TECHNICAL DATA SHEET

Date: 30/07/2025
Rev.: 0
Prepared by: PP
Checked by: HKE
European approvals:
ETA No: 25/0236 Penetration Seals
DoP No.: FS/PP/FSG - 30/07/2025
CE 2821

FIRESAFE / FSG

Firestop Graphite for Penetration Seals

PRODUCT DESCRIPTION

FIRESAFE / FSG is a graphite-based fire-rated sealant that expands when exposed to heat, creating a fireproof and smokeproof barrier to adjacent rooms.

Scan QR code for detailed information

Fire resistance
≤ 240 minutes

Acoustic insulation
Rw ≤ 55 dB

Lifespan
25 years

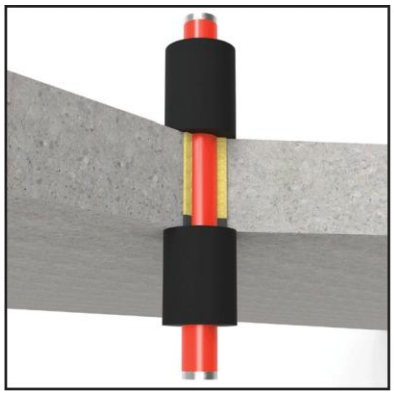
Paintable
After 24 hours

PROPERTIES
✓ Fire resistance ≤ 240
✓ CE marked
✓ High acoustic insulation properties
✓ Environmentally friendly and user-friendly
✓ Quick and easy installation
✓ Primer is generally not needed
✓ Quick drying
✓ Halogen-free
✓ Paintable after 24 hours
✓ Minimum 25-year product lifespan

AREA OF USE
✓ Masonry and cast wall constructions, density ≥ 350 kg/m³
✓ Masonry and cast deck constructions, density ≥ 400 kg/m³
✓ Insulated and non-insulated plaster walls ≥ 100 mm
✓ Fire sealant for cables and cable bundles
✓ Fire sealant for cable trays and cable risers
✓ Fire sealant for plastic pipes
✓ Fire sealant for multilayer pipes
✓ Fire sealant for metal pipes with flammable pipe insulation
✓ In combination with FIRESAFE FSB1 and FSB2 Boards
✓ In combination with FIRESAFE FSP fire paint

Packaging

FIRESAFE / FSG	Contents	Box	Pallet	Pallet	Item no.
Plastic cartridge	310 ml	12 pcs.	128 boxes	1536 pcs.	100.203
Sausage	300 ml	18 pcs.	98 boxes	1764 pcs.	100.204



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1. Technical data

FIRESAFE / FSG - Cartridge - 310 ml	EAN code 7070800102290
FIRESAFE / FSG - Sausage - 300 ml	EAN code 7070800102313
Condition	Ready-to-use, water-based sealant
Colour	Dark grey (may darken after curing)
Shelf life	24 months in unopened packaging at temperatures between +5°C and +30°C
Storage temperature during transport	+5 °C to +30 °C
Temperature during application	+5 °C to +30 °C
Permanent temperature resistance	-15 °C to +75 °C (after curing completed)
Drying time (visual)	Max. 30 minutes
Non-adhesive	Max. 60 minutes
Fully cured	3 to 5 days depending on thickness and temperature
Specific gravity	1.50 - 1.60 g/cm^3
Expansion temperature	Starts at approx. +150°C
Usage category [1)]	Type Z_2 in accordance with EAD 350454-00-1104
Paintable [2)]	Yes
Can be installed from 1 side	Yes
Airtight and smokeproof	Yes, in accordance with S_a and S_{200} NEN 6075
Acoustic properties	12mm depth + 15mm backing material: $R_{S,W}$ (C;C_{tr}) = 55 (-2; -9) dB and $R_{s,\,max,w}$ (C;C_{tr}) = 58 (-5 ; -13) dB
Reaction to fire	Class E in accordance with EN 13501-1
Certification / fire resistance	Classification in accordance with EN 13501-1/2
VOC content	< 1 g/l
European approvals	ETA 25/0236. Penetration Seals
Test standards	EN 1366-3. Penetration Seals
Compatibility	Suitable for use with most materials
Product lifespan	Minimum 25 years

1) Permitted environmental conditions
Duct sealant for use in conditions with < 85% RH, with protection against temperatures below 0 °C, and with no exposure to rain or UV (TR 024, type Z_2). Indoor environments.

