application is not listed in the certification of the product?

Application in the jobsite	=	Application in the certification	
Application in the jobsite	≠	Application in the certification	

DOCUMENTATION NEEDED

Engineering Judgement by the producer	Test lab **positive evaluation**

Airflow mitigation

Data	Power	Cooling	Other
Data Cabling	Electric Cabling	Piping/Ducts	Fire, Gas Suppression
			Emergency Lighting
			Access & Security Control Cabling

Highest risk

- ✓ Creates largest volume of openings through wall and floor assemblies
- ✓ Present unique challenge due to continuous **cable re-penetration**

Cable Repenetration increases risks to people and assets

Pre-engineered firestop eliminates the risk of human error

New construction

- Traditional systems are also the most often **incorrectly installed**
- **Inspection failures** are common yet don't catch all incorrect installations

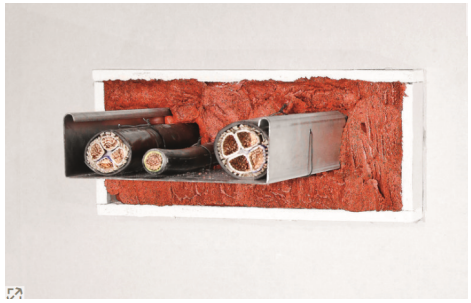
Renovation

- When repenetrating, there is lack of coordination resulting in **wide-open penetrations**
- **Higher risks** to fire protection
- Increase **energy costs**

What firestop products are available on the market?

- Cushions

- Coated Board



- Foam

- **Preformed devices!**

Solutions should fit application needs

Performance Requirements

- ✓ Minimum Code compliance for firestop system rating

- ✓ Ensure life safety and property loss prevention
- ✓ Correct installation
- ✓ Re-penetrability (MAC work)
- ✓ Ease of inspection
- ✓ Prevent airborne disease transmission
- ✓ Prevent dust contamination
- ✓ Room pressurization
- ✓ Reduce cooling and heating costs

Solution

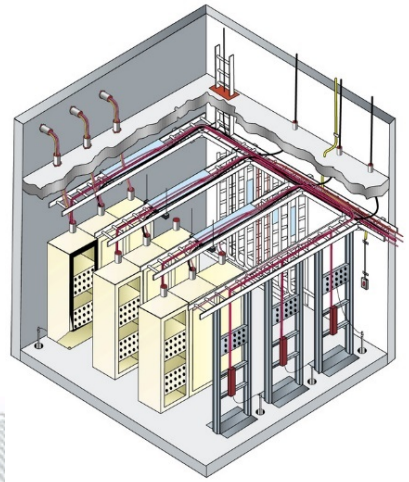
Traditional Firestop System
(generates dust and greater potential to human error)

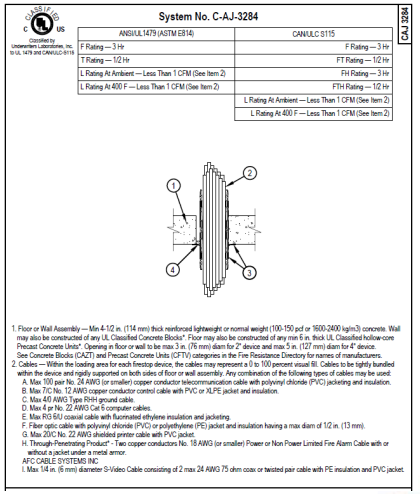
Pre-formed firestop system
(fiber-free for easy cable changes)

Bicsi

Clearly convey your design intent

- Mandate cable pathway devices in **Master specs**
- **Draw** cable pathways devices on Datacom or Telecom details
- **Create documentation** regarding firestop placement in layout for future maintenance





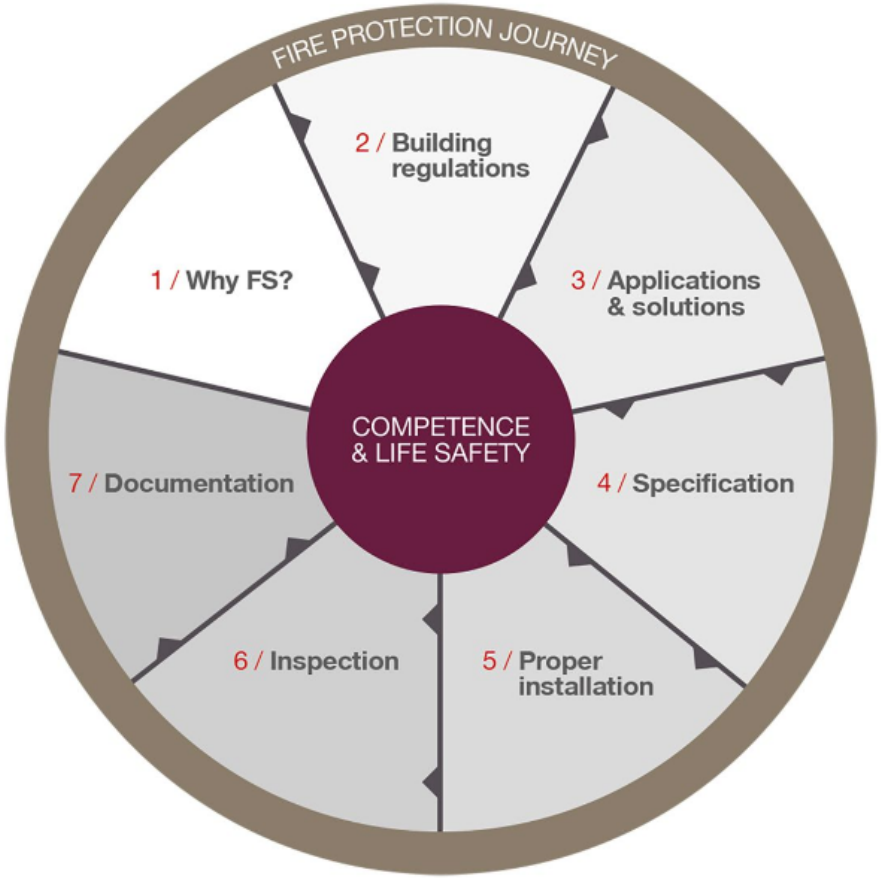
System No. C-AJ-3284

CAJ 3284

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
L Rating At Ambient — Less Than 1 CFM (See Item 2)	FH Rating — 3 Hr
L Rating At 400 F — Less Than 1 CFM (See Item 2)	FTH Rating — 1/2 Hr
	L Rating At Ambient — Less Than 1 CFM (See Item 2)
	L Rating At 400 F — Less Than 1 CFM (See Item 2)

1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Floor may also be constructed of any min 6 in. thick UL Classified hollow-core Precast Concrete Units*. Opening in floor or wall to be max 3 in. (76 mm) diam for 2" device and max 5 in. (127 mm) diam for 4" device. See Concrete Blocks (CAZT) and Precast Concrete Units (CFTV) categories in the Fire Resistance Directory for names of manufacturers.
2. Cables — Within the loading area for each firestop device, the cables may represent a 0 to 100 percent visual fill. Cables to be tightly bundled within the device and rigidly supported on both sides of floor or wall assembly. Any combination of the following types of cables may be used:
   A. Max 100 pair No. 24 AWG (or smaller) copper conductor telecommunication cable with polyvinyl chloride (PVC) jacketing and insulation.
   B. Max 7/C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
   C. Max 4/0 AWG Type RHH ground cable.
   D. Max 4 pr No. 22 AWG Cat 6 computer cables.
   E. Max RG 6/U coaxial cable with fluorinated ethylene insulation and jacketing.
   F. Fiber optic cable with polyvinyl chloride (PVC) or polyethylene (PE) jacket and insulation having a max diam of 1/2 in. (13 mm).
   G. Max 20/C No. 22 AWG shielded printer cable with PVC jacket.
   H. Through-Penetrating Product* - Two copper conductors No. 18 AWG (or smaller) Power or Non Power Limited Fire Alarm Cable with or without a jacket under a metal armor.
   AFC CABLE SYSTEMS INC
   I. Max 1/4 in. (6 mm) diameter S-Video Cable consisting of 2 max 24 AWG 75 ohm coax or twisted pair cable with PE insulation and PVC jacket.

The firestop journey



3 things to remember

- **Fire & Smoke** are devastating occurrence that happen more often than we think
- Designers should consider maintenance and **future cable capacity**
- Reach out to us for **support**!

Thank you

Matteo Moccia
Product Manager
Hilti Italia S.p.A.
+39 344 1888143
matteo.moccia@hilti.com