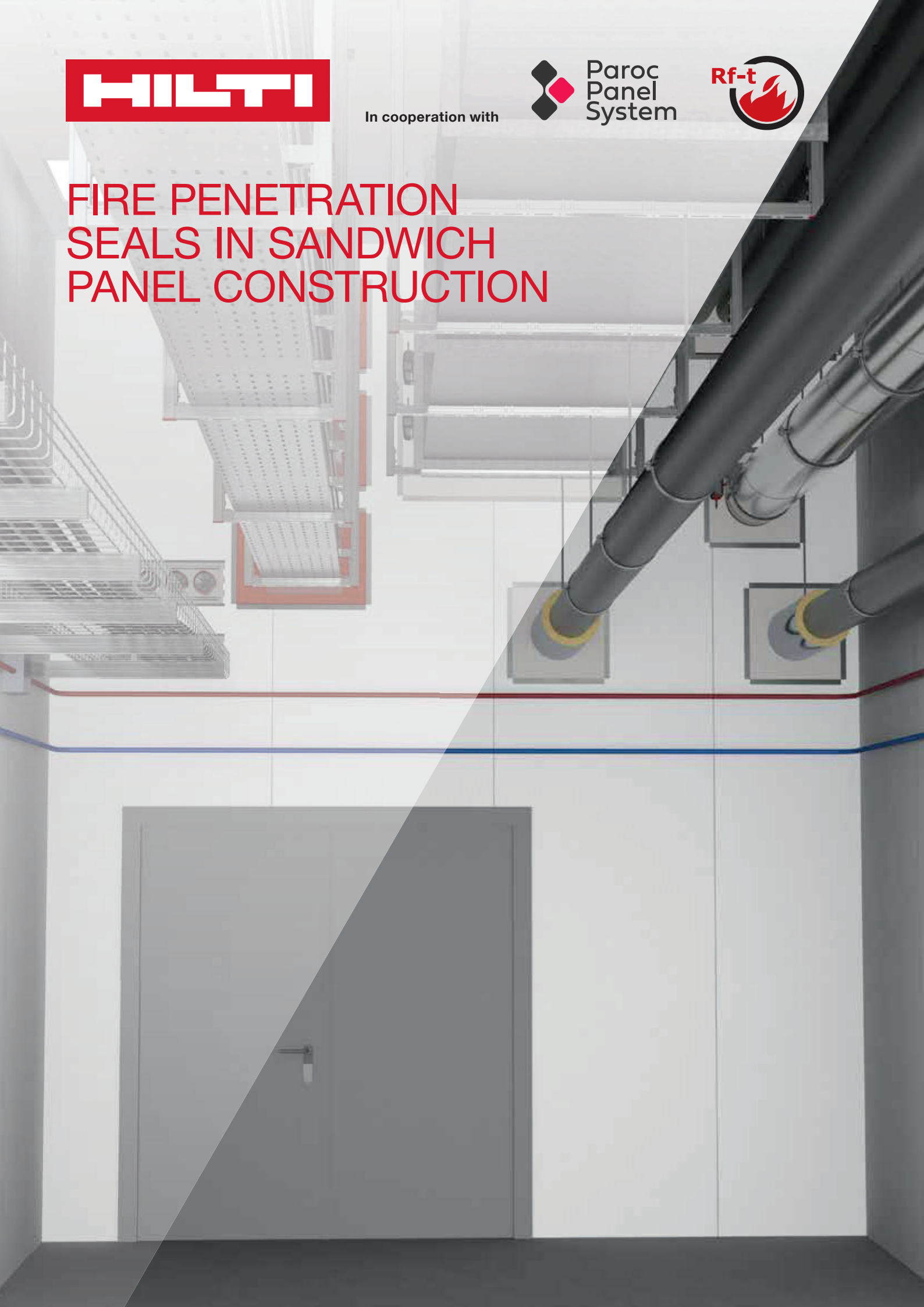
In cooperation with

Paroc Panel System

Rf-t

FIRE PENETRATION SEALS IN SANDWICH PANEL CONSTRUCTION



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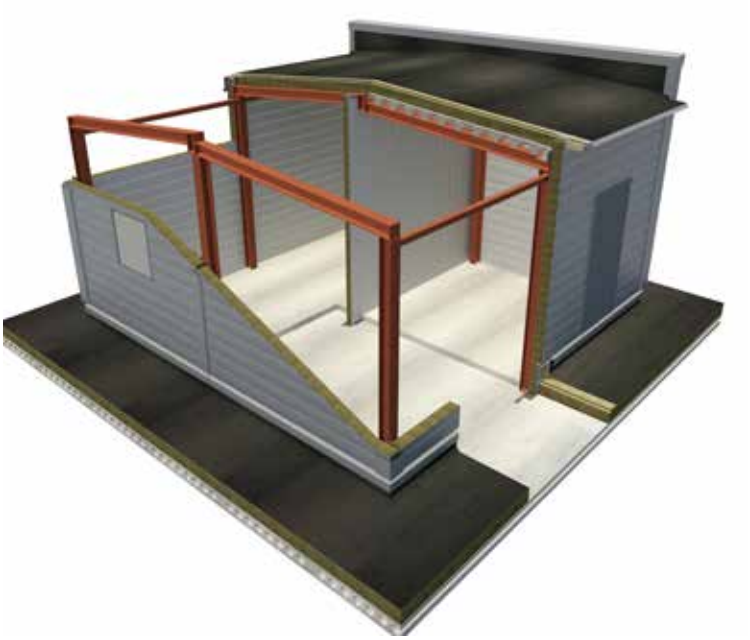
INTRODUCTION

Prefabricated internal walls shorten construction cycles

Many owners of large commercial and industrial projects are capitalizing on the benefits of shorter construction cycles thanks to sandwich panels wall systems. The light, prefabricated panels can be easily transported to site and quickly erected, allowing other trades to begin their work immediately. In facilities such as data centers where every additional day of uptime counts, these fast-track construction methods are helping improve and accelerate the return on their construction investment.



The challenge

Unfortunately, the existing standards for fire testing penetration seals in sandwich panels has frustrated many designers looking for solutions in these types of walls. Firestop manufacturers cannot compare results across panel types or manufacturers, making widespread testing cost prohibitive and leading to an industry-wide lack of tested systems in these wall construction types.

The Future Solution

To meet the current market demand, Hilti Firestop has cooperated with Paroc Panel System and Rf-Technologies Fire Dampers to test a wide range of applications for certified fire protection solutions in sandwich panel construction.

In cooperation with

DESIGN OF PAROC PANEL SYSTEM SANDWICH PANELS

Design of Paroc Panel System sandwich panels

With large span widths, unique fire-door support testing and a wide range of panels for various applications, Paroc Panel System has a solution for every facility. Hilti and Rf-Technologies have partnered to provide a portfolio of solutions for the most common mechanical, electrical and telecoms penetrations in industrial facilities. To help ensure the most cost-efficient design of your sandwich panel construction, contact the manufacturers early in the design process. Especially as it relates to Firestop and Fire Dampers, early consideration of the tested system parameters will reduce the need for time-consuming Engineering Judgments and the risk of costly delays to timelines, rework or problems during commissioning.

Paroc Panel System panels are manufactured using AST® Technology that helps ensure their high tensile strength, reliable longevity and fire resistance. Five various Paroc Panel System sandwich panels have been certified for fire penetration seals. Panel type should be chosen according to required strength, fire and thermal insulation properties:

- AST S for internal walls with normal fire requirements
- AST F, AST F+ and AST S+ for internal walls with high fire requirements
- AST E for walls with higher strength and fire requirements

Technical performance of Paroc Fire Proof Panels

Panel Type		Panel Properties				
	Nominal thickness, mm	100	120	150	175	200
	Actual thickness, mm	99	120	151	173	202
AST L	Fire rating, max[2] horizontal/vertical	NPD	NPD	EI120/EI180	EI120/EI180	EI120/EI180
	Weight, kg/m^2 [3]	17	18	21	22	24
AST S	Fire rating, max[2] horizontal/vertical	EI60/EI60	EI90/EI90	EI180/EI180	EI180/EI180	EI240/EI240
	Weight, kg/m^2 [3]	19	21	23	25	28
AST S+	Fire rating, max[2] horizontal/vertical	EI120/EI120	EI120/EI120	–	–	–
	Weight, kg/m^2 [3]	19	21	–	–	–
AST F	Fire rating, max[2] horizontal/vertical	EI45/EI120	EI45/EI120	EI240/EI240	EI240/EI240	EI240/EI240
	Weight, kg/m^2 [3]	21	24	27	30	33
AST F+	Fire rating, max[2] horizontal/vertical	EI120/EI120	EI120/EI120	–	–	–
	Weight, kg/m^2 [3]	21	24	–	–	–
AST E	Fire rating, max[2] horizontal/vertical	EI45/EI120	EI45/EI120	EI240/EI240	EI240/EI240	EI240/EI240
	Weight, kg/m^2 [3]	22	24	28	31	34

- = Not available

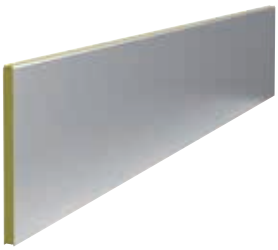
[2] Fire resistance – contact please Paroc Panel System for more information regarding details and spans. Paroc Panel System's AST® panels are non-combustible and classified Euroclass A2-s1,d0 in accordance with the standard EN 13501-1.

FIRE-RATED WALLS

General

Paroc Fire Proof Panels are non-combustible, Euroclass A2-s1,d0 in accordance with the standard EN 13501-1. Fire resistance for Paroc Panel System structures has been classified according to the standards EN 13501-2, EN 15254-5 and EN 15254-7.

Fire-rated walls



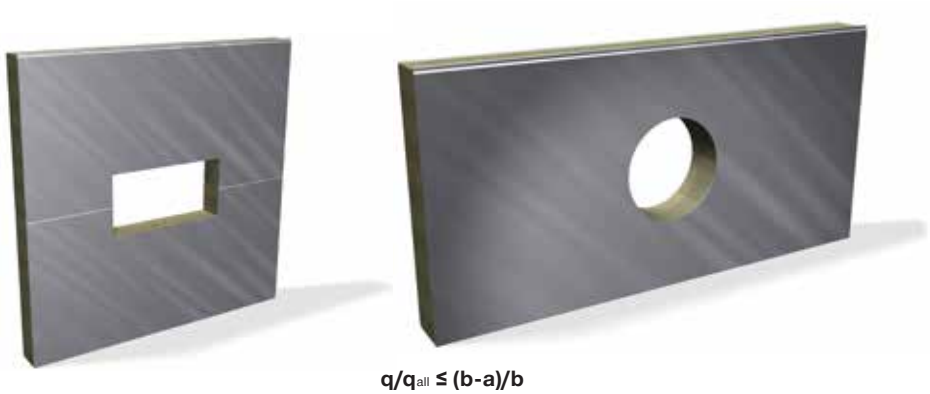
Fire-rated walls are non-loadbearing, which means that loads may not be transferred from e.g. roof structures down onto a Paroc Fire Proof Panel wall. Fire classifications are subject to restrictions on span widths. Contact Paroc Panel System or visit www.parocpanels.com. Separate rules apply for acoustic panels and panels with facings of stainless or galvanized steel.

Openings and cut-outs

When dimensioning Paroc Fire Proof Panels panels, account for strength loss that occurs due to openings and cut-outs for doors, windows, pipe penetrations, etc. Design panels with cut-outs to take the loads they are subject to irrespective of the openings. If this is not possible, loads directed on the panels are to be transferred to adjacent panels or using auxiliary structures to the building frame. In case of large openings, the structures can be made of steel profiles transferring the load to the building main frame.

The maximum opening sizes for single service penetrations do not reduce the strength of Paroc Fire Proof Panels panels sufficiently to require special measures. However, multiple cut-outs within a panel must be considered cumulatively. If required, panels with higher strength classes may need to be used at openings.
If the degree of cut-out exceeds the ratio q/q_{all}, the load is either to be transferred to adjacent panels in accordance with figure 2, or, if this is not possible, to be directed on the load-bearing frame by auxiliary structures.

Consider maximum opening sizes noted on typical details in this brochure to remain within tested system parameters.



$q/q_{all} \leq (b-a)/b$

Figure 1
Maximum load for panels with cut-outs q. Allowed load capacity for the whole panel q_{all} can be taken from the dimensioning curves at the actual span and with largest support width.

Figure 2
Load distribution factors.

APERTURE FRAMING, JOINT STITCHING & THERMOPROFILES

Aperture framing

All rectangular openings must be framed on both sides of the wall with 30 x 30-L angles, fixed to panel facing with self-drilling screws at distances of 125 mm. Seal behind L-angles with Hilti CFS-S ACR acrylic sealant.

Joint stitching

Where openings bisect joints in the sandwich panels, the joints must be stitched with self-drilling screws every 150 mm to a distance of 600 mm on each side of the opening. Additionally, any panel joints within 600 mm of an opening should be similarly stitched.

If an opening bisects more than 2 panel joints, install 100 mm Paroc Fire Proof Panels MIT thermo-profiles every 600 mm behind the L-angle aperture framing.