2) Paintable
FIRESAFE / FSG can be painted with most water-based paints.

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2. Acoustic properties

FIRESAFE / FSG has been tested in accordance with EN ISO 10140-2.

A higher degree of noise insulation can be achieved using deeper or double-sided sealing, or through the use of a backing material. The noise insulation value only applies to the sealant and not to the other elements of the construction.

✓ For single-sided sealant, 12 mm depth, 15 mm backing material: R_W = 55 dB.

3. Installation instructions

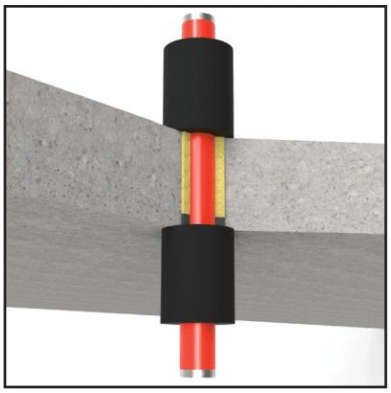
Ensure that the penetration and gap are cleared of any dust, debris, or grease. Apply moisture to absorbent materials if necessary.

Even out the joint with a damp grouting tool.

Apply a generous amount of FIRESAFE / FSG at the opening to prevent air bubbles from forming[1)].

Fill out the fire resistance label and glue it next to the fire seal.

[1)] When using a backing material, ensure that it is cut slightly wider than the aperture itself.



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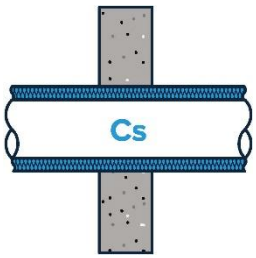
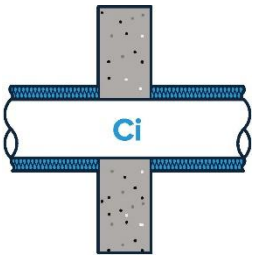
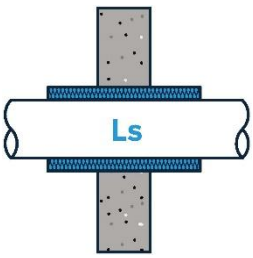
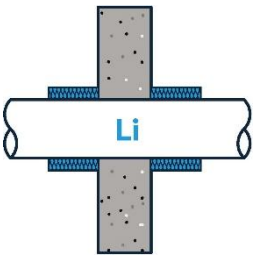
4. Usage table. Usage table per 310 ml. Joint - metre per pack m[1]

Joint width	10 mm	15 mm	20 mm	25 mm	30 mm	40 mm	50 mm	60 mm	80 mm	100 mm
Joint depth 12.5 mm	2.45 m[1]	1.65 m[1]	1.20 m[1]	1.00 m[1]	0.80 m[1]	0.60 m[1]	0.50 m[1]	0.40 m[1]	0.30 m[1]	0.25 m[1]
Joint depth 15 mm	2.05 m[1]	1.35 m[1]	1.00 m[1]	0.80 m[1]	0.65 m[1]	0.50 m[1]	0.40 m[1]	0.30 m[1]	0.25 m[1]	0.20 m[1]
Joint depth 25 mm	1.20 m[1]	0.80 m[1]	0.60 m[1]	0.50 m[1]	0.40 m[1]	0.30 m[1]	0.25 m[1]	0.20 m[1]	0.15 m[1]	0.10 m[1]

5. Pipe insulation (Configuration)

As different insulations serve different purposes, they may be placed around pipes in various configurations.
This must be taken into account when applying FIRESAFE / FSG around these pipes. Possible configurations are shown below:

1. Continuous pipe insulation		2. Local pipe insulation	
Cs: Continuous pipe insulation, on both sides, also in the penetration itself.	**Ci:** Continuous pipe insulation, on both sides, excluding the penetration itself.	**Ls:** Pipe insulation in the specified length locally on both sides, also in the penetration itself.	**Li:** Pipe insulation in the specified length locally on both sides, excluding the penetration itself .
			

6. Permitted pipe insulation materials

FIRESAFE / FSG is a product that expands when exposed to heat. FIRESAFE / FSG has undergone extensive testing with a variety of insulation materials. The table below shows the insulation materials that are permitted.

