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European Technical Assessment

ETA-21/0661 – version 02 of 12-06-2023

General Part

Technical Assessment Body issuing the European Technical Assessment:

Full name or acronym (if full name included in the header)

Trade name of the construction product

Fire Mortar

Product family to which the construction product belongs

Sealing mortar for fire safe wall and floor pipe and cable penetrations

Manufacturer

FireSeal AB
Box 7091
164 07 Kista
Sweden

Manufacturing plant(s)

SMP Putsprodukter AB
Tallbacksgatan 11 Hus J
SE-195 72 Rosersberg
Sweden

This European Technical Assessment contains

23 pages including 1 Annex 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 Fire stopping and fire sealing products – Penetration seals

This version replaces

ETA 21/0661, issued on 27/07/2021

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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I. Specific parts of the European Technical Assessment

1. Technical description of the product

Fire Mortar is a non-combustible gypsum-based mortar. The mortar is a mixture of calcium sulphate, expanded perlite, calcium hydroxide and fiberglass.

Fire Mortar is supplied as a dry material, and is mixed with water to the required ratio prior to installation.

Fire Mortar when mixed is self-supporting in a wall and floor orientation, and is used with a permanent mineral wool backing, depending upon the required application (see Annex A).

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD): EAD 35454-00-1104

The intended use of Fire Mortar is to reinstate the fire resistance performance of flexible wall, rigid wall and floor constructions where they are penetrated by various steel, stainless steel, cast iron and copper pipes and cables.

Flexible walls (gypsum plasterboard): minimum one board layer of minimum 12,5 mm thickness on each side, Minimum overall plasterboard thickness 25 mm.

Rigid walls: The wall must have a minimum thickness of 70 mm and comprise concrete, aerated concrete or masonry, with a minimum dry density of 550 kg/m³.

Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum dry density of 550 kg/m³.

The walls, floors and supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

Detailed information and data are given in Annex A.

The provisions made in this European Technical Assessment are based on an assumed working life of the hardened product of 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

The real working life might be, in normal use conditions, considerable longer without major degradation affecting the Basic Requirements for construction works.

The use category of the Fire Mortar is:

Category Type Z2: Intended for uses in internal conditions with humidity lower than 85 % RH excluding temperatures below 0°C, without exposure to rain or UV.

The product shall be installed and used as described in the ETA-holder's installation instructions.

The indications of the manufacturer regarding transport and storage (minimum and maximum storage temperature, maximum duration of storage) have to be followed.

3. Performance of the product and references to the methods used for its assessment

Table 1. Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics.

Product type: Mortar		Intended use: Penetration Seal
Essential characteristic	Assessment method	Performance
BWR 2 Safety in case of fire		
Reaction to fire	EN 13501-1:2019	Class 'A1'
Resistance to fire	EN 13501-2:2019	Annex A
BWR 3 Hygiene, health and environment		
Air permeability	EN 1026	No performance assessed
Water permeability	EAD 350454-00-1104, Annex C	No performance assessed
Content, emission and/or release of dangerous substances	EN 16516	Release scenarios IA1 - Product with direct contact to indoor air VOC and SVOC emission: < 0,005 mg/m ³ after 28 days S/W3 - Product with no contact to soil, ground- and surface water
BWR 4 Safety in use		
Mechanical resistance and stability	EOTA TR 001:2003	No performance assessed
Resistance to impact/movement	EOTA TR 001:2003	No performance assessed
Adhesion	EOTA TR 001:2003	No performance assessed
Durability	EAD 350454-00-1104, clauses 2.2.9.3.1 and 2.2.9.3.11 EOTA TR 024	Use category Z2 – intended for uses in internal conditions with humidity lower than 85 % RH excluding temperatures below 0 °C, without exposure to rain or UV
BWR 5 Protection against noise		
Airborne sound insulation	EN ISO 717-1:	No performance assessed
BWR 6 Energy economy and heat retention		
Thermal resistance	EN ISO 6946	No performance assessed
Water vapour permeability	EN ISO 12572 EN 12086	No performance assessed

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to EAD 350005-00-1104, the applicable legal act for determining the AVCP system is: Commission Decision No 1999/454/EC of 22 June 1999 (OJ L 178 of 14 July 1999, p. 42), as amended by Commission Decision No 2001/596/EC of 8 January 2001 (OJ L 209 of 2 August 2001, p. 33). The applicable system of assessment and verification of constancy of performance (see Annex V in connection with Article 65 Paragraph 2 of Regulation (EU) No 305/2011) is system 1 as given in the following table.