Paroc Fire Proof Panels with AST® core used for wall

LOW-VOLTAGE

HILTI	Product Firestop Speed Sleeve CFS-SL GA	Construction project
ID CFS-SL GA_SPW_EL_001	Content Firestop penetration seal for cables through Paroc Fire Proof Panels	
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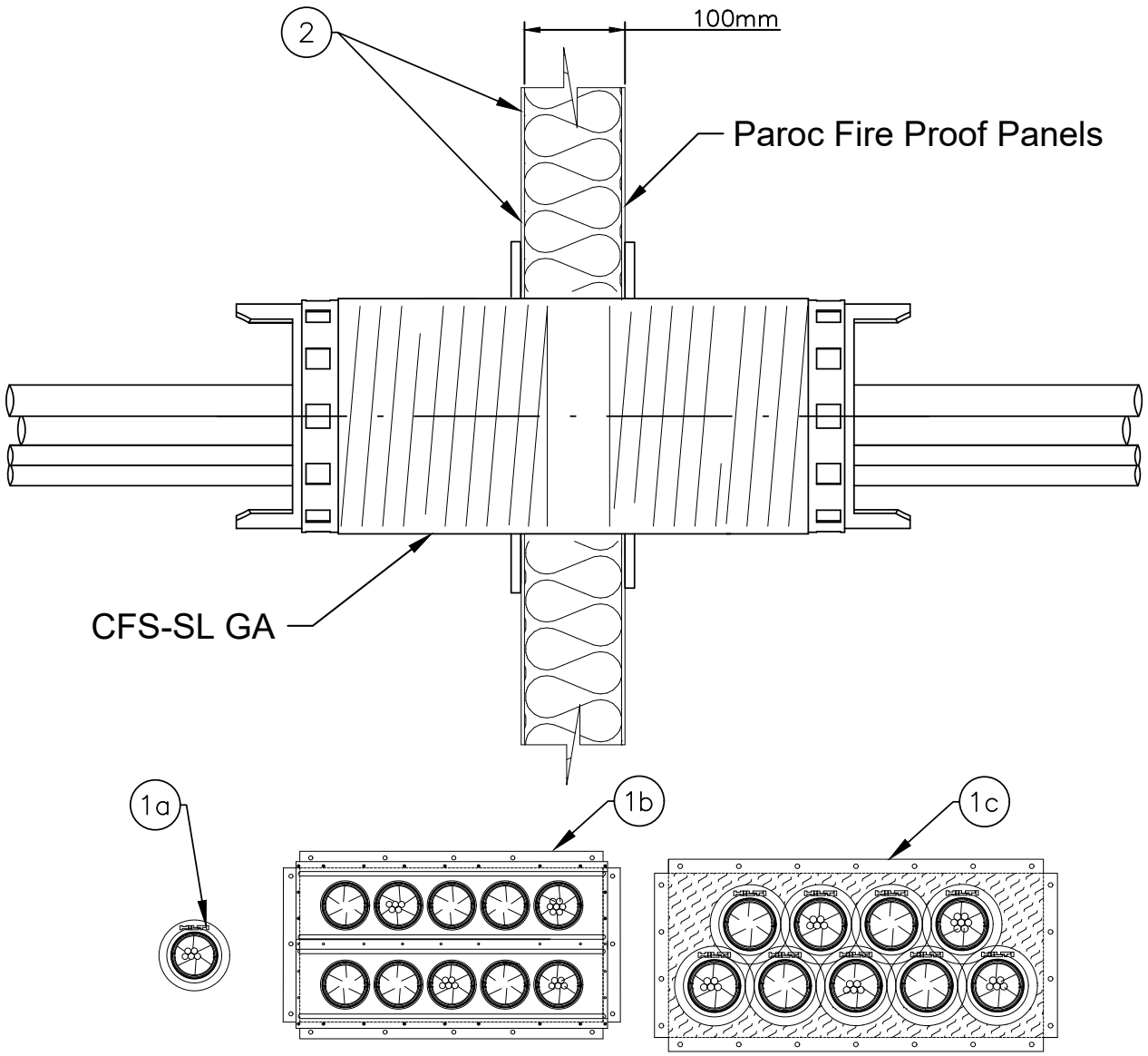
EI60



- European Technical Assessment ETA-20/1234 (CFS-SL GA)
- Classification report 20406F
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product Firestop Speed Sleeve CFS-SL GA	Construction project
ID CFS-SL GA_SPW_E_001	Content Firestop penetration seal for cables through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Pipe insulation and / or cable protection	Min. seal depth [mm]
1a	All cables	Ø ≤ 21	CFS-SL GA M	Ø 115	none	-	100
1b	All cables	Ø ≤ 21	CFS-SL GA M + CFS-SL GP	660 x 370	Fill entire cavity between gangplates with CFS-FX	-	100
1c	All cables	Ø ≤ 21	CFS-SL GA M + CFS-CT	800 x 350	CFS-S ACR to depth of 10 mm	-	100

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
CFS-SL GA M can only be installed in Paroc AST Sandwich Panels with a thickness of 100mm.
Where openings bisect joints in the sandwich panels, the joints must be stitched with self-drilling screws every 150mm to a distance of 600mm on each side of the opening and filled with CFS-S-ACR sealant to a distance of 100mm from the aperture edge.

Base material	100mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws (MD21Z 5,5x25) every 100mm. Only applicable for rectangular openings as shown in cases 1b and 1c.

③ Infomation about the firestop

Hilti Firestop Speed Sleeve CFS-SL GA M
- Application for cables and cable bundles
- CFS-SL GP Gangplate affixed to wall with Hilti S-DD 03Z self-drilling screws of length ≥ 25 mm

④ Distance

First service support: ≤ 500mm

Single sleeves CFS-SL GA M installed directly in sandwich panel wall – linear arrangement
Distance between wall apertures: 35 mm.

Multiple sleeves CFS-SL GA M installed in coated board seal CFS-CT 1S - cluster arrangement
Distance between adjacent apertures: 35 mm.

Multiple sleeves CFS-SL GA M with gangplates CFS-SL GP installed in foam seal CFS-FX - cluster arrangement
Distance between the adjacent apertures: in line with the gangplate opening positions.

Separation between CFS-SL GA and adjacent seals:

Separations [≥ ... mm]	CFS-SL GA M	CFS-SL GA M + CFS-CT 1S	CFS-SL M + CFS-SL GP + CFS-FX	CFS-BL	CFS-CT 1S	Other penetration seals
CFS-SL GA M		100	200	100	100	200
CFS-SL GA M + CFS-CT 1S	100		100	100	100	200
CFS-SL M + CFS-SL GP + CFS-FX	200	100		100	200	200
CFS-BL	100	100	100		100	200
CFS-CT 1S	100	100	200	100		200
Other penetration seals	200	200	200	200	200	

⑤ Deflection solution

Stop cable tray on either side of wall, normal deflection accommodated by unsupported cables.

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ELECTRICAL

	Product Firestop Block CFS-BL	Construction project
ID CFS-BL_SPW_MX_001	Content Firestop penetration seal for cables, metalic cable trays, cable trunking, conduits and busbars through Paroc Fire Proof Panels	
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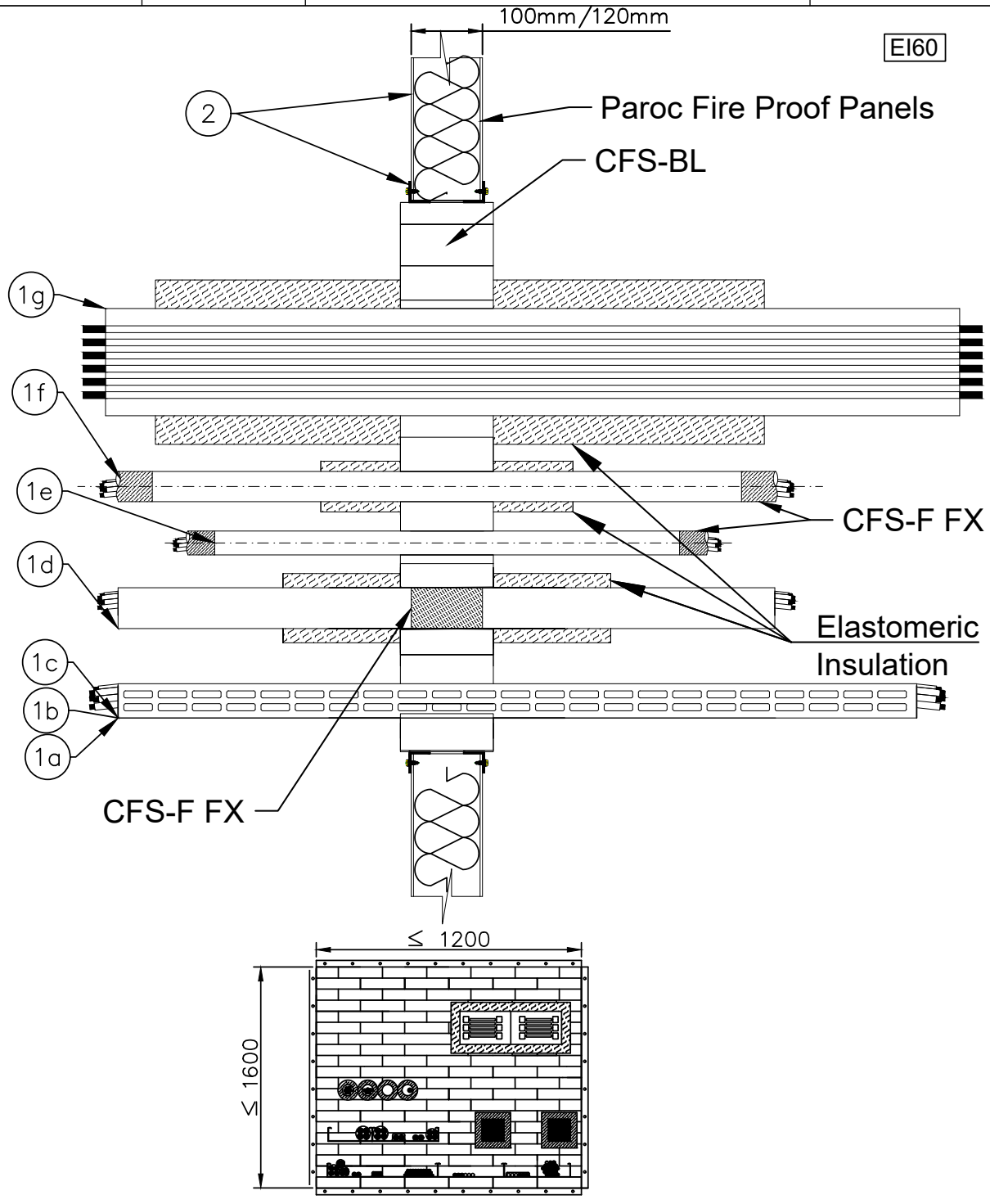

- European Technical Assessment ETA-13/0099 (CFS-BL)
- Classification report 20406C
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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HILTI	Product **Firestop Block CFS-BL**	Construction project
ID CFS-BL_SPW_MX_001	Content Firestop penetration seal for cables, metalic cable trays, cable trunking, conduits and busbars through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Description/ Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Pipe insulation and / or cable protection	Min. seal depth [mm]
1a	All cables	-	Ø ≤ 80	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	-	130
1b	Cable bundles	Individual cable Ø ≤ 21mm	Ø ≤ 100	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	-	130
1c	Metalic Cable trays	-	≤ 1100	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	-	130
1d	Cable trunking	-	≤ 100 x 100	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	Trunking filled with CFS-FX to thickness of wall and locally wrapped with foamed elastomeric insulation on either side of penetration seal, T*= 32 mm, L*= 300 mm	130
1e	Small cable conduits	Plastic and/or steel	Ø ≤ 16	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	-	130
1f	Large cable conduits	Steel	Ø ≤ 50 (with cables Ø ≤ 21)	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	Conduit capped with CFS-FX to a depth of 40mm and locally wrapped with foamed elastomeric insulation on either side of penetration seal, T*= 20 mm, L*= 200 mm	130
1g	Busbar	E+I Engineering copper busbar	5000 amp	CFS-BL	≤1200 x 1600	CFS-FIL to a depth of 15mm	Busbar locally wrapped with foamed elastomeric insulation on either side of penetration seal, T*= 32 mm, L*= 500 mm	130

T* = Insulation thickness, L* = Insulation length

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
CFS-Bl seal can only be used in the Paroc AST sandwich panels with thicknesses of 100mm or 120mm.
Where openings bisect joints in the sandwich panels, the joints must be stitched with self-drilling screws every 150mm to a distance of 600mm on each side of the opening.

Base material	100mm or 120mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws (MD21Z 5,5x25) every 100mm

③ Infomation about the firestop

Hilti Firestop Block CFS-BL
- Application for cables, cable trays, trunking, conduits and busbars
- For aperture heights ≥1000mm: CFS-BL seal must be secured by 2x channels fixed vertically over seal, installed ≥400mm from seal edge & each other.

④ Distance

First service support: ≥ 400mm

Distances between services within CFS-BL seal					
	Cables / cable Supports / small conduits	Large conduits	Busbar	Trunking	Seal edge
Cables / cable Supports / small conduits	≥ 50	≥ 100	≥ 250	≥ 100	≥ 50
Large conduits	≥ 200	≥ 40	≥ 200	≥ 200	≥ 50
Busbar	≥ 200	≥ 200	≥ 25	≥ 200	≥ 25
Trunking	≥ 200	≥ 200	≥ 200	≥ 100	≥ 50

Separation between adjacent seals					
	CFS-CT Service Penetrations	CFS-CT Damper Penetrations	CFS-D	CFS-SL GA	Other seals
CFS-BL	≥ 100	≥ 200	≥ 50	≥ 100	≥ 200

⑤ Deflection solution

Firestop Blocks can accommodate moderate deflection of services. Please contact Hilti for further details.

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	Product Firestop Cable Disc CFS-D	Construction project
ID CFS-D_SPW_E_001	Content Firestop penetration seal for single/small cable bundles through Paroc Fire Proof Panels	
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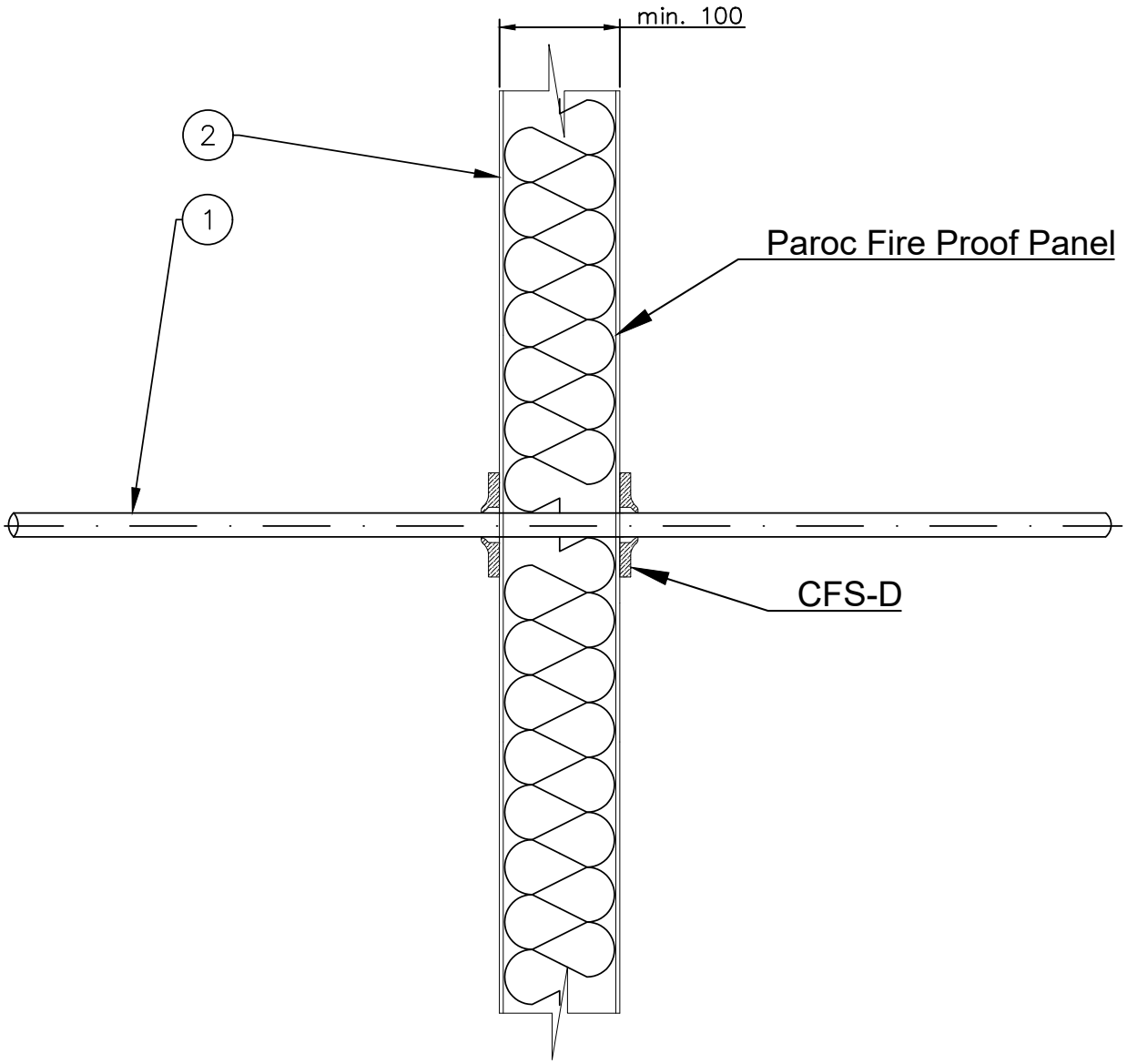

- European Technical Assessment ETA-16/0050 (CFS-D)
- Classification report 20406G
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product Firestop Cable Disc CFS-D	Construction project
ID CFS-D_SPW_E_001	Content Firestop penetration seal for single cables through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Pipe insulation and / or cable protection	Min. seal depth [mm]
1a	All cables	Ø ≤ 21	CFS-D	Ø ≤ 25	-	-	100

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.

Base material	Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	No aperture framing required

③ Infomation about the firestop

Hilti Firestop Cable Disc CFS-D
- Application for cables

④ Distance

First service support: ≥ 500mm

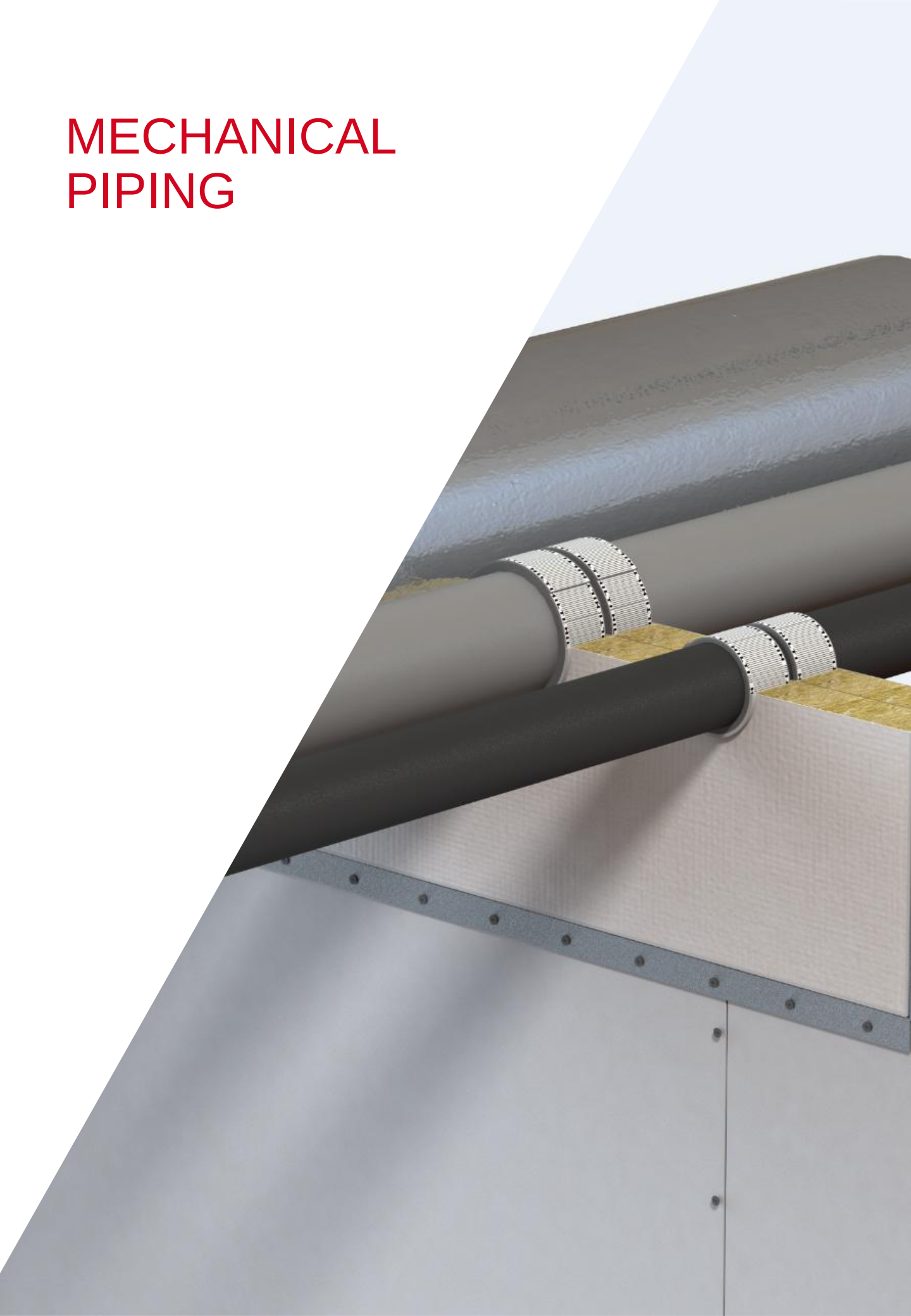
Distances between openings [mm]

Separation between penetration seals			
	CFS-D	CFS-BL	CFS-SL GA
CFS-D	≥ 100	≥ 100	≥ 100

⑤ Deflection solution

Stop cable tray on either side of wall, normal deflection accommodated by unsupported cables.

MECHANICAL PIPING



	Product **Firestop** **Coated Board System CFS-CT**	Construction project
ID CFS-CT_SPW_NCP_001	Content Firestop penetration seal for single and multiple non-combustible pipes through Paroc Fire Proof Panels	
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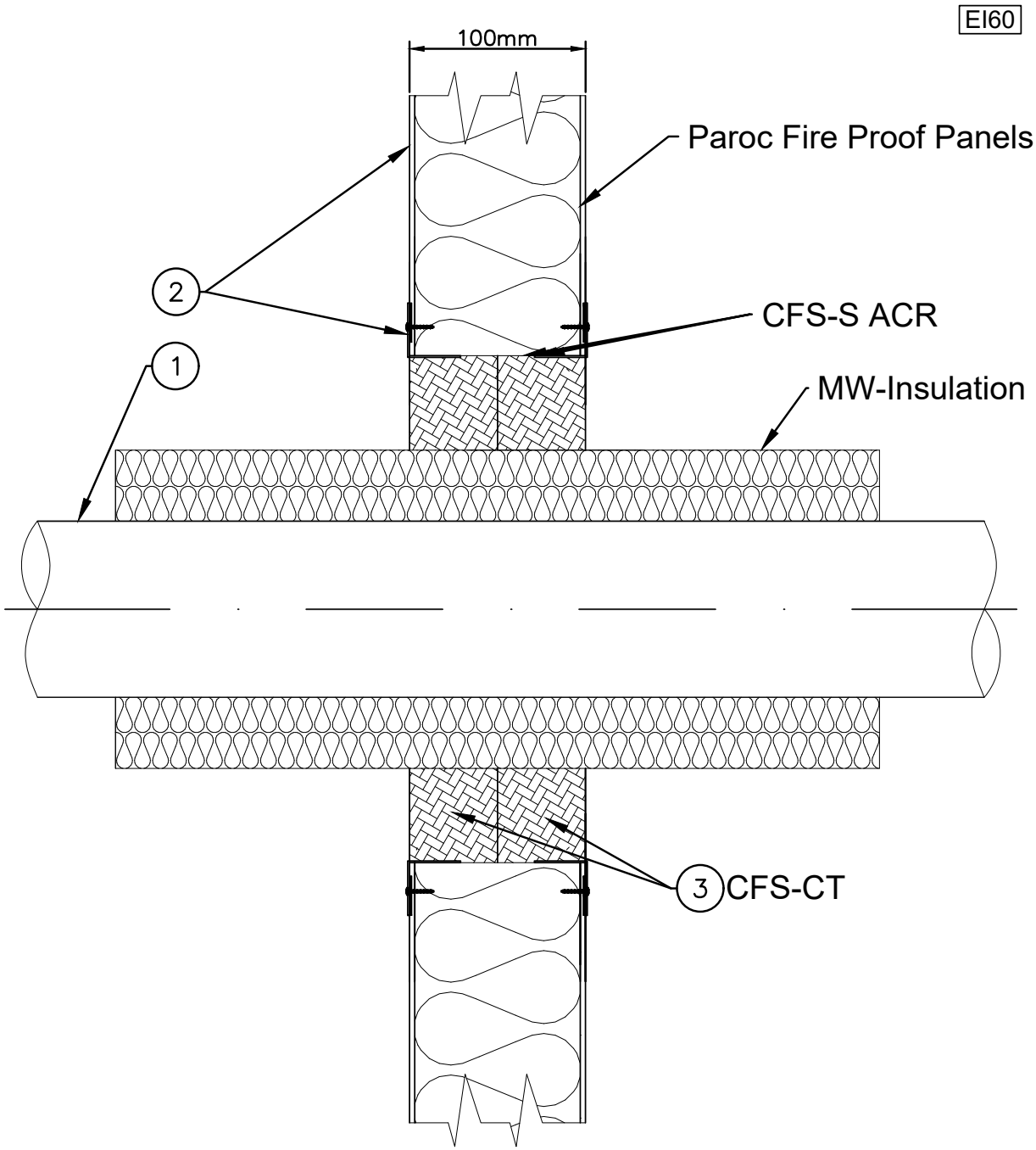

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Classification report 20406D
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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HILTI	Product Firestop Coated Board System CFS-CT	Construction project
ID CFS-CT_SPW_NCP_001	Content Firestop penetration seal for for single and multiple non-combustible pipes through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Pipe insulation and /or cable protection	Min. Seal depth [mm]
1a	Non-combustible pipe	Copper, steel, stainless steel and cast iron	10 < Ø ≤ 64	CFS-CT	≤ 2000 x 600	CFS-S ACR to depth of 10 mm	Aluminium-backed mineral wool, insulated continuously through penetration seal T*=30mm, L*≥750mm	100
1b	Non-combustible pipe	Steel, stainless steel and cast iron	64 < Ø ≤ 324	CFS-CT	≤ 2000 x 600	CFS-S ACR to depth of 10 mm	Aluminium-backed mineral wool, insulated continuously through penetration seal T*=40mm, L*≥750mm	100

T* = Insulation thickness, L* = Insulation length

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must be also considered.
CFS-CT 1S 2x50 can only be installed in the Paroc AST Sandwich Panels with thickness of 100mm.
Where openings bisect joints in the sandwich panels, the joints must be stitched with self-drilling screws every 150 mm to a distance of 600 mm on each side of the opening.