Insulation types	Pipe types	Permitted Elastic pipe insulation	
Elastic pipe insulation Fire class BL-s1,d0 to B-s3,d0 or DL- s3,d0 in accordance with EN 13501-1.	✓ Multilayer pipes ✓ Copper pipes ✓ (Stainless) steel pipes	✓ AF/Armaflex ✓ SH/Armaflex ✓ Kaiflex ST ✓ Kaiflex KK Plus s2	✓ K-Flex EC ✓ K-Flex ST ✓ K-Flex EC AD ✓ K-Flex ST/SK ✓ K-Flex ST Frigo ✓ K-Flex SRC
PIR/PUR insulation Fire class E in accordance with EN 13501-1	✓ Copper pipes ✓ (Stainless) steel pipes ✓ Cast iron pipes	✓ Insul-Phen ✓ Insul-Pirplus ✓ Insul-Pir 33 ✓ Kingspan Tarecpir M1	✓ Kingspan Tarecpir B2 ✓ Kingspan Tarecpir CR ✓ Kingspan Tarecpir HT ✓ Kingspan Tarecpir HD ✓ Kingspan Kooltherm FM
Various thermal insulation options Fire class Cl-s1-d0. In accordance with EN 13501-1	✓ Multilayer pipes	✓ PE foam	

Insulation materials must possess at least the same fire resistance as tested in accordance with EN 13501-1.

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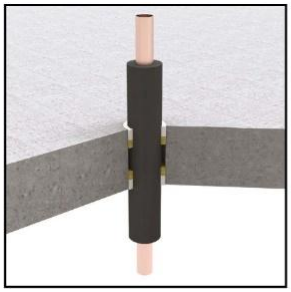
7. Fire safety performance for pipe penetrations

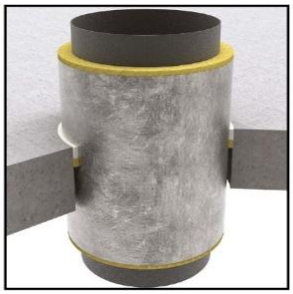
Installation penetrations in light partition plaster, masonry, cast walls and floors.

Type of installation	Size Ø [mm]	Insulation type	Construction				Rating in minutes
			FW-100 and MW-100	SW-30	MW-150	MV-150	
Plastic pipes	≤ 50	Non-insulated		✓			EI 45. U/U
	≤ 110				✓		EI 240. U/C
	≤ 160		✓		✓	✓	EI 120. U/C
					✓		EI 180. U/C
Plastic pipe with cables	≤ 110		✓		✓	✓	EI 120. U/C
Fibre-reinforced composite pipes	≤ 90		✓		✓		EI 60. C/U
		Elastic	✓		✓		
	≤ 16	Non-insulated		✓			EI 60. C/U
Multilayer pipes	≤ 32, max. 2 pcs.	Non-insulated		✓			EI 90. C/U
		PE foam		✓			EI 45. C/U
	≤ 32	PE foam	✓		✓	✓	EI 120. U/C
	≤ 40	Non-insulated	✓		✓	✓	
	≤ 75	Elastic	✓		✓	✓	EI 90. C/U
Copper, cast iron, and steel pipes	≤ 60.3	Non-insulated	✓		✓	✓	EI 90. C/U
	≤ 114.3	Elastic	✓		✓	✓	
		Phenolic	✓		✓		EI 60. C/U
	≤ 219.1	PIR	✓		✓		EI 120. U/C
Gas pipe	≤ 60.3	Multitherm Bandage [1]	✓		✓		
Air conditioning pipe	≤ 70	PE foam	✓				

[1] Multitherm Bandage on pipe. Length 75 - 150 mm out on each side of the construction. See ETA 25/0236

FW-100: Light partition wall. Plaster walls with a thickness of ≥ 100 mm.
MW-100: Masonry and cast wall constructions, thickness ≥ 100 mm. Density 350 kg/m^3.
MW-150: Masonry and cast wall constructions, thickness ≥ 150 mm. Density 350 kg/m^3.
MV-150: Masonry and cast wall constructions, thickness ≥ 150 mm. Density 400 kg/m^3.
SW- 30: Shaft wall consisting of two layers of plaster, 15 mm type F, fire-rated plaster in accordance with EN 520, or a sheet of calcium silicate with the same thickness. The shaft wall may be fitted with or without wall insulation.