Product(s)	Intended use(s)	Level(s) or class(es) (resistance to fire)	System(s) of assessment and verification of constancy of performance
Fire stopping and Fire Sealing Products	For fire compartmentation and/or fire protection or fire performance	Any	1

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan* of the manufacturer deposited with Kiwa and agreed in accordance with EAD 350454-00-1104, section 3. Changes to the product/production process, which could result in this deposited data / information being incorrect, should be notified to Kiwa for approval whether these changes do not affect the content of the ETA before the changes are introduced.

The *Control Plan* is a confidential part of the ETA and only handed over to the notified product certification body involved in the assessment and verification of constancy of performance.

The factory production control operated by the manufacturer shall be in accordance with the above mentioned *Control Plan*.

Issued in Rijswijk on (12-06-2023) by

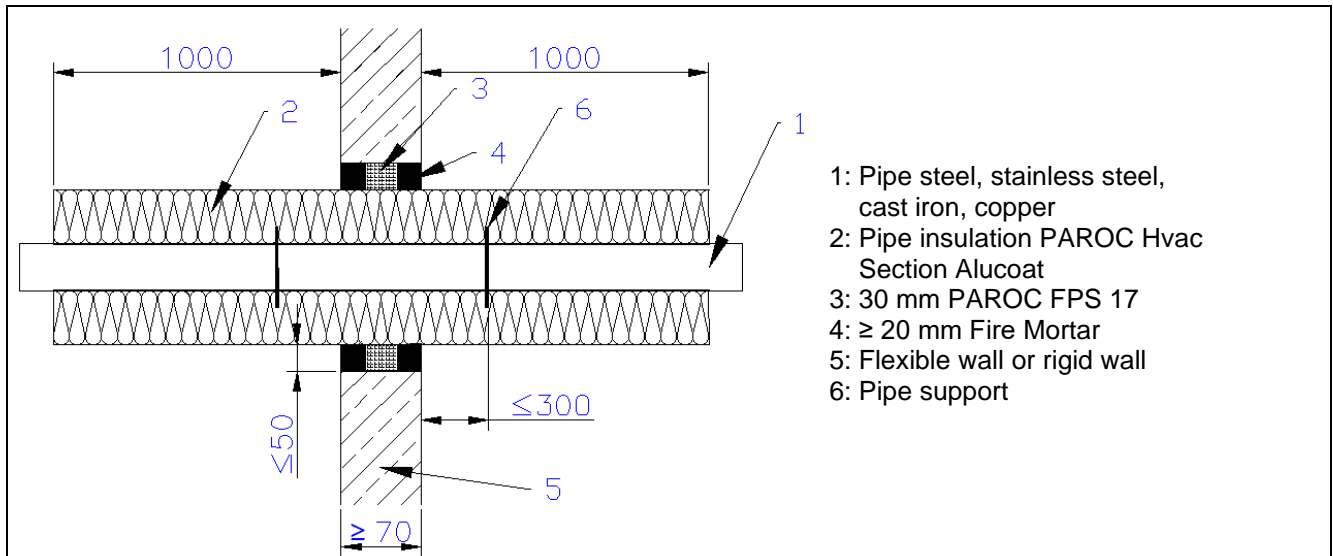


Ron Scheepers

Technical Assessment Body Kiwa Nederland B.V.

ANNEX A. Resistance to fire classification – Fire Mortar

A.1. Penetrations of pipes with sustained insulation through flexible or rigid walls with minimum wall thickness 70 mm



Flexible walls (gypsum plasterboard): minimum one board layer of minimum 12,5 mm thickness on each side, Minimum overall plasterboard thickness 25 mm.

Rigid walls (concrete, masonry or aerated concrete): minimum density 550 kg/m³.

Type of pipe insulation shall be PAROC Hvac Section Alucoat with minimum density 85 kg/m³, minimum thickness as indicated in the figures on the next page, minimum length 1000 mm from both sides of the wall penetration. Ends and joints between two pipe insulation sections to be closed using Alucoat tape. The pipe insulation shall be fastened with a minimum of 4 wires per full section.

Distance between the surface of the wall and the first support for the pipes maximum 300 mm. Clearance in the aperture between the wall and the pipe insulation shall be maximum 50 mm.

The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the wall around the pipe insulation.

The minimum 20 mm gap on both sides shall be filled with fiber gypsum designated "Fire Mortar" flush with the two wall sides. The filling has to be free of cavities.