Base material	100mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR. Sealant between steel angle and wall, and affixed with self-drilling screws (MD21Z 5,5x25) every 100mm

③ Infomation about the firestop

Hilti Firestop Coated Board System CFS-CT
- Application for non-insulated and MW-insulated non-combustible pipes,
  non-insulated pipes to be wrapped with local mineral wool insulation to the length specified

④ Distance

First service support: ≥ 250 mm

Distances between penetrants [mm]

Separation between services				
	Metal pipes	Plastic Pipes	Seal Edges	Other services
Metal Pipes	≥ 50	≥ 50	≥ 50	≥ 200

Distances between openings [mm]

Separation between penetration seals				
	Other Seals	CFS-CT - Damper Penetrations	CFS-BL	CFS-SL GA
CFS-CT	≥ 200	≥ 200	≥ 100	≥ 100

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HILTI	Product Firestop Wrap CFS-W P in Firestop Coated Board System CFS-CT	Construction project
ID CFS-W P_CFS-CT_SPW_NCP_001	Content Firestop penetration seal for single and multiple non-combustible pipes with combustible insulation through Paroc Fire Proof Panels	
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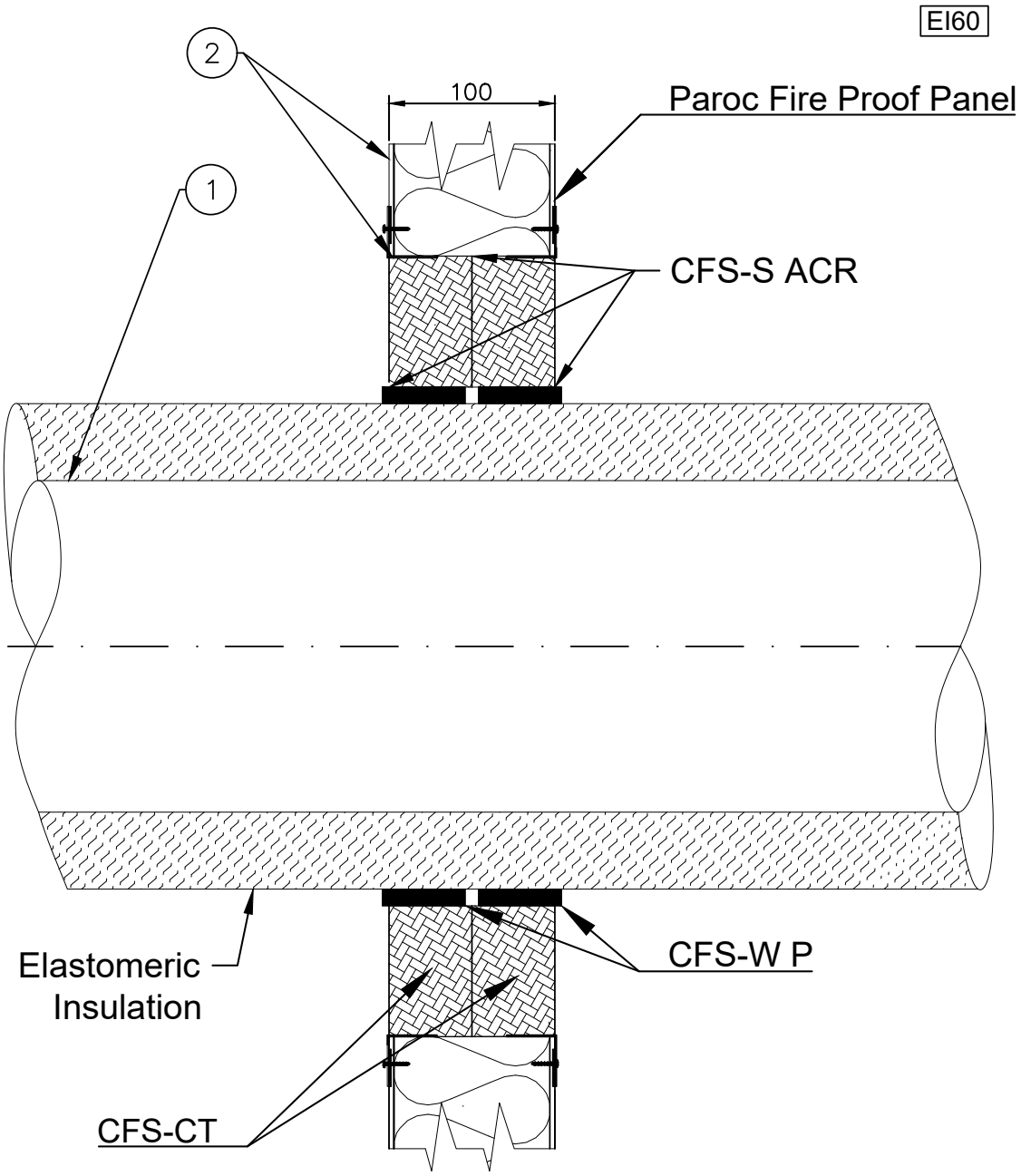

- European Technical Assessment ETA-20/0989 (CFS-CT)
- Classification report 20406D
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

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HILTI	Product Firestop Wrap CFS-W P in Firestop Coated Board System CFS-CT	Construction project
ID CFS-W P_CFS-CT_SPW_NCP_001	Content Firestop penetration seal for single and multiple non-combustible pipes with combustible insulation through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Pipe insulation and /or cable protection	Min. Seal depth [mm]
1a	Non-combustible pipe	Copper, steel, stainless steel and cast iron	10 < Ø ≤ 64	CFS-CT CFS-W P	≤ 2000 x 600	CFS-S ACR to depth of 10mm	Continuous foamed elastomeric insulation, T*= 15.5 - 39.5 mm	100
1b	Non-combustible pipe	Steel, stainless steel and cast iron	64 < Ø ≤ 219	CFS-CT CFS-W P	≤ 2000 x 600	CFS-S ACR to depth of 10mm	Continuous foamed elastomeric insulation, T*= 32 - 50 mm	100

T* = Insulation thickness

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
CFS-CT applications can only be installed in the Paroc AST Sandwich Panels with thickness of 100mm.
Where openings bisect joints in the sandwich panels, the joint must be stitched with self-drilling screws every 150mm to a distance of 600mm on each side of the opening.

Base material	100mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR. Sealant between steel angle and wall, and affixed with self-drilling screws (MD21Z 5,5x25) every 100mm

③ Infomation about the firestop

Hilti Firestop Wrap CFS-W P in Hilti Firestop Coated Board System CFS-CT
- Application for non-combustible pipes with continous combustible insulation

Wrap Layer	
ø [mm]	Layers
10-64	2
64-219	3

④ Distance

First service support: ≥ 250mm

Distances between penetrants [mm]

Separation between services				
	Metal pipes	Plastic Pipes	Seal Edges	Other services
Plastic Pipes	≥ 50	≥ 50	≥ 50	≥ 200

Distances between openings [mm]

Separation between CFS-CT 1S 2x50 seal with adjacent seals				
	All other seals	CFS-CT - Damper Penetrations	CFS-BL	CFS-SL GA
CFS-CT	≥ 200	≥ 200	≥ 100	≥ 100

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	Product **Firestop Wrap CFS-W P in Firestop Coated Board System CFS-CT**	Construction project
ID CFS-W P_CFS-CT_SPW_CP_001	Content Firestop penetration seal for single and multiple combustible pipes through Paroc Fire Proof Panels	
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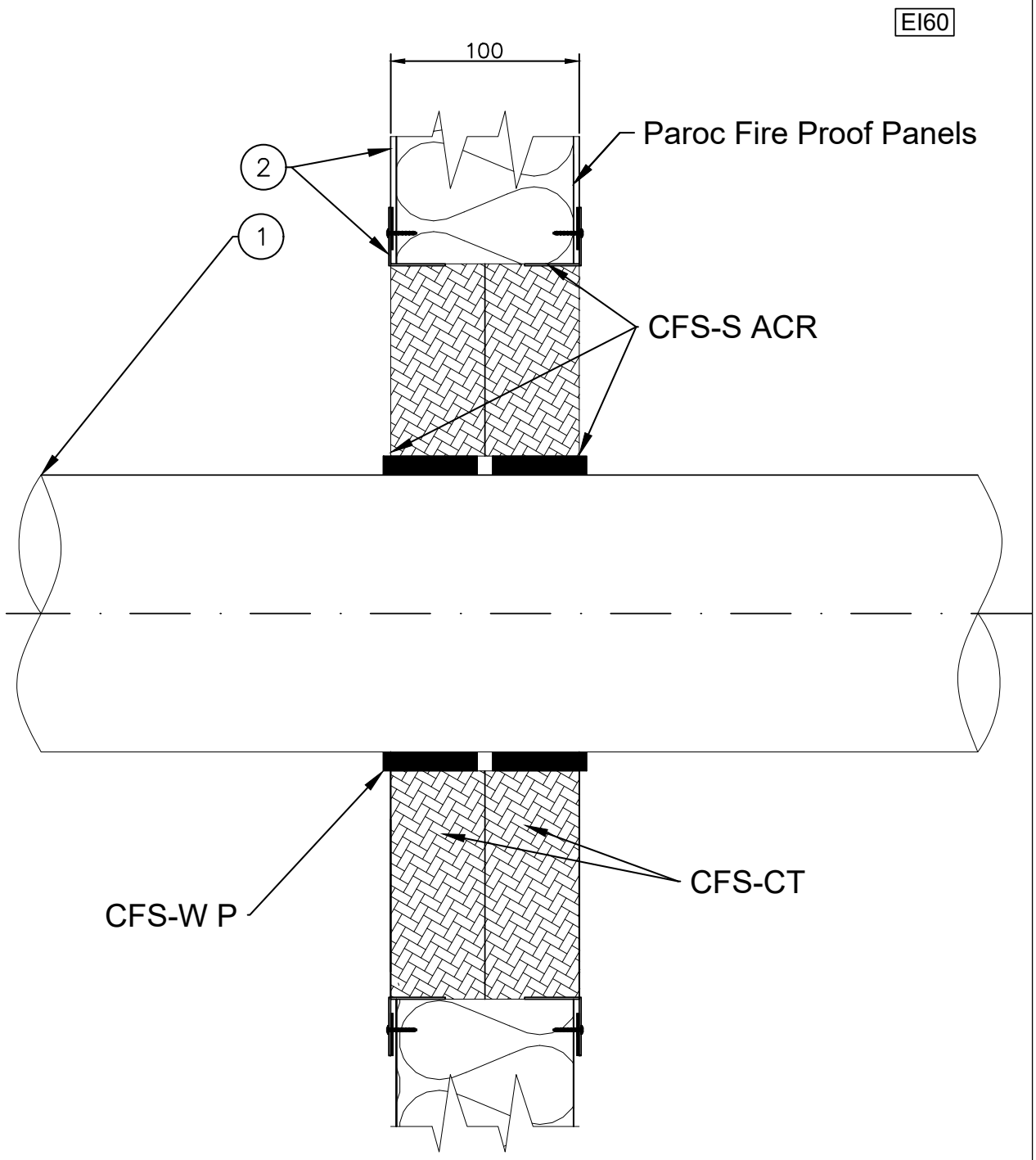

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Classification report 20406D
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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HILTI	Product **Firestop Wrap CFS-W P in Firestop Coated Board System CFS-CT**	Construction project
ID CFS-W P_CFS-CT_SPW_CP_001	Content Firestop penetration seal for single and multiple combustible pipes through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Min. Seal depth [mm]
1a	Combustible pipe	PP	Ø ≤ 110	CFS-CT CFS-W P	≤ 2000 x 600	CFS-S ACR to depth of 10mm	100
1b	Combustible pipe	PVC	Ø ≤ 110	CFS-CT CFS-W P	≤ 2000 x 600	CFS-S ACR to depth of 10mm	100
1c	Combustible pipe	PE	Ø ≤ 110	CFS-CT CFS-W P	≤ 2000 x 600	CFS-S ACR to depth of 10mm	100

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
CFS-CT 1S 2x50 can only be installed in the Paroc AST Sandwich Panels with thickness of 100mm.
Where openings bisect joints in the sandwich panels, the joints must be stitched with self-drilling screws every 150mm to a distance of 600mm on each side of the opening.

Base material	100mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR. Sealant between steel angle and wall, and affixed with self drilling screws (MD21Z 5,5x25) every 100mm

③ Infomation about the firestop

Hilti Firestop Wrap CFS-W P in Hilti Firestop Coated Board System CFS-CT
- Application for single or multiple combustible pipes:

Wrap layer	
ø [mm]	Layers
32-56	2
63-75	3
90-110	4

④ Distance

First service support: ≥ 500mm

Distances between penetrants [mm]

Separation between services				
	Metal pipes	Plastic Pipes	Seal Edges	Other services
Plastic Pipes	≥ 50	≥ 50	≥ 50	≥ 200

Distances between openings [mm]

Separation between CFS-CT 1S 2x50 seal with adjacent seals				
	All other seals	CFS-CT - Damper Penetrations	CFS-BL	CFS-SL GA
CFS-CT	≥ 200	≥ 200	≥ 100	≥ 100