See next page. Permitted: Plastic pipes, - Fibre-reinforced composite pipes, - Multilayer pipes, - Permitted elastic insulation types

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8. Permitted plastic pipes, - fibre-reinforced composite pipes, - noise-insulated pipes, - multilayer pipes, - cellular rubber insulation

Permitted plastic pipes (or equivalent)	Permitted fibre-reinforced pipes (or equivalent)
✓ PE(-HD), PE-X, ABS, SAN+PVC, PP, PVC(-U/-C) pipes	✓ Aquatechnik Fusio PP-R 80, Aquatechnik Fusio PP-RCT, ✓ Aquatherm Blue-S, Aquatherm Blue-MF, Aquatherm Red-MF, ✓ Aquatherm Green-MF, Aquatherm Green-MS, ✓ Aquatherm Green-S, Aquatherm Lilac-S, Aquatherm Grey-MS and Aquatherm Orange M, ✓ Bänninger PP-R, Bänninger Climatec PP-RCTen Bänninger Watertec PP-RCT
Permitted noise dampening plastic pipes (or equivalent)	**Permitted cellular rubber-type elastic insulation (or equivalent)**
✓ Coes PhoNoFire, Coestilen BluePower, Geberit Silent PP, Geberit Silent dB 20 ✓ Girpi Friaphon, Marley Silent, Pipelife Master 3, PhonEX AS ✓ Poloplast POLO-KAL NG, Poloplast POLO-KAL 3S, Skolan dB, Raupiano Plus ✓ Valsir Triplus, Wavin SiTech+, Wavin AS, DykaSono, Uponor Decibel	✓ Reaction to fire class ≤ B-s1, d0 - e.g. ArmaFlex Ultima, Kaiflex KK Plus S1 ✓ Reaction to fire class ≤ B-s2, d0 - e.g. ArmaFlex AF EVO, Kaiflex KK Plus S2 / ST, K-Flex ST ✓ Reaction to fire class ≤ B-s3, d0 - e.g. ArmaFlex AF / XG / SH, K-Flex H ✓ Reaction to fire class ≤ C-s2, d0 - e.g. Kaiflex HT S2 ✓ Reaction to fire class ≤ D-s3, d0 - e.g. ArmaFlex NH / SH / HT ✓ The insulation may also have the classifications BL, CL, or DL (linear insulation).
Permitted multilayer pipes (or equivalent)	
✓ Alpex DUO, Valsir Pexal, Valsir Mixal and APE Plain (PE-Xb/AL/PE-Xb) ✓ Geberit Mepla and Uponor Unipipe (PE-RT/AL/PE-RT) ✓ Henco and Uponor (PE-Xc/AL/PE-Xc) ✓ Uponor, REHAU (PE-Xa) and REHAU (PE-Xc) ✓ SP Superpipe and POLYGON PEX (PE-X/AL/PE-X) ✓ Valsir Pexal and Valsir Mixal (PE/AL/PE-Xb) ✓ Wavin Tigris, Protecta-Line System and Alpex F50 Profi (PE-X/AL/PE)	

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9. Fire safety performance for cable penetrations

Installation penetrations in light partition plaster, masonry, cast walls and floors.

Cable (trays)	Size Ø [mm]	Construction				Rating in minutes
		FW-100/ MW-100	SW-30	MW-150	MV-150	
Cable trays	All			✓		**EI 180**
Cables	≤ 14		✓			**EI 90**
	≤ 21			✓		**EI 180**
	≤ 25	✓		✓	✓	**EI 60**
Cable bundles	≤ 100	✓		✓	✓	
				✓		**EI 90**
Plastic pipe with cable(s)	≤ 16	✓		✓	✓	**EI 60. U/U**
Plastic pipe in bundle with cables	≤ 16, max. 8 pcs.	✓		✓	✓	**EI 90. U/U**
Plastic pipe in bundle with cables	≤ 19, max. 2 pcs.		✓			**EI 90. U/U**
Plastic pipe in bundle with cables	≤ 25, max. 2 pcs.		✓			**EI 45. U/C**

FW-100: Light partition wall. Plaster walls, thickness ≥ 100[mm].
MW-100: Masonry and cast wall constructions, thickness ≥ 100 [mm]. Density 350 kg/m^3.
MW-150: Masonry and cast wall constructions, thickness ≥ 150 [mm]. Density 350 kg/m^3.
MV-150: Masonry and cast covering constructions, thickness ≥ 150 [mm]. Density 400 kg/m^3.
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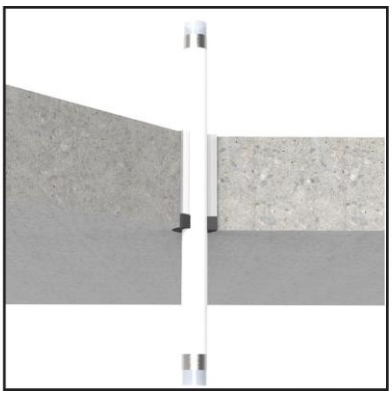

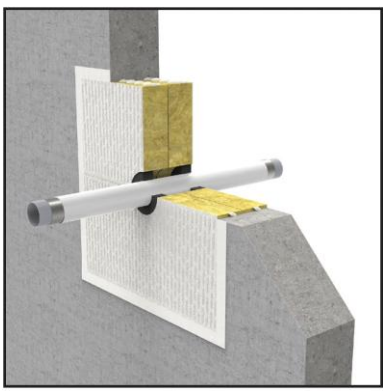

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10. Fire sealant in electrical rooms

FIRESAFE / FSG is a fire-rated sealant that expands when exposed to heat and has been tested in accordance with EN 1366-3 in concrete floors with a thickness of at least 150 mm. Penetrations for electrical installations are easy to seal with fireproofing using FIRESAFE / FSG. A number of common penetrations are listed in the table below. Always check ETA 25/0036 for the proper application and fire resistance.

Electrical cabinets	Size Ø [mm]	FIRESAFE / FSG	Type of penetration		Backing material	MV-150	Rating in minutes
			Yes	No			
Cables d	≤ Ø 25 mm	Sealant at floor base	✓	✓	25 mm ceramic fibre 128 kg/m³		**EI 60**
	≤ Ø 21 mm	Sealant at floor top	✓	✓	Rock wool	✓	**EI 120**
Cable bundle d with cable	≤ Ø 80 mm (≤ Ø 21 mm pc.)	Sealant at floor base	✓	✓	25 mm ceramic fibre		**EI 120**
		Sealant at floor top	✓	✓	Rock wool	✓	
Corrugated electrical conduits made from plastic d	≤ Ø 50 with cable (≤ Ø 21 mm pc.)	Sealant at floor base	✓	✓	25 mm ceramic fibre 128 kg/m³	✓	**EI 90. U/U**
		Sealant at floor top	✓	✓	Rock wool	✓	**EI 120. U/C**
Multilayer pipes d	≤ Ø 40	Sealant at floor base	✓	✓	25 mm ceramic fibre	✓	
		Sealant at floor top + Multitherm Bandage [1]	✓	✓	Rock wool	✓	
Multilayer pipes, PE insulation d	≤ Ø 32	Sealant at floor top	✓	✓	Rock wool	✓	
Copper, cast iron, and steel pipes d	≤ Ø 35	Sealant at floor base + Multitherm Bandage [1]	✓	✓	25 mm ceramic fibre 128 kg/m³	✓	**EI 60. U/C**
		Sealant at floor top + Multitherm Bandage [1]	✓	✓	Rock wool	✓	**EI 120. U/C**

[1] Multitherm Bandage on pipe. Length 75 - 150 mm out on each side of the construction. See ETA 25/0236

MV-150: Solid floor, thickness 150 mm. Ø [mm] Diameter of penetration

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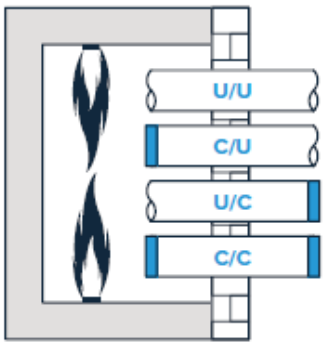
11. Explanation of abbreviations for pipe ends (cf. EN 1366-3: 2021).

Instructions:



The test configuration will determine the use of pipes. Before a type of pipe undergoes testing, the intended use of the pipes must be taken into account. Where will the plastic pipes be used in practice?

Test standard EN 1366-3 provides requirements for this. This will decide whether or not the pipe must be capped. See the test configuration in **Table 1** for flammable plastic pipes and **Table 2** for metal pipes.

During fire testing, the ends of the pipe and fire sealing systems must be tested to determine whether the pipes must be capped at one or both ends, or kept fully uncapped in the building. Pressure, smoke, and hot gases must not be able to pass through the pipes or fire sealing systems in the event of a fire.

Table 1 - Test configuration for plastic pipes

Test setup	Pipe end		Permitted use			
	In oven	Outside of oven	U/U	C/U	U/C	C/C
U/U	Uncapped	Uncapped	✓	✓	✓	✓
C/U	Capped	Uncapped	X	✓	✓	✓
U/C	Uncapped	Capped	X	X	✓	✓
C/C	Capped	Capped	X	X	X	✓

*** U/U tested, covers all pipe ends.**

Table 2 - Test configuration for metal pipes

Test setup	Pipe end		Permitted use		
	In oven	Outside of oven	U/C	C/U	C/C
U/C *	Uncapped	Capped	✓	✓	✓
C/U	Capped	Uncapped	X	✓	✓
C/C	Capped	Capped	X	X	✓

*** U/C tested, also covers U/U.**

FIRESAFE / FSG

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Plastic pipes

Table H.1 on the next page displays some examples of pipes and intended uses where the end of the pipe is capped or not. The table cannot take all possible usage options into account. When deciding whether to cap the end of the pipe or to let it remain uncapped, several factors must be considered: is the system under pressure, and is the system ventilated?

Consider the service type of the pipe to determine whether it should be capped. If national regulations provide other requirements than those given in table H1, then these regulations shall apply.

12. Testing of plastic pipe configurations adapted for the type of service

Table H.1. Plastic pipes

Pipe type, type of service	Pipe end		Test setup
	In oven	Outside of oven	
Rainwater drainage	Uncapped	Uncapped	**U/U**
Sewage, ventilated	Uncapped	Uncapped	**U/U**
Sewage, non-ventilated	Uncapped	Capped	**U/C**
Gas pipes, drinking water pipes, hot water pipes	Uncapped	Capped	**U/C**
Capped pipe systems with permanent water pressure, water supply	Capped	Capped	**C/C**

Pipe ends C/U or U/C apply to wastewater pipes with a water trap in accordance with table H.1 in EN 1366-3.
Pipe ends C/C apply to pipes with permanent water pressure, e.g., pipes for hot and cold water supply following table H.1 in EN 1366-3.

Non-flammable metal pipes

Metal pipes are usually capped in the testing oven. As the metal will not melt away, it is assumed that there will not be an open end on the pipes in the event of a fire. It is therefore assumed that the suspension system will remain in place. If the pipes are supported by a suspension system that does not have a fire resistance, or if there are waste chutes, the metal pipes will not be capped in the testing oven, as shown in table **H.2**.

Table H.2. Metal pipes or non-flammable pipes

Pipe type, type of service	Pipe end		Test setup
	In oven	Outside of oven	
Service support – fire rated suspension system [a]	Capped	Uncapped	**C/U**
Service support – suspension system without fire resistance	Uncapped	Capped	**U/C**
Chute for waste disposal	Uncapped	Capped	**U/C**
[a] must be documented via fire testing or calculations (e.g. Euro codes)			

13. Requirements for the properties of structural components

Flexible plaster walls

The minimum thickness for walls must be 75 mm, and the wall must consist of steel or wood studs* with at least 2 layers of plaster cladding on each side, thickness 12.5 mm.

Masonry – cast walls

The minimum thickness for walls is 75 mm and the wall must consist of concrete, aerated concrete, or masonry with a density of at least 350 kg/m^3 or timber (CLT) with a density of at least 400 kg /m^3.

Masonry – cast floors or CLT

The minimum thickness for floors is 150 mm and the wall must consist of concrete, aerated concrete, or masonry with a density of at least 400 kg/m^3 or timber (CLT) with a minimum thickness of 140 mm and a density of at least 400 kg /m^3.

* There must be a distance of at least 100 mm from each part of the penetration joint to the three studs, and the aperture between the penetration joint and the studs must be covered. The gap between the penetration joint and the studs must be fitted with at least 100 mm of insulation with fire classification A1 or A2 (in accordance with EN 13501-1).
The construction must be classified in accordance with EN 13501-2 for the specified fire resistance.

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Firestop Graphite for Penetration Seals

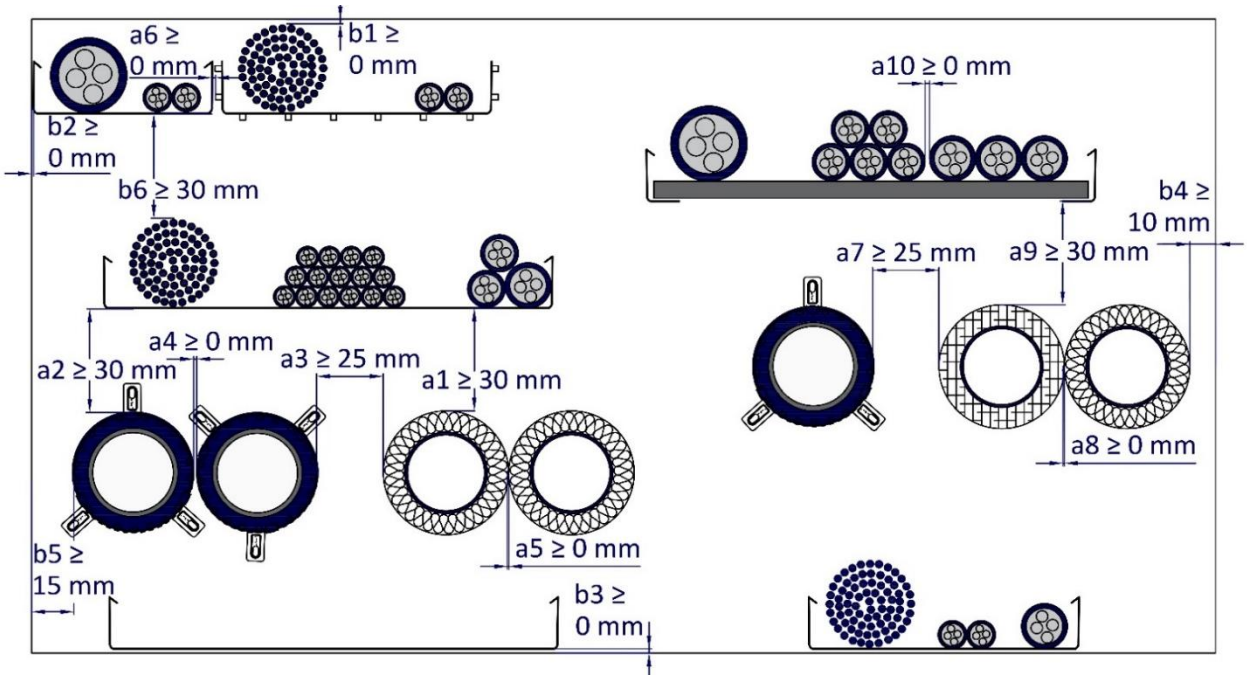
TECHNICAL DATA SHEET

Date: 30/07/2025
Rev.: 0
Prepared by: PP
Checked by: HKE
European approvals:
ETA No: 25/0236 Penetration Seals
DoP No.: FS/PP/FSG - 30/07/2025
CE 2821

14. Distances

Mixed penetration seals, mutual distances and distances to recess edges.
Alternatively, distances between single penetrations and distances to recess edges. See table and figure.

Figure no.	Type of installation	Distance [mm]
a1	Distance between cables / cable trays and metal pipes.	≥ 30
a2	Distance between cables / cable trays and plastic pipes.	≥ 30
a3	Distance between metal pipes and plastic pipes.	≥ 25
a4	Distance between plastic pipes.	≥ 0
a5	Distance between metal pipes with non-flammable insulation.	≥ 0
a6	Horizontal distance between cable trays.	≥ 0
b6	Vertical distance between cable trays and other installations.	≥ 30
a7	Distance between plastic pipes and pipes with flammable insulation.	≥ 25
a8	Distance between pipes with non-flammable insulation and pipes with flammable insulation.	≥ 0
a9	Distance between cables / cable trays and pipes with flammable insulation.	≥ 30
a10	Distance between pipes stacked together or assembled in rows.	≥ 0
b1	Distance between cables / cable trays and upper seal edge.	≥ 0
b2	Distance between cables / cable trays and side seal edge.	≥ 0
b3	Distance between cables / cable trays and bottom seal edge.	≥ 0
b4	Distance between metal pipes and all seal edges.	≥ 10
b5	Distance between plastic pipes and all seal edges.	≥ 15



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15. Service support - suspension systems and distances

Wall figure a: The distance to the nearest or first service support for all types of technical installations may be ≤ 450 mm from the fire partition, except for cable trays, which must be ≤ 250 mm from the fire partition.

Floor figure b: The distance to the nearest or first service support for all types of technical installations may be ≤ 450 mm from the fire partition, except for cable trays, which must be ≤ 250 mm from the fire partition.

Figure a.

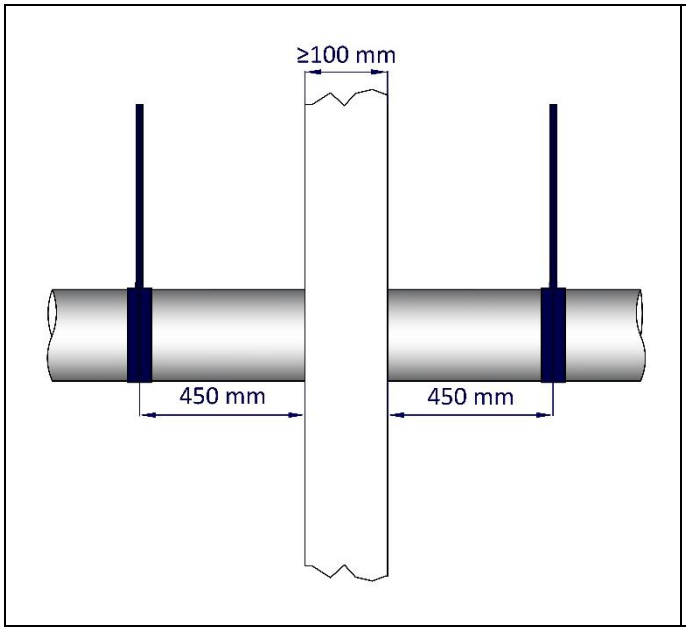
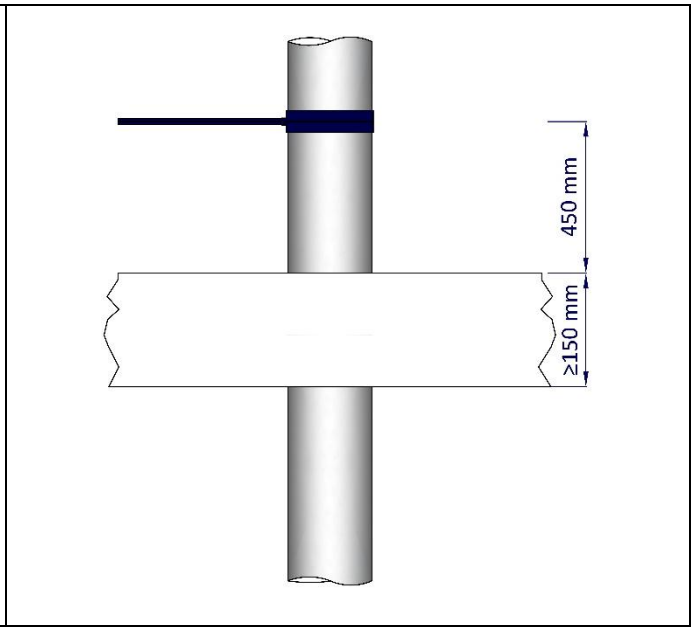


Figure b.



16. Available documents and approvals for FIRESAFE / FSG

Technical documents
✓ Product data sheet (PDS)
✓ Technical data sheet (TDS)
✓ Safety datasheet (SDS)
✓ CE marking
✓ Emissions reports
✓ Acoustics report

Approvals
✓ Tested in accordance with EN 1366-3
✓ Classification in accordance with EN 13501-1/2
✓ Certified in accordance with EAD 350454-00-1104
✓ ETA: 25/0236 Penetration Seals
✓ Declaration of Performance (DoP)

The documents listed above can be obtained from your Firesafe contact person, via QR code (Digital Pass), or on the Firesafe website: **www.firesafe.no.**