Services	Pipe insulation	Max. aperture	Classification
Single copper pipes ²⁾ OD 12 – 54 mm	60 mm	204 mm	EI 90 C/U ¹⁾
Single steel pipes ²⁾ OD 12 – 219 mm	40 mm	369 mm	EI 90 C/U ¹⁾
Multi-copper pipes ²⁾ OD 12 – 54 mm	20 mm	274 x 226 mm	EI 90 C/U ¹⁾
Multi-steel pipes ²⁾ OD 12 – 54 mm	20 mm	274 x 226 mm	EI 90 C/U ¹⁾

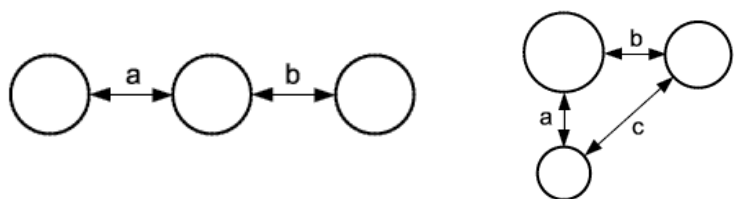
¹⁾ The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)

²⁾ The classification is valid for fire resistance from both sides

³⁾ Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C

⁴⁾ The metal service pipes may be installed in angles between 90-45 degrees from the wall

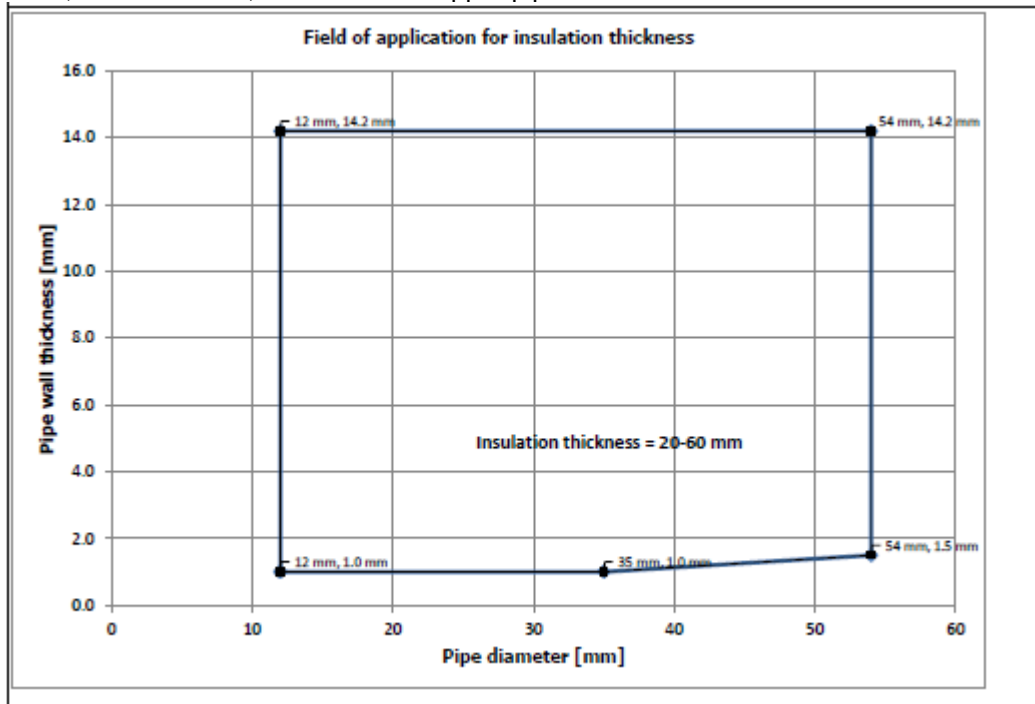
⁵⁾ In multi-pipe penetrations the pipes may be installed linear or in a cluster, see sketch below. The minimum distance between the outer sides of the pipe insulation a, b and c must be 30 mm.