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	Product Firestop Collar CFS-C P	Construction project
ID CFS-C P_SPW_CP	Content Firestop penetration seal for single combustible pipes through sandwich panel walls	
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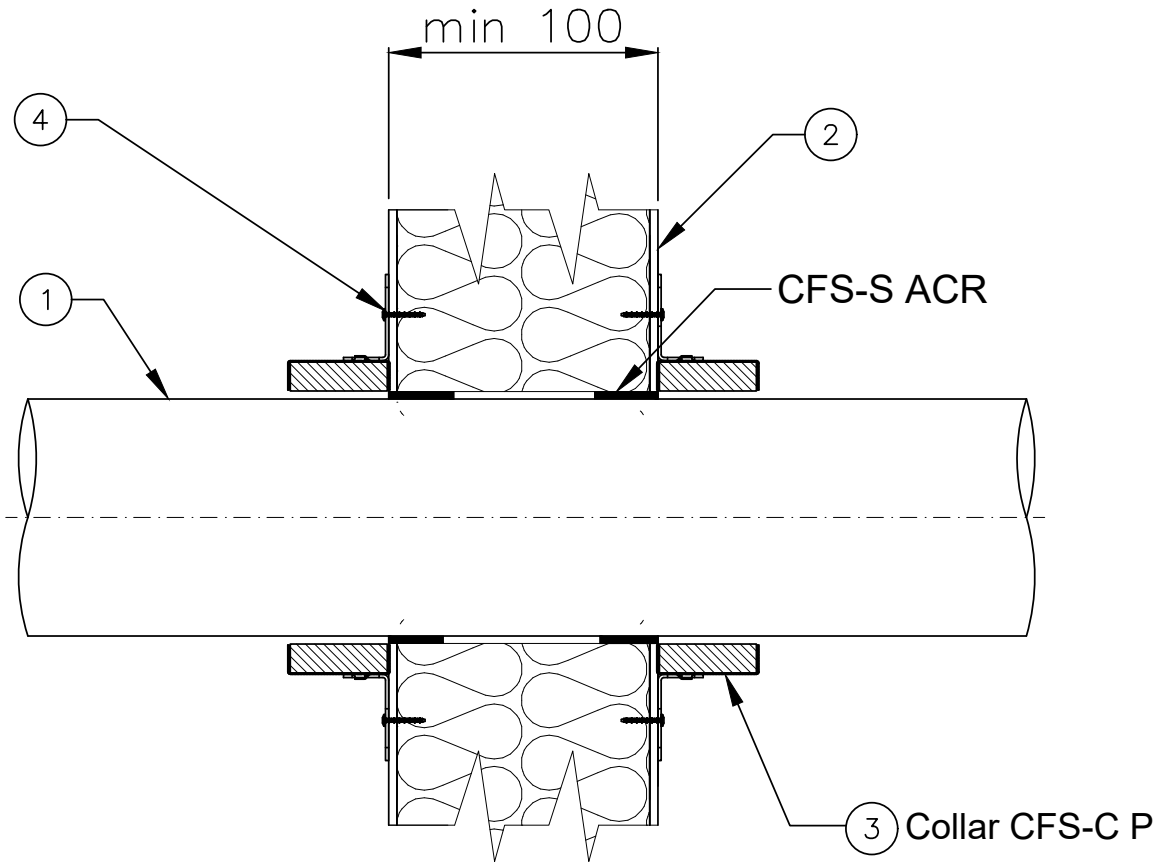
EI60



- European Technical Assessment ETA-10/0404 (CFS-C P)
- Classification report 20406E
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product Firestop Collar CFS-C P	Construction project
ID CFS-C P_SPW_CP	Content Firestop penetration seal for single combustible pipes through sandwich panel walls	
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① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap filler	Pipe insulation and/or cable protection (length)	Min. seal deph [mm]
a	Combustible pipe (U/U)	PP	Ø 75x1,9	CFS-C P	85	CFS-S ACR 15 mm depth	Pipes may be insulated with ≤ 4 mm sound decoupling	100
b		PVC	Ø 110 (2,2 - 5,3 mm)		120		Pipes may be insulated with 4 - 9mm sound decoupling	

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must also be considered. The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.	
Base Material	Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E

③ Infomation about the firestop

Hilti FirestopCollar CFS-C P
- Application for combustible pipes in singular round openings
- Number of Fixings and Fixation types:

Pos	Material	Fixing material
a	PP	3x Hilti S-MD21Z 5,5x25
b	PVC	4x Hilti S-MD21Z 5,5x25
c		

④ Distances

First support min. 250mm

	Distances between adjacent seals	
	CFS-C P	Other Seals
CFS-C P	≥ 100	≥ 200

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	Product **Firestop Endless Collar CFS-C EL**	Construction project
ID CFS-C EL_SPW_CP_001	Content Firestop penetration seal for single combustible pipes through sandwich panel walls	
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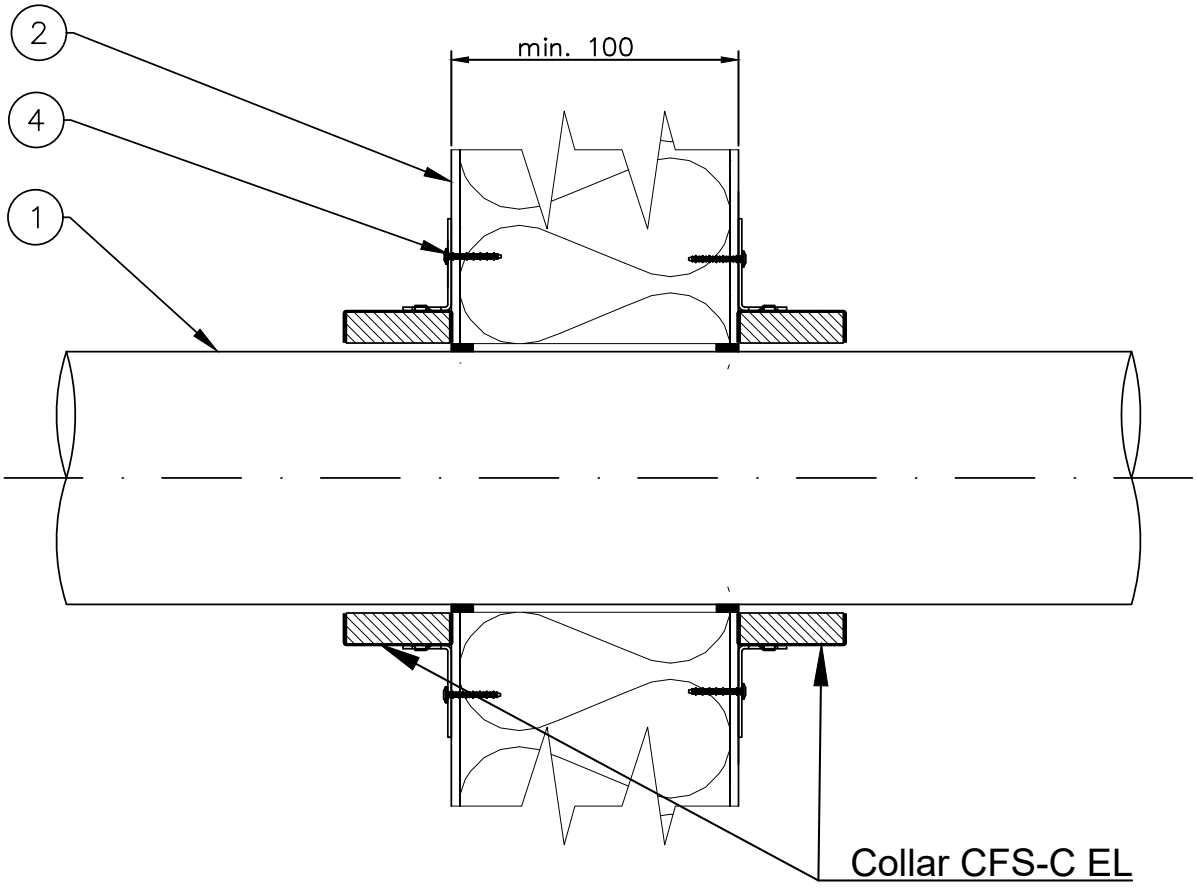
EI60



- European Technical Assessment ETA-14/0085 (CFS-C EL)
- Classification report xxxxx
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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HILTI	Product **Firestop Endless Collar CFS-C EL**	Construction project
ID CFS-C EL_SPW_CP_001	Content Firestop penetration seal for single combustible pipes through sandwich panel walls	
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① Installation

Pos	Penetrant	Description/ Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap filler	Annular gap filler depth (min.)	Pipe insulation and / or cable protection	Seal depth [mm]
1a	Combustible pipe (U/U)	PP	Ø 32-110	CFS-C EL	40 ≤ Ø ≤ 130	CFS-S ACR ≤ 10 mm	CFS-S ACR ≤ 5 mm	Pipes may be insulated with ≤ 9 mm sound decoupling	100
1b	Combustible pipe (U/U)	PVC	Ø 50-110	CFS-C EL	62 ≤ Ø ≤ 130	CFS-S ACR ≤ 10mm	CFS-S ACR ≤ 5 mm	Pipes may be insulated with ≤ 9 mm sound decoupling	100
1c	Combustible pipe (U/U)	PE	Ø 32-110	CFS-C EL	40 ≤ Ø ≤ 130	CFS-S ACR ≤ 10 mm	CFS-S ACR ≤ 5 mm	Pipes may be insulated with ≤ 9 mm sound deoupling	100

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.

Base material	Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E

③ Infomation about the firestop

Hilti Firestop Endless Collar CFS-C EL
- Application for combustible pipes in singular round openings

Fixing:
- Hilti S-MD21Z 5,5x25 self drilling screws

④ Distance

First support min. 250mm

Distances between penetrants [mm]

	Distances between services			
	Cables / Cable Supports	Metal Pipes / Pipe Insulation	Plastic Pipes / Pipe Closure Devices	Seal Edges
Plastic Pipes / Pipe Closure Devices	≥ 200	≥ 200	≥ 200	≥ 200

Distances between openings [mm]

	Separation between penetration seals					
	CFS-CT Service Penetrations	CFS-CT Damper Penetrations	CFS-BL	CFS-SL GA	CFS-D	CFS-C EL
CFS-C EL	≥ 200	≥ 200	≥ 200	≥ 200	≥ 200	≥ 200

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RF-TECHNOLOGIES
FIRE DAMPERS

HILTI	Product Firestop Coated Board System CFS-CT	Construction project
ID CFS-CT_SPW_FD_001	Content Firestop penetration seal for RF-Technologies round fire dampers through Paroc Fire Proof Panels	
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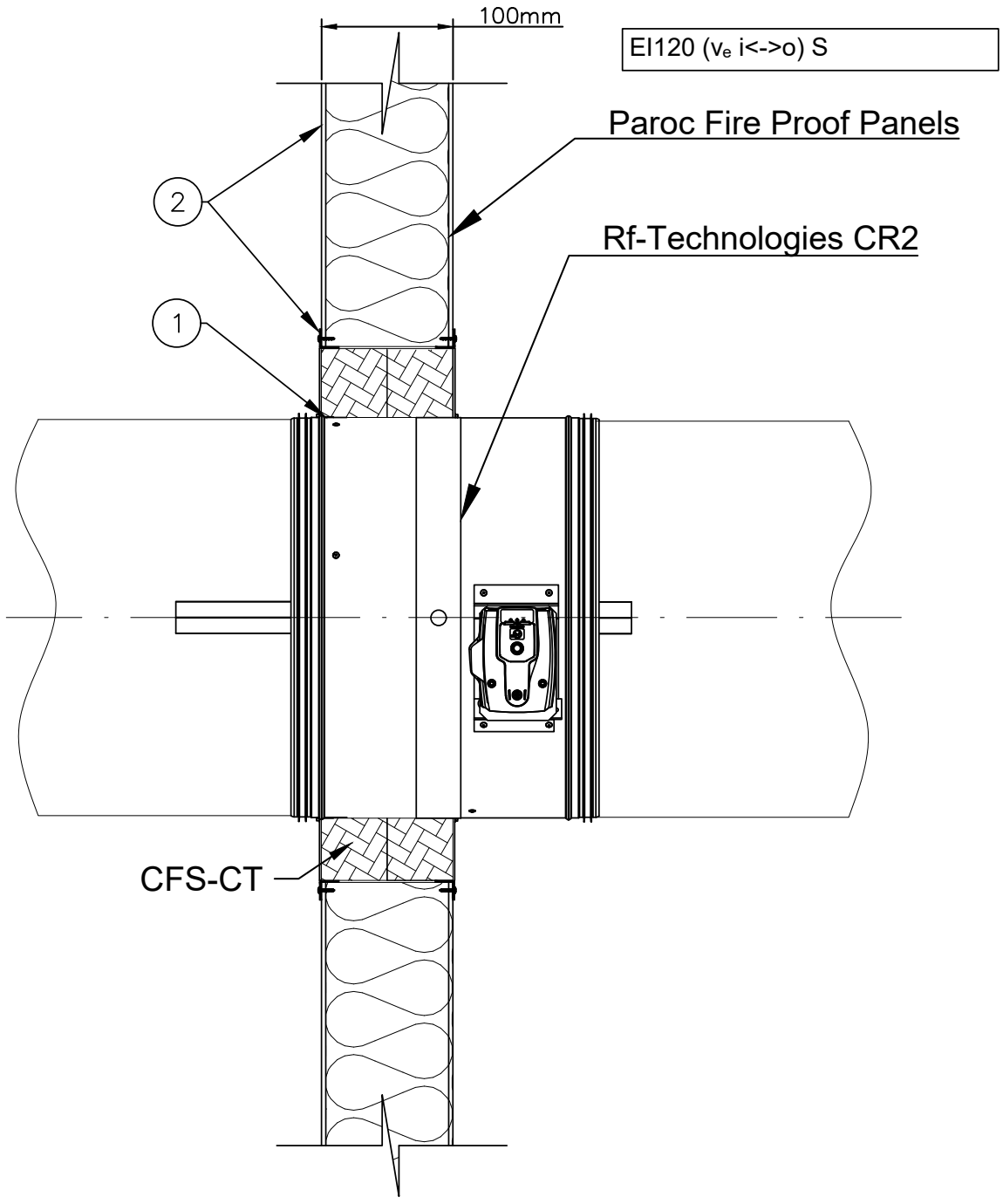

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Classification report 20406J
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product **Firestop Coated Board System CFS-CT**	Construction project
ID CFS-CT_SPW_FD_001	Content Firestop penetration seal for round RF-Technologies fire dampers through Paroc Fire Proof Panels	
Page 02 / Rev 00		

① Installation

Pos	Penetrant	Description/ Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Pipe insulation and / or cable protection	Min. seal depth [mm]
1a	Round dampers	Rf-T CR2	Ø ≤ 630	CFS-CT	≤ 730 X 730	CFS-S ACR to a depth of 10 mm	-	100

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
Applications with CFS-CT 1S 2x50 can only be installed in Paroc AST Sandwich Panels with thickness of 100mm.
Where openings bisect joints in the sandwich panels, the joints must be stitched with self-drilling screws every 150mm to a distance of 600mm on each side of the opening.

Base material	100mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws (MD21Z 5.5x25) every 100mm

③ Infomation about the firestop

RF-Technologies Fire Damper: CR2 Ø ≦ 630
Hilti Firestop Coated Board System CFS-CT
- Application for round fire dampers in single installation

④ Distance

Minimum separation of 75mm between Fire Damper and a construction element
Minimum distance to other openings: 200 mm

⑤ Deflection solution

- RF-Technologies Fire dampers can be installed into sandwich panel walls in accordance with deflection requirements such as DW145.
- The fire damper must be solidarized with the wall by screw-fixing RF-Technologies made-to-measure fixing lugs. Please contact RF-Technologies or your distributor.
- The sealing details between fire damper and wall remain unchanged.
- The connection of galvanized ductwork to the fire damper should be made with breakaway bolts or a flexible joint to allow for movement between the damper and ductwork.

HILTI	Product Firestop Coated Board System CFS-CT	Construction project
ID CFS-CT_SPW_FD_003	Content Firestop penetration seal for single or multiple rectangular Rf-Technologies through Paroc Fire Proof Panels	
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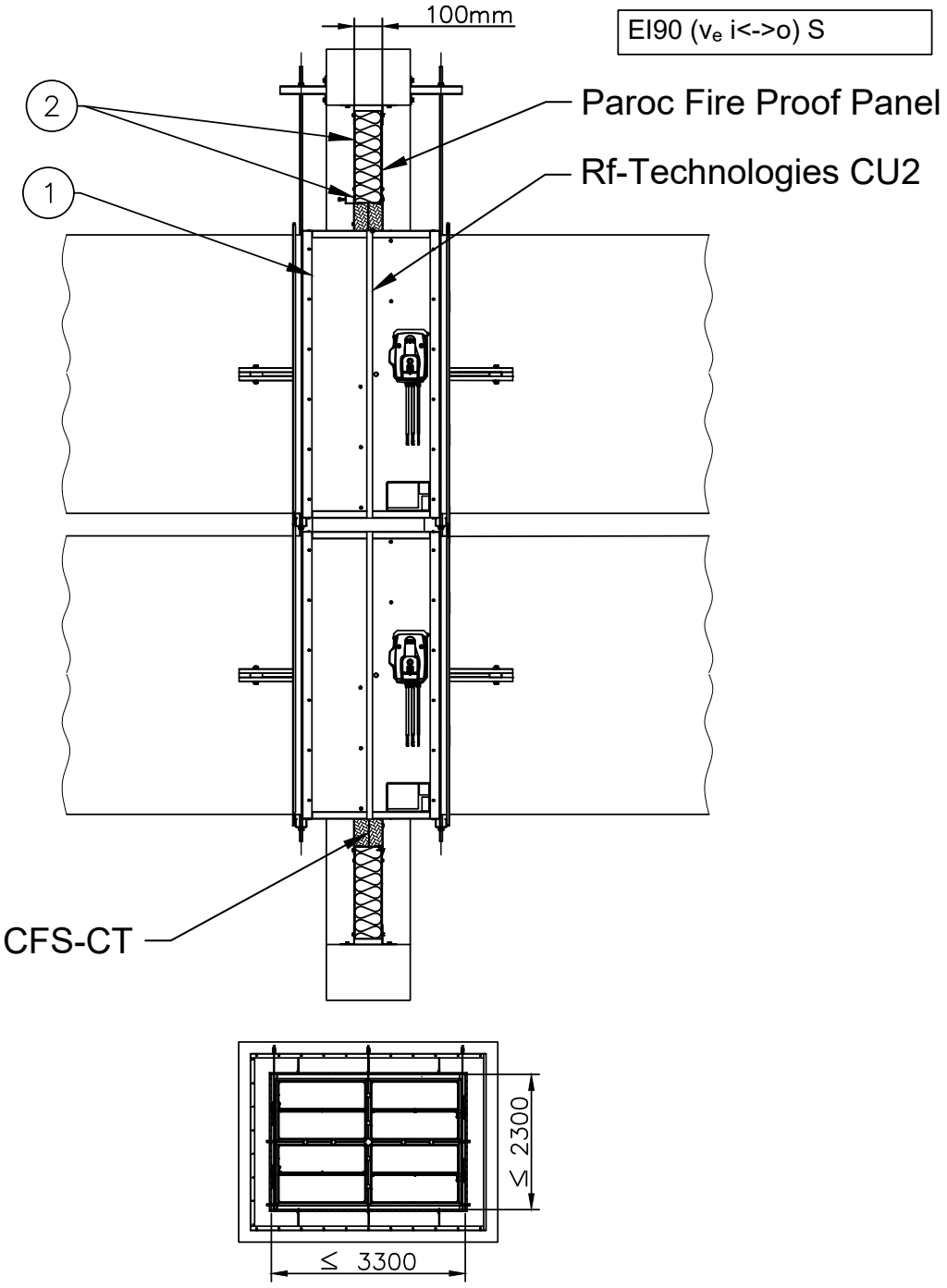

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Classification report 20545B
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product **Firestop Coated Board System CFS-CT**	Construction project
ID CFS-CT_SPW_FD_003	Content Firestop penetration seal for single or multiple rectangular Rf-Technologies through Paroc Fire Proof Panels	
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① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap	Min. seal depth [mm]
1a	Rectangular dampers	Rf-Technologies CU2	Individual damper: 2000 x 1000mm (max 2x2 rectangular dampers with min dist.)	CFS-CT	Maximum 45mm annular space between CFS-CT & damper	CFS-S ACR to a depth of 10 mm	100

② Construction: This Typical is relevant for the following construction material

Fire-resistance criteria for the respective construction materials must be also considered.
Applications with CFS-CT 1S 2x50 can only be installed in Paroc AST Sandwich Panels with thickness of 100mm.
Where openings bisect joints in the sandwich panel, the joint must be stitched with self-drilling screws every 150mm to a distance of 600mm on each side of the opening.

Base material	100mm Paroc Fire Proof Panel AST S, S+, E, F, F+
Aperture Frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws every 100mm. If an opening bisects more than 2 panel joints, install 100mm Paroc Panel System MIT thermo-profiles every 600mm behind the L-angle aperture framing.

③ Infomation about the firestop

Rf-Technologies Fire Damper CU2: 2000 x 1000
Hilti Firestop Coated Board System CFS-CT
- Application for rectangular fire dampers in single and battery installations

④ Distance

Distance between fire damper and construction element: 75mm
Minimum separation of Fire Dampers in separate ducts: 200mm

⑤ Deflection solution

- Rf-Technologies Fire dampers can be installed into sandwich panel walls in accordance with deflection requirements such as DW145.
- The fire damper must be solidarized with the wall by screw-fixing Rf-Technologies made-to-measure fixing lugs. Please contact Rf-Technologies or your distributor.
- The sealing details between fire damper and wall remain unchanged.
- The connection of galvanized ductwork to the fire damper should be made with breakaway bolts or a flexible joint to allow for movement between the damper and ductwork.

STEAL BEAM

HILTI	Product Firestop Blocks CFS-BL	Construction project
ID CFS-BL_SPW_SB	Content Firestop penetration seal for steel beam through Paroc Fire Proof Panels	
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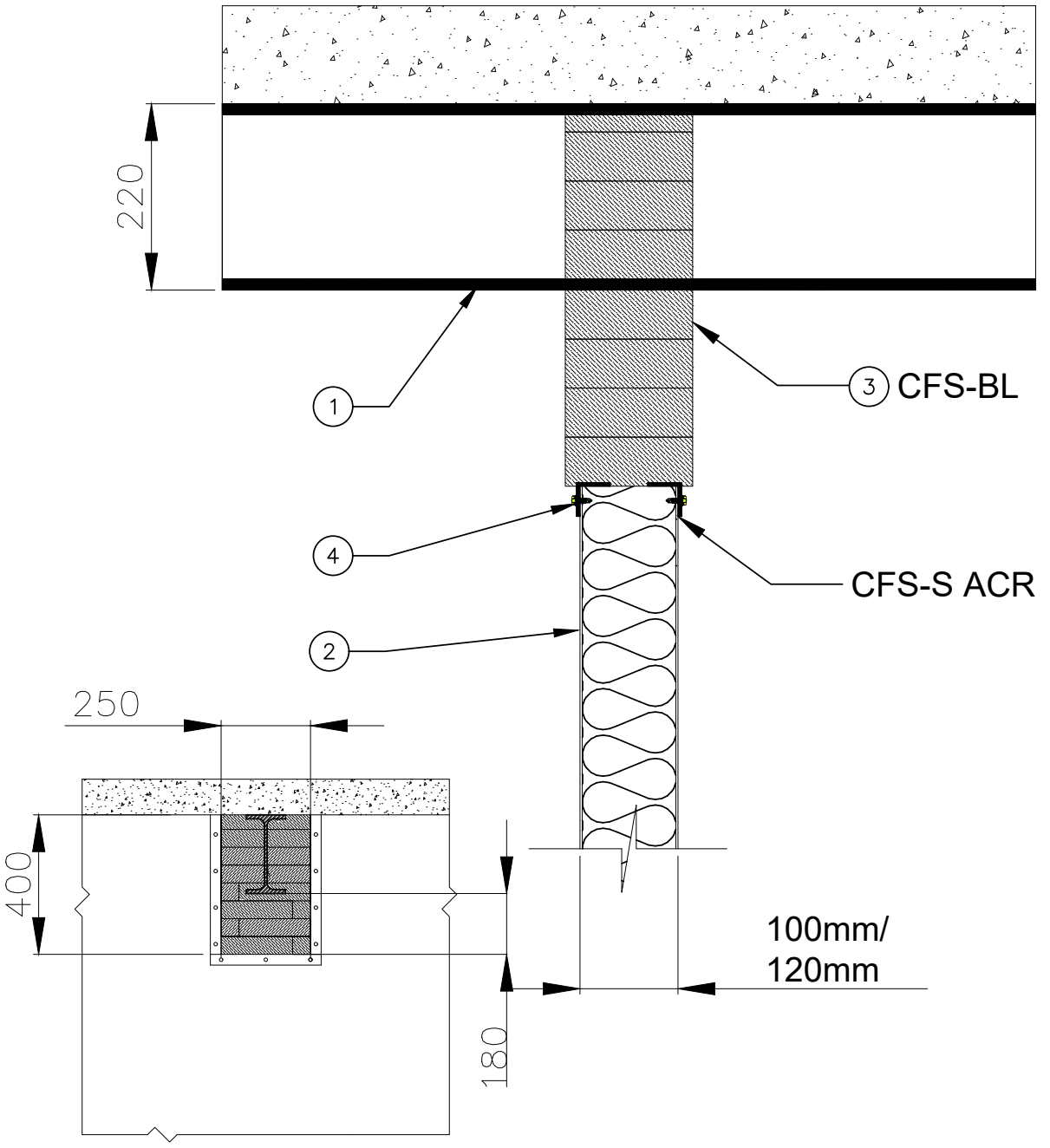
EI60



- European Technical Assessment ETA-13/0099 (CFS-BL)
- Assessment report 20406K
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product Firestop Blocks CFS-BL	Construction project
ID CFS-BL_SPW_SB	Content Firestop penetration seal for steel beam through Paroc Fire Proof Panels	
Page 02 / Rev 00		

① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Min. seal deph [mm]
1.	Steel beam	IPE 220 (fire protected steel beam)	110x220	CFS-BL	≤ 250 x 400	100

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must also be considered.	
Base Material	100/120mm Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E
Aperture frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws (Hilti S-MD21Z 5,5x25) every 100mm.

③ Infomation about the firestop

Hilti Firestop Block CFS-BL
- Application for steel beam with vertical deflection

Service protection:
- Intumescent Paint: Hilti Fire Finish 120+ (dry layer thickness: 5mm)

④ Deflection Solution

1. Ensure opening appropriately dimensioned to accomodate deflection between steel flashing and service penetrations.
2. The maximum recommended vertical compression value for Hilti firestop blocks CFS-BL is 10mm per unit. For a total height of 180mm of blocks underneath the steel beam, the penetrant system can accommodate approximately 40mm. compression of vertical movement.

HILTI	Product Firestop Coated Board System CFS-CT	Construction project
ID CFS-CT_SPW_SB	Content Firestop penetration seal for steel beam through Paroc Fire Proof Panels deflection solution	
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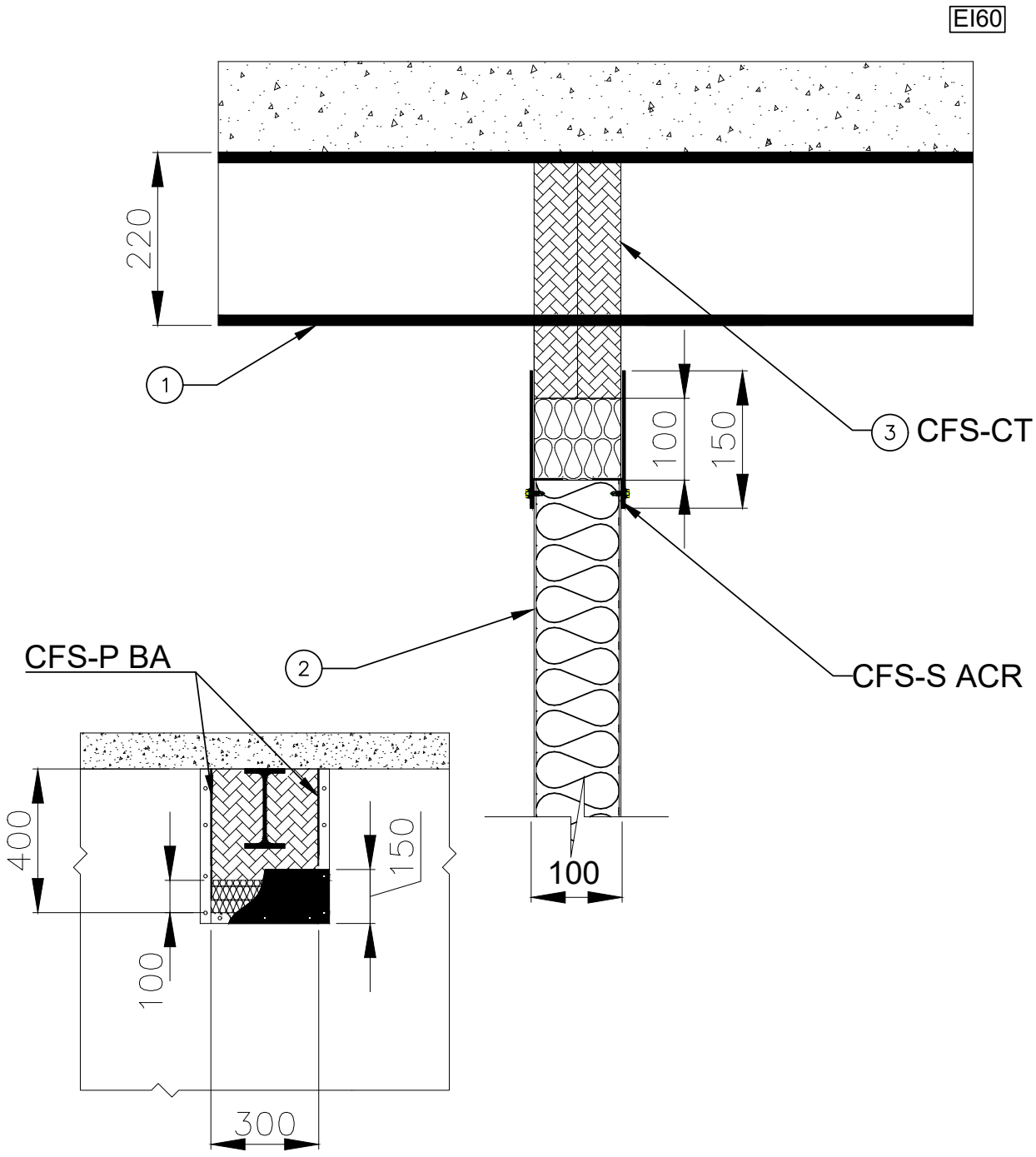

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Assessment Report: 20406I
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product Firestop Coated Board System CFS-CT	Construction project
ID CFS-CT_SPW_SB	Content Firestop penetration seal for steel beam through Paroc Fire Proof Panels deflection solution	
Page 02 / Rev 00		

① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	Opening size [mm]	Min. seal deph [mm]
a	Steel beam	IPE 220 (fire protected steel beam)	110x220	CFS-CT CFS-P BA CFS-S ACR	≤300 x 400	100

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must also be considered. The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.	
Base Material	100mm Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E
Aperture frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws every 100mm

③ Infomation about the firestop

Hilti Firestop Coated Board CFS-CT
- Application for Steel beam

Service protection:
- Intumescent Paint: Hilti Fire Finish 120+ (5mm dry thickness)

Fixing Material:
- Hilti S-MD21Z 5,5x25 self drilling screws for fixing of steel angle 30x30x2

④ Deflection Solution

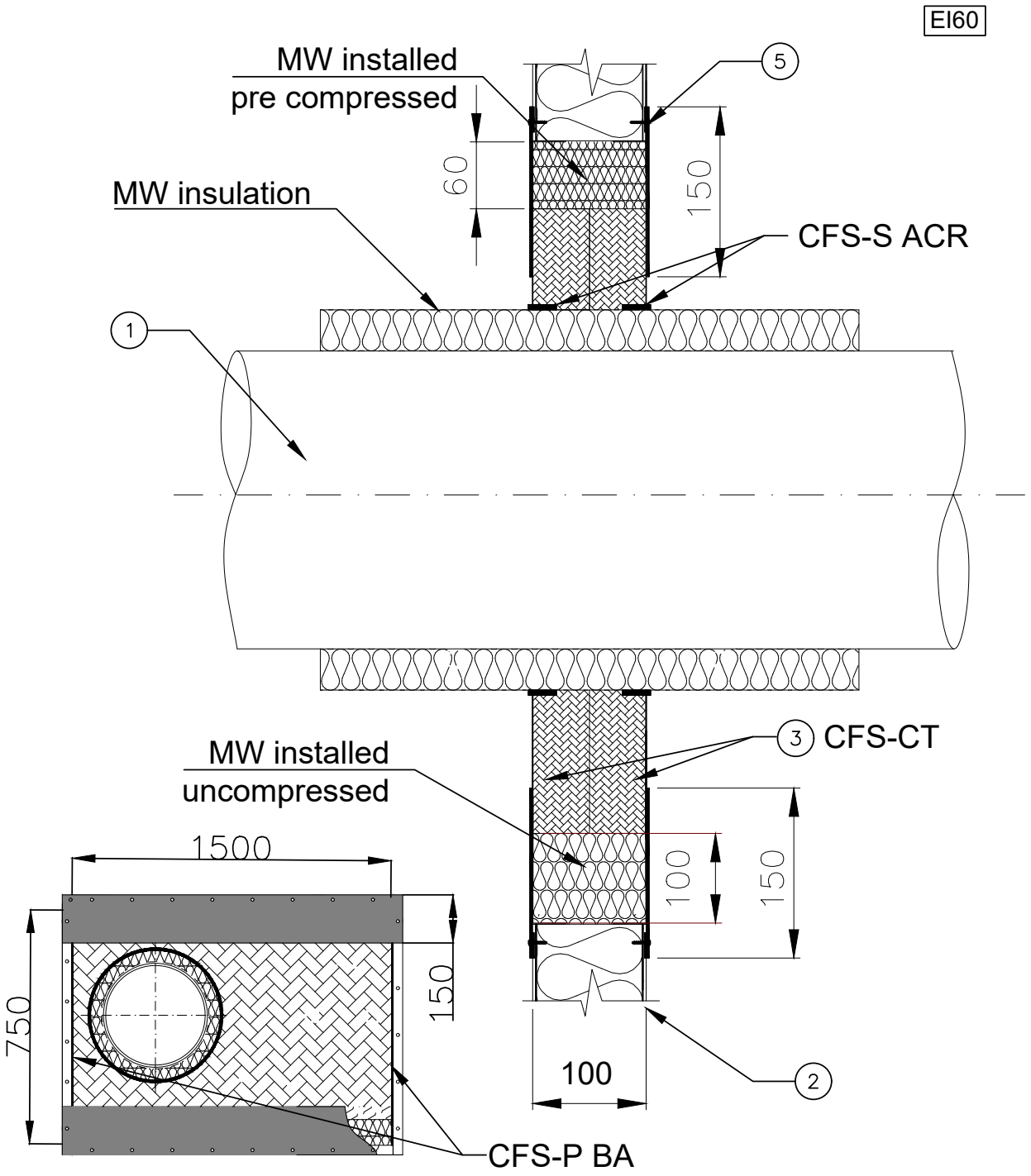
1. Ensure opening appropriately dimensioned to accomodate deflection between steel flashing and service penetrations.
2. Dimension of the opening height so that the distance between the bottom edge of the steel beam and the bottom edge of the opening equals 180mm to allow a vertical movement of 40mm.
3. Install CFS-P BA bandage on the vertical flank (left-/rigth side) of the opening over the entire height.
4. Install mineral wool board CFS-CT (back to back) perfectly fit in opening taking into account a residual opening at the bottom area of 100mm.
5. Install mineral wool with a density of 40kg/m³ slightly compressed from a thickness of 120mm to a thickness of 100mm, to accomodate required movement at bottom area of opening.
6. In this design, the uncompressed MW can achieve up to 40mm compression through vertical movement providing system flexibility without any deformation. Based on the vertical movement value, the height of the layer of MW must be calculated to limit the vertical compression to 50%.
7. Install on both sides 1mm thick and 150mm high metal sheets in the width of the opening including the 30mm wide metal angles, taking into account an overlap at bottom compression area. The CFS-CT mineral wool panel is overlapped to 20mm in the lower area seal.

NOTE 1: For fixing of the metal sheets use the same screws as for the fixing of the 30mm wide angles.

NOTE 2: Prior to the metal plate fixing, the contact area to the 30mm wide sheet metal angles must be sealed with sealant.CFS-S ACR.

SPECIAL SOLUTIONS FOR SERVICE DEFLECTION

	Product Firestop Coated Board system CFS-CT	Construction project
ID CFS-CT_SPW_DEF_NCP_001	Content Firestop penetration seal for non-combustible pipes with non-combustible insulation through Paroc Fire Proof Panels (pipe vertical deflection solution)	
Page 01 / Rev 00		



- European Technical Assessment ETA-11/0429 (CFS-CT)
- Classification Report: 20406D
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in according with Hilti instructions for use

Not to scale
all dimensions in [mm]

A „Typical“ is a preconfigured fire protection solution, consisting of certain components and for certain applications, which is assigned an adopted fire resistance duration. Typicals will be choosen according to its fire resistance duration and are subject to the technical product documentation and the underlying product approvals which will be published by Hilti from time to time, underlying the generic adoption and won't be selected project- or design specific. For this reason the suggested Typicals might not correspond the project- or design specific requirements, and have to be rated by the costumer or an expert ordered by the costumer with regard to the actual project specific design criteria and requirements.

HILTI	Product Firestop Coated Board system CFS-CT	Construction project
ID CFS-CT_SPW_DEF_NCP_001	Content Firestop penetration seal for non-combustible pipes with non-combustible insulation through Paroc Fire Proof Panels (pipe vertical deflection solution)	
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① Installation

Pos	Penetrant	Description/ Type	Dimensions [mm]	Firestop material	Opening size [mm]	Annular gap filler	Pipe insulation and/or cable protection (length)	Min. seal deph [mm]
a	Non combustible (CU / FE) pipes	Copper/Steel	CU ≤ 60 FE ≤ 324	CFS-CT CFS-P BA CFS-S ACR	≤1500 x 750	CFS-S ACR to depth of 25mm	Aluminium-backed mineral wool, insulated continuously through penetration seal T*=40mm, L*≥750mm	100

T* = Insulation thickness, L* = Insulation length

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must also be considered. The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.	
Base Material	100mm Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E
Aperture frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws every 100mm

③ Infomation about the firestop

Hilti Firestop Coated Board
- Application for non combustible pipe with non-combustible (MW) insulation for vertical deflection

④ Distance

First service support: ≤ 250 mm

Distance between openings 200mm

Distance between services [mm]

	Metal Pipes / Pipe Insulation	Seal Edges
Metal Pipes	≥ 100	≥ 50
Seal Edges	≥ 50	≥ 50

⑤ Fixing material

Hilti S-MD21Z 5,5x25 self drilling screws for fixing of steel angle 30x30x2

⑥ Deflection solution

1. Ensure opening appropriately dimensioned to accomodate deflection between steel flashing and service penetrations.
2. Install CFS-P BA bandage on the vertical flank (left-/rigth side) of the opening over the entire height.
3. Install mineral wool board CFS-CT (back to back) perfectly fit in opening taking into account a residual opening at the top of 60mm and at the bottom of 100mm.
4. TOP AREA: Install mineral wool with a density of 40kg/m³ precompressed from a thickness of 120mm compressed to 50% to a thickness of 60mm, placed in the top compression area.
   BOTTOM AREA: Install mineral wool with a density of 40kg/m³ slightly compressed from a thickness of 120mm to a thickness of 100mm, to accomodate required movement at bottom of opening.
5. In this design, the uncompressed MW can achieve up to 40mm compression through vertical movement, accommodated by the release of top compressed MW providing system high flexibility without any deformation.
6. Install on both sides 1mm thick and 150mm high metal sheets across the width of the opening including the 30mm wide metal angles, taking into account an overlap of the upper and lower compression areas. The CFS-CT mineral wool panel is overlapped to 20mm in the lower area and 60mm in the upper area seal.

NOTE 1: For fixing of the metal sheets use the same screws as for the fixing of the 30mm wide angles.

NOTE 2: Prior to the metal plate fixing, the contact area to the 30mm wide sheet metal angles must be sealed with sealant.CFS-S ACR

	Product **Firestop Coated Board system CFS-CT for Pipe deflection**	Construction project
ID CFS-CT_SPW_DEF_NCP_002	Content Firestop penetration seal for non-combustible pipes with combustible insulation through Paroc Fire Proof Panels deflection solution	
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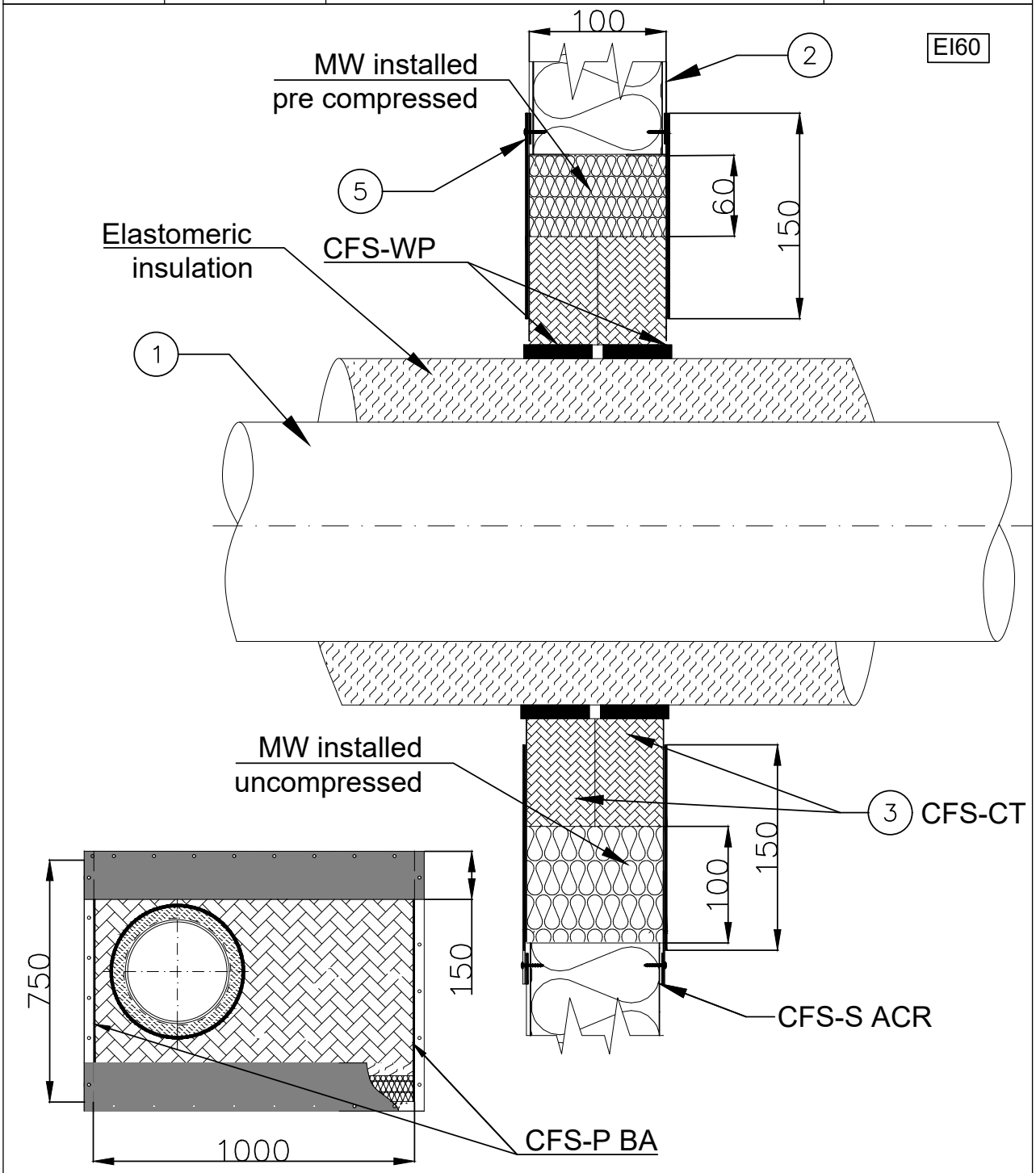

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Test report 20040703-6
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in according with Hilti instructions for use

Not to scale

all dimensions in [mm]

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HILTI	Product **Firestop Coated Board system CFS-CT for Pipe deflection**	Construction project
ID CFS-CT_SPW_DEF_NCP_002	Content Firestop penetration seal for non-combustible pipes with combustible insulation through Paroc Fire Proof Panels deflection solution	
Page 02 / Rev 00		

① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Firestop material	CFS-WP Layer	Opening size [mm]	Annular gap filler	Pipe insulation and/or cable protection (length)	Min. seal deph [mm]
a	Non combustible (CU / FE) pipes	Copper, steel, stainless steel and cast iron	10 < Ø ≤ 60	CFS-W P CFS-CT CFS-P BA CFS-S ACR	2 Layer	≤1000 x 750	CFS-S ACR to depth of 25mm	Continuous foamed elastomeric insulation, T*= 15.5 - 39.5 mm	100
b									
c		Steel, stainless steel and cast iron (U/C)	60 < Ø ≤ 219		3 Layer			Continuous foamed elastomeric insulation, T*= 32 - 50 mm	

T* = Insulation thickness, L* = Insulation length

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must also be considered. The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.	
Base Material	100mm Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E
Aperture frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws every 100mm

③ Infomation about the firestop

Hilti Firestop Coated Board
- Application for non combustible pipe with combustible insulation for vertical deflection

④ Distance

Distance between openings 200mm

First service support: ≤ 250 mm

Distance between services [mm]

	Metal Pipes / Pipe Insulation	Seal Edges
Metal Pipes	≥ 100	≥ 50
Seal Edges	≥ 50	≥ 50

⑤ Fixing material

Hilti S-MD21Z 5,5x25 self drilling screws for fixing of steel angle 30x30x2

⑥ Deflection solution

1. Ensure opening appropriately dimensioned to accomodate deflection between steel flashing and service penetrations.
2. Install CFS-P BA bandage on the vertical flank (left-/rigth side) of the opening over the entire height.
3. Install mineral wool board CFS-CT (back to back) perfectly fit in opening taking into account a residual opening at the top of 60mm and at the bottom of 100mm.
4. TOP AREA: Install mineral wool with a density of 40kg/m³ precompressed from a thickness of 120mm compressed to 50% to a thickness of 60mm, placed in the top compression area.
   BOTTOM AREA: Install mineral wool with a density of 40kg/m³ slightly compressed from a thickness of 120mm to a thickness of 100mm, to accomodate required movement at bottom of opening.
5. In this design, the uncompressed MW can achieve up to 40mm compression through vertical movement, accommodated by the release of top compressed MW providing system high flexibility without any deformation.
6. Install on both sides 1mm thick and 150mm high metal sheets over the width of the opening including the 30mm wide metal angles, taking into account an overlap of the upper and lower compression areas. The CFS-CT mineral wool panel is overlapped to 20mm in the lower area and 60mm in the upper area seal.

NOTE 1: For fixing of the metal sheets use the same screws as for the fixing of the 30mm wide angles.

NOTE 2: Prior to the metal plate fixing, the contact area to the 30mm wide sheet metal angles must be sealed with sealant.CFS-S ACR

HILTI	Product Firestop Coated Board System CFS-CT	Construction project
ID CFS-CT_SPW_MQ	Content Firestop penetration seal for Hilti Installation channels with deflection solution	
Page 01 / Rev 00		

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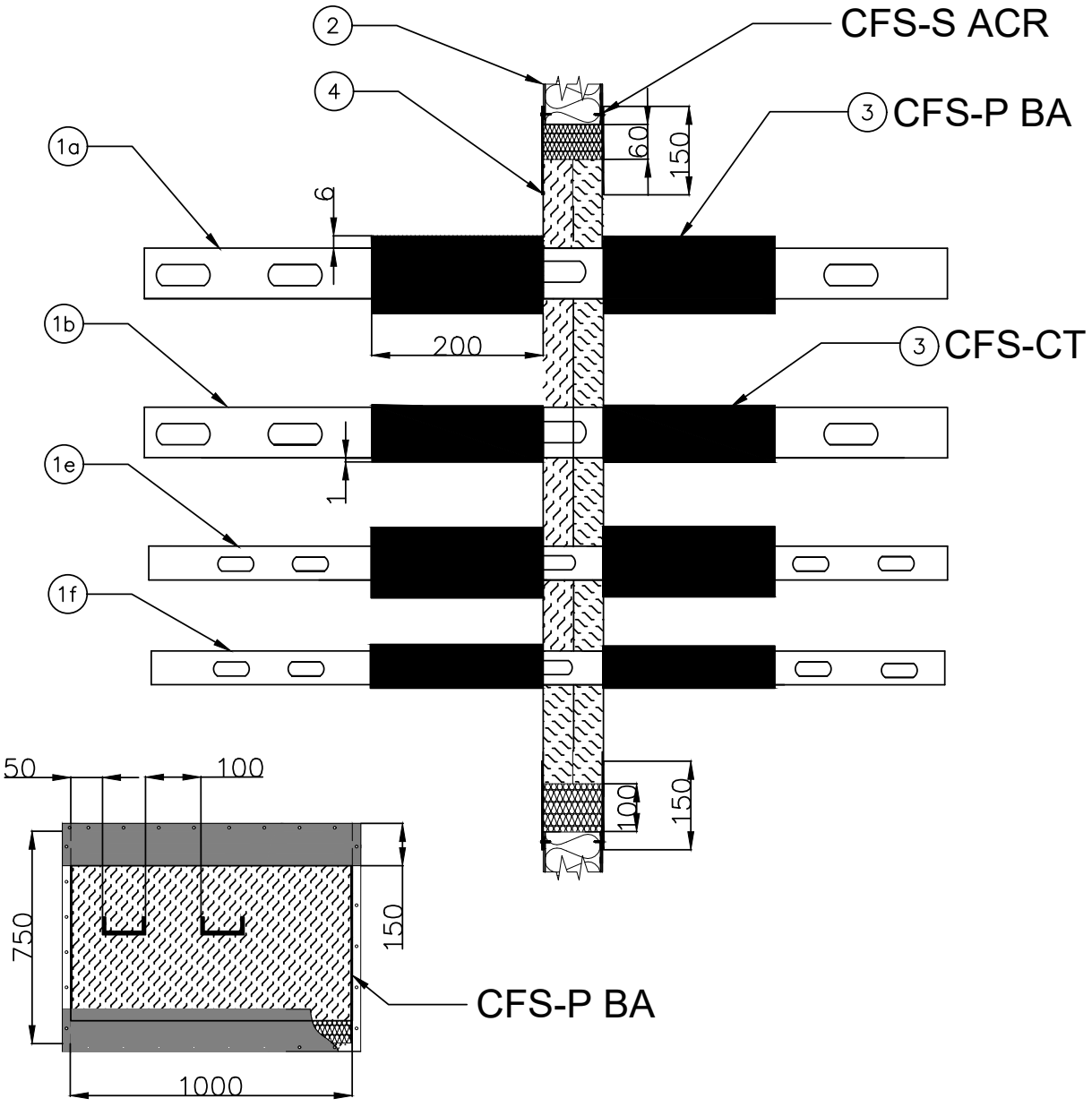

- European Technical Assessment ETA-11/0429 (CFS-CT)
- Assessment Report: 20406I
- Fire reaction class acc. to EN13501-1
- Fire resistance acc. to EN13501-2
- Installation in acccording with Hilti instructions for use

Not to scale
all dimensions in [mm]

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	Product **Firestop Coated Board System CFS-CT**	Construction project
ID CFS-CT_SPW_MQ	Content Firestop penetration seal for Hilti Installation channels with deflection solution	
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① Installation

Pos	Penetrant	Description/Type	Dimensions [mm]	Protection material	Opening size [mm]	Annular gap filler	Min. seal deph [mm]
a	Installation channels	Hilti MQ 41/3	41 x 41mm (Hilti MQ 41/3)	CFS-P BA, 6mm thick, lenght 200mm	≥1500 x 750	CFS-S ACR to depth of 10mm	100
b		Hilti MQ 41/3	41 x 41mm (Hilti MQ 41/3)	CFS-CT, 1mm dry thick, lenght 200mm			
c		Hilti MQ 41D	41 x 82mm (Hilti MQ 41B)	CFS-P BA, 6mm thick, lenght 200mm			
d		Hilti MQ 41D	41 x 82mm (Hilti MQ 41B)	CFS-CT, 1mm dry thick, lenght 200mm			
e		Hilti MM C-30	30 x 30 mm (Hilti MM C-30)	CFS-P BA, 6mm thick, lenght 200mm			
f		Hilti MM C-30"	30 x 30 mm (Hilti MM C-30)	CFS-CT, 1mm dry thick, lenght 200mm			

② Construction: This Typical is relevant for the following construction materials:

Fire-resistance criteria for the respective construction materials must also be considered. The tested wall thickness represents a minimum thickness required for the penetration fire-resistance rating.	
Base Material	100 mm thick Paroc wall AST-S, AST-S+, AST-F, AST-F+, AST-E
Aperture frame	Steel angle (L-shape) 30x30x2mm around perimeter of the opening sealed with CFS-S ACR Sealant between steel angle and wall, and affixed with self-drilling screws every 100mm

③ Infomation about the firestop

Hilti Firestop Coated Board CFS-CT
- Application for Hilti Installation channels

④ Distance

Distance between openings 200mm
First service support: ≤ 250 mm

Distances between services [mm]

	Installation channels	Seal Edges	Other services
Installation channels	≥ 100	≥ 50	≥ 200

⑤ Fixing material

Hilti S-MD21Z 5,5x25 for fixing of steel angle 30x30x2

⑥ Deflection solution

1. Ensure opening appropriately dimensioned to accomodate deflection between steel flashing and service penetrations.
2. Install CFS-P BA bandage on the vertical flank (left-/rigth side) of the opening over the entire height.
3. Install mineral wool board CFS-CT (back to back) perfectly fit in opening taking into account a residual opening at the top of 60mm and at the bottom of 100mm.
4. TOP AREA: Install mineral wool with a density of 40kg/m³ precompressed from a thickness of 120mm compressed to 50% to a thickness of 60mm, placed in the top compression area.
   BOTTOM AREA: Install mineral wool with a density of 40kg/m³ slightly compressed from a thickness of 120mm to a thickness of 100mm, to accomodate required movement at bottom of opening.
5. Install from both sides 1mm thick and 150mm high metal sheets in the width of the opening including the 30mm wide metal angles, taking into account an overlap of the upper and lower compression areas.
   The CFS-CT mineral wool panel is overlapped to 20mm in the lower area and 60mm in the upper area seal.

NOTE 1: For fixing of the metal sheets use the same screws as for the fixing of the 30mm wide angles.

NOTE 2: Prior to the metal plate fixing, the contact area to the 30mm wide sheet metal angles must be sealed with sealant.CFS-S ACR.

Design your passive fire protection with Hilti: Our Firestop Specialists are available to help – from first draft to detailed planning and building permit to installation and final inspection.

You will find our fire protection solutions as 2D and 3D BIM objects in the extensive Hilti BIM/CAD library.

Our technical library provides you with comprehensive documentation. To simplify the design work you can, for example, download 2D product drawings and documents such as approvals, specifications and tendering templates.

Your Hilti advantage: Hilti Fire Protection Experts will also be happy to support you in person. Just ask your Hilti Team about it.

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