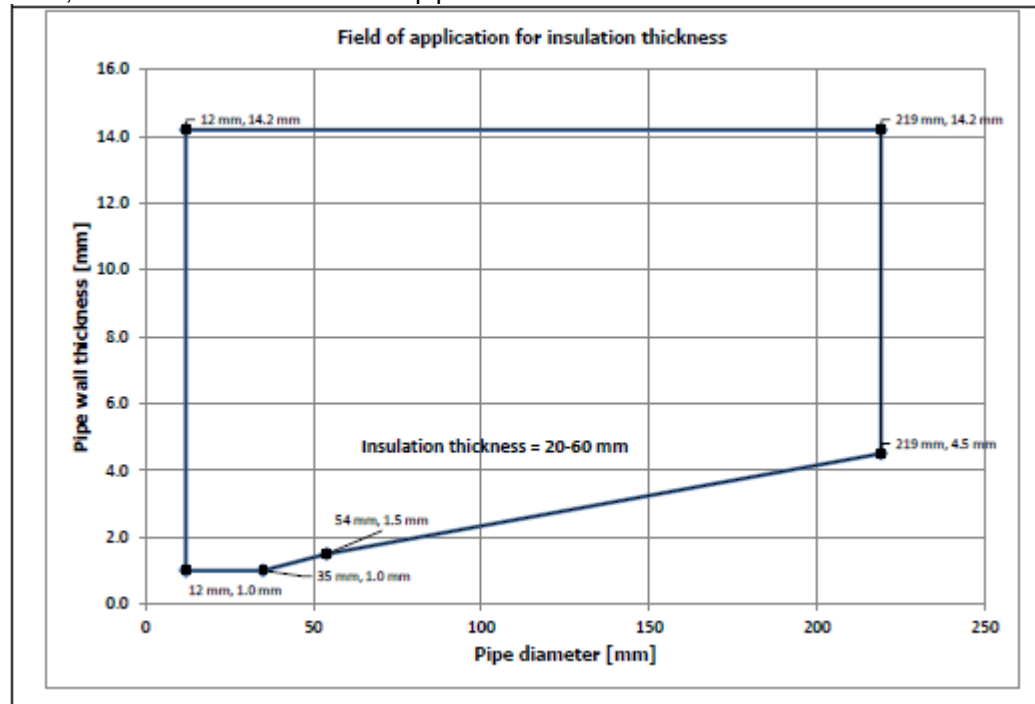
Linear arrangement

Cluster arrangement

Steel, stainless steel, cast iron and copper pipes



Steel, stainless steel and cast iron pipes



A.2. Penetrations of pipes with sustained insulation through rigid floors with minimum wall thickness 150 mm

1: Pipe steel, stainless steel, cast iron, copper
 2: Pipe insulation PAROC Hvac Section Alucoat
 3: 30 mm PAROC FPS 17
 4: ≥ 60 mm Fire Mortar
 5: Rigid floor
 6: Pipe support

Rigid floors (concrete, masonry or aerated concrete): minimum density 550 kg/m³.
 Type of pipe insulation shall be PAROC Hvac Section Alucoat with minimum density 85 kg/m³, minimum thickness as indicated in the figures on the next page, minimum length 1000 mm from both sides of the floor penetration. Ends and joints between two pipe insulation sections to be closed using Alucoat tape. The pipe insulation shall be fastened with a minimum of 4 wires per full section.
 Distance between the surface of the floor and the first support for the pipes maximum 1100 mm. Clearance in the aperture between the floor and the pipe insulation shall be maximum 50 mm.
 The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the floor around the pipe insulation.
 The minimum 60 mm gap on top of the PAROC FPS 17 shall be filled with fiber gypsum designated “Fire Mortar” flush with the floor. The filling has to be free of cavities.

Services	Pipe insulation	Max. aperture	Classification
Single copper pipes ²⁾ OD 12 – 54 mm	60 mm	204 mm	EI 120 C/U ¹⁾
Single steel pipes ²⁾ OD 12 – 219 mm	40 mm	369 mm	EI 120 C/U ¹⁾
Multi-copper pipes ²⁾ OD 12 – 54 mm	20 mm	274 x 226 mm	EI 120 C/U ¹⁾
Multi-steel pipes ²⁾ OD 12 – 54 mm	20 mm	274 x 226 mm	EI 120 C/U ¹⁾

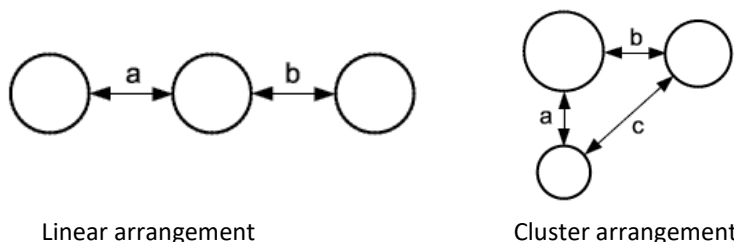
¹⁾ The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)

²⁾ The classification is valid for fire resistance with fire from below

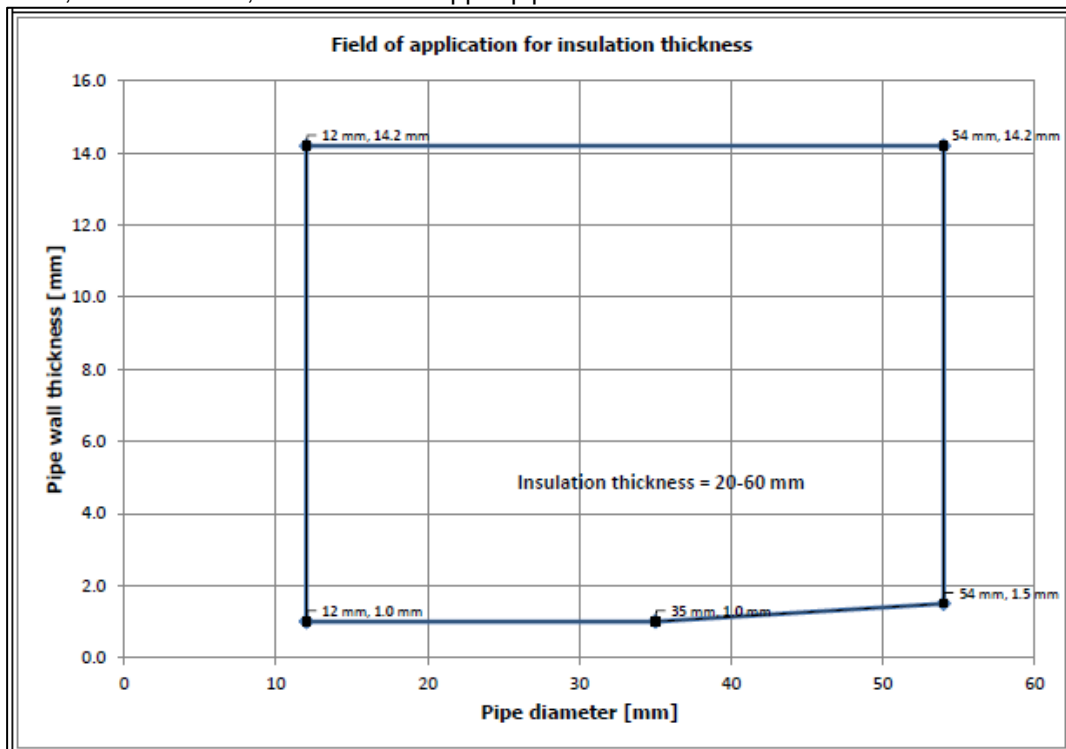
³⁾ Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C

⁴⁾ The metal service pipes may be installed in angles between 90-45 degrees from the wall

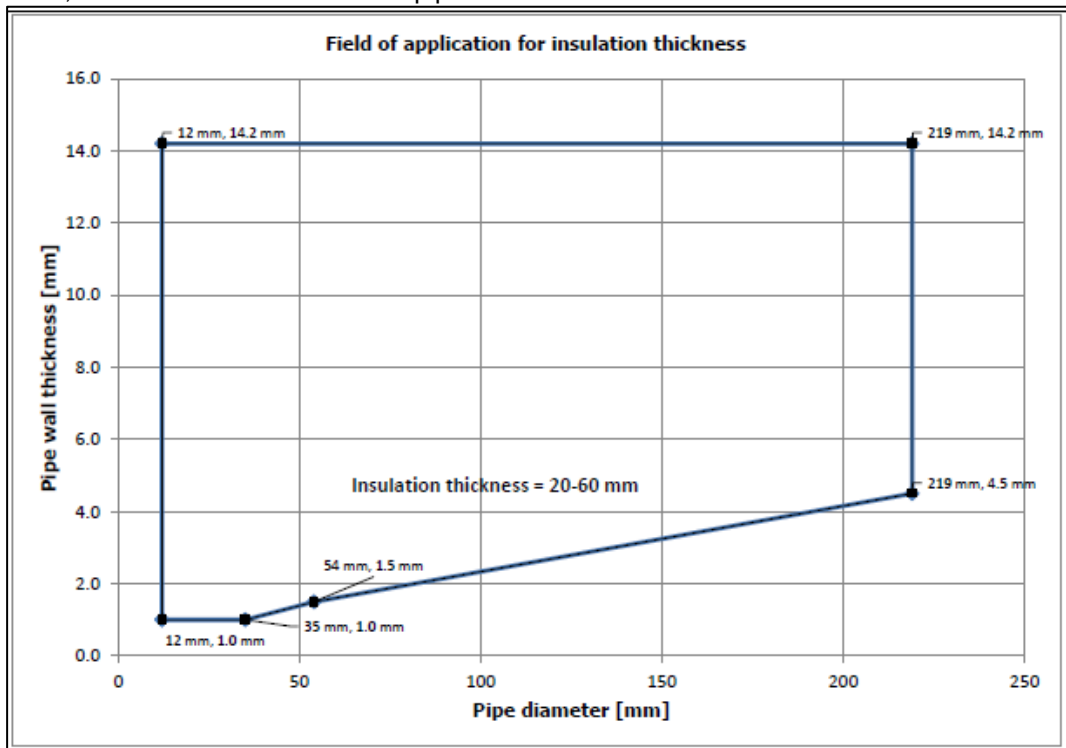
⁵⁾ In multi-pipe penetrations the pipes may be installed linear or in a cluster, see sketch below. The minimum distance between the outer sides of the pipe insulation a, b and c must be 30 mm.



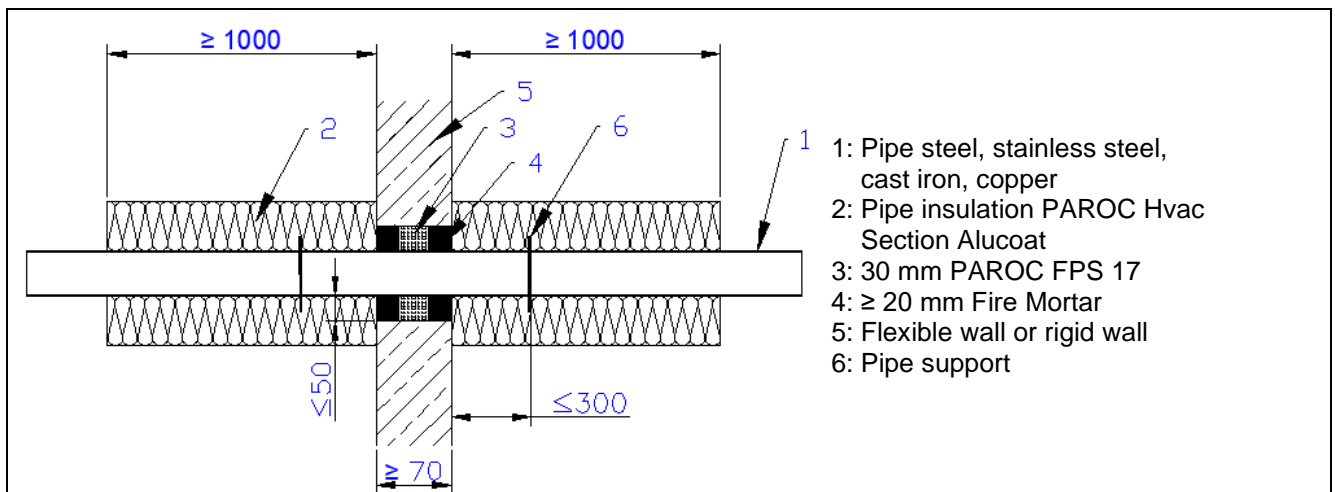
Steel, stainless steel, cast iron and copper pipes



Steel, stainless steel and cast iron pipes



A.3. Penetrations of pipes with interrupted insulation through flexible or rigid walls with minimum wall thickness 70 mm



Flexible walls (gypsum plasterboard): minimum one board layer of minimum 12,5 mm thickness on each side, Minimum overall plasterboard thickness 25 mm.

Rigid walls (concrete, masonry or aerated concrete): minimum density 550 kg/m³.

Type of pipe insulation shall be PAROC Hvac Section Alucoat with minimum density 85 kg/m³, minimum thickness as indicated in the figures on the next page, minimum length 1000 mm from both sides of the wall penetration. Ends and joints between two pipe insulation sections to be closed using Alucoat tape. The pipe insulation shall be fastened with a minimum of 4 wires per full section.

Distance between the surface of the wall and the first support for the pipes maximum 300 mm. Clearance in the aperture between the wall and the pipe insulation shall be maximum 50 mm.

The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the wall around the pipe insulation.

The minimum 20 mm gap on both sides shall be filled with fiber gypsum designated "Fire Mortar" flush with the two wall sides. The filling has to be free of cavities.

Services	Pipe insulation	Max. aperture	Classification
Single copper pipes ²⁾ OD 12 – 54 mm	20 mm	84 mm	EI 90 C/U ¹⁾
Single steel pipes ²⁾ OD 12 – 54 mm	20 mm	84 mm	EI 90 C/U ¹⁾
Single steel pipes ²⁾ OD 54 – 219 mm	40 mm	249 mm	EI 90 C/U ¹⁾
Multi-copper pipes ²⁾ OD 12 – 54 mm	20 mm	209 x 164 mm	EI 90 C/U ¹⁾
Multi-steel pipes ²⁾ OD 12 – 54 mm	20 mm	209 x 164 mm	EI 90 C/U ¹⁾

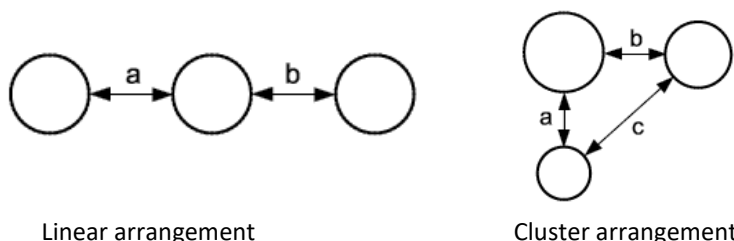
¹⁾ The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)

²⁾ The classification is valid for fire resistance from both sides

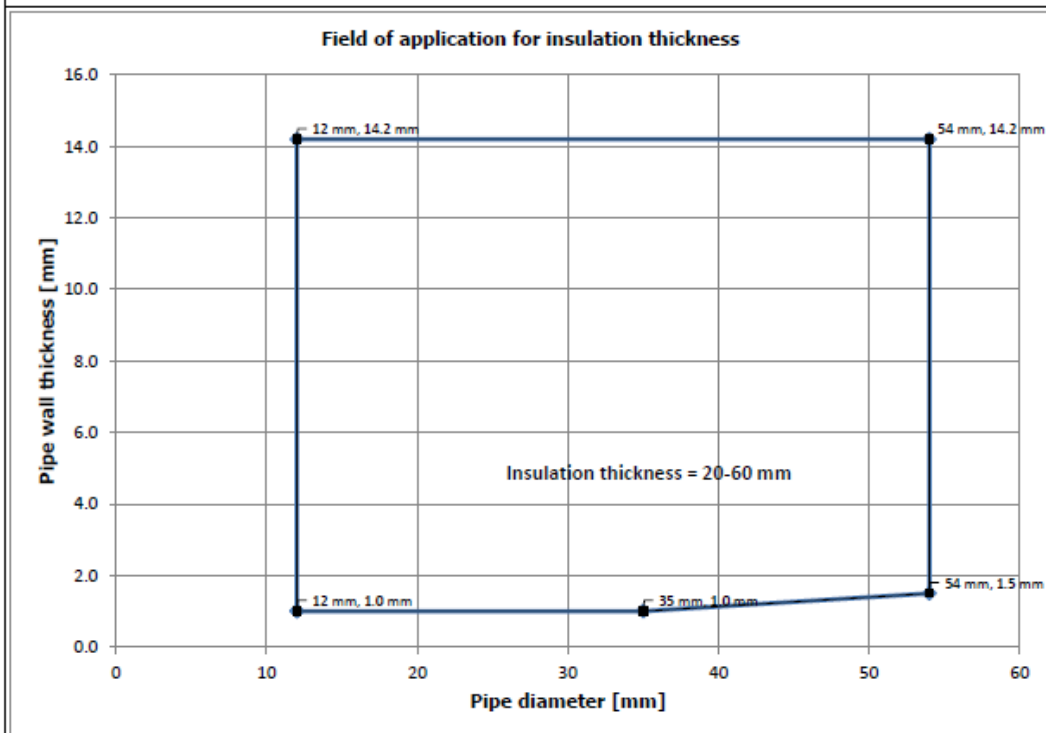
³⁾ Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C

⁴⁾ The metal service pipes may be installed in angles between 90-45 degrees from the wall

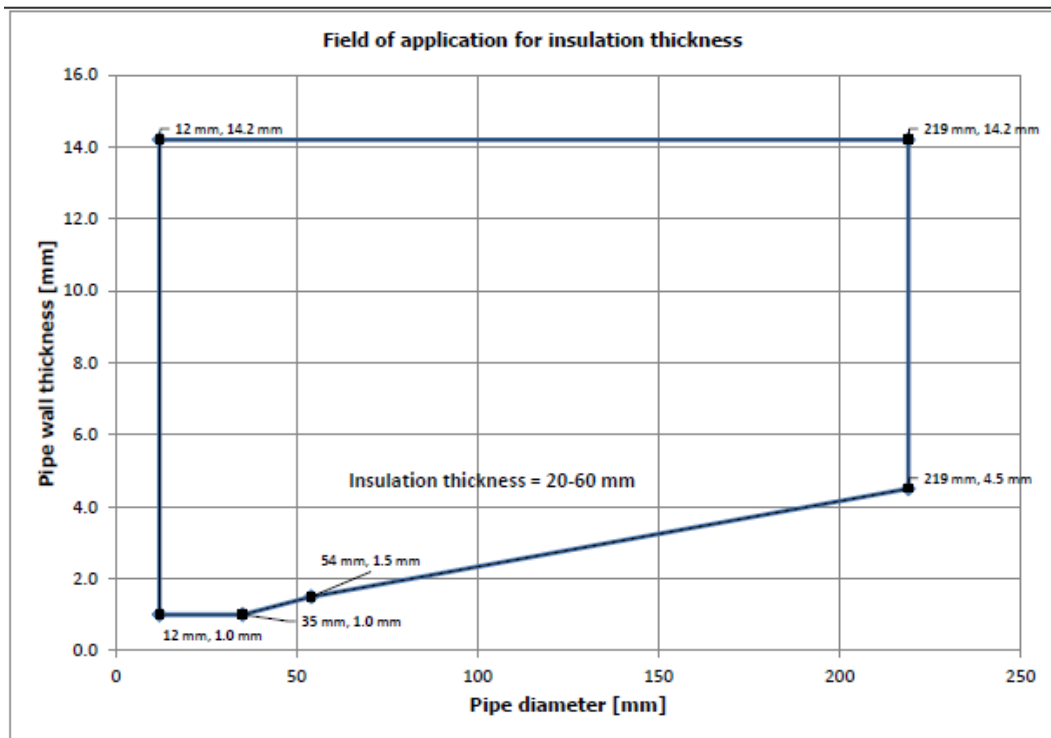
⁵⁾ In multi-pipe penetrations the pipes may be installed linear or in a cluster, see sketch below. The minimum distance between the outer sides of the pipe insulation a, b and c must be 30 mm.



Steel, stainless steel, cast iron and copper pipes



Steel, stainless steel and cast iron pipes



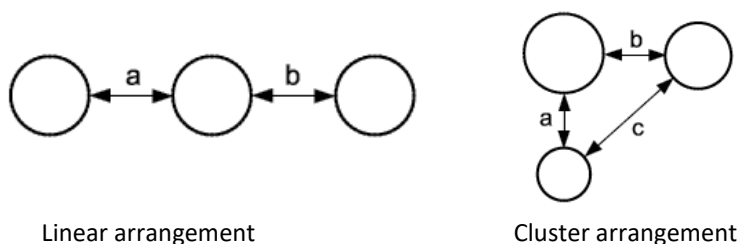
A.4. Penetrations of pipes with interrupted insulation through rigid floors with minimum wall thickness 150 mm

1: Pipe steel, stainless steel, cast iron, copper
 2: Pipe insulation PAROC Hvac Section Alucoat
 3: 30 mm PAROC FPS 17
 4: ≥ 60 mm Fire Mortar
 5: Rigid floor
 6: Pipe support

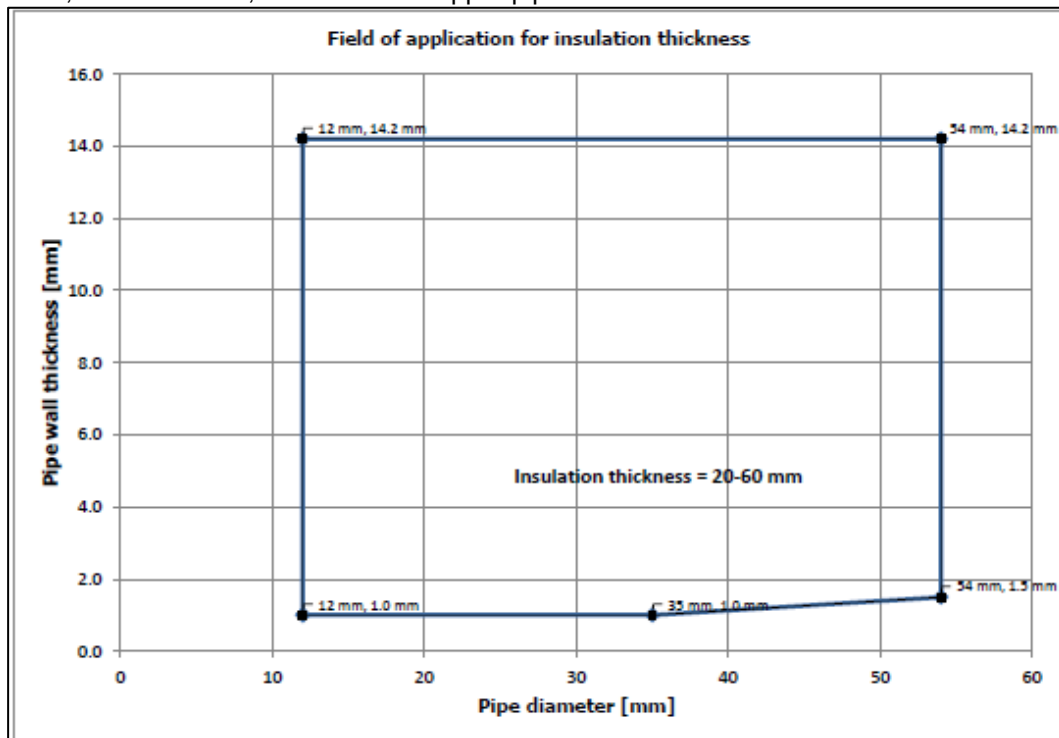
Rigid floors (concrete, masonry or aerated concrete): minimum density 550 kg/m³.
 Type of pipe insulation shall be PAROC Hvac Section Alucoat with minimum density 85 kg/m³, minimum thickness as indicated in the table below, minimum length 1000 mm from both sides of the floor penetration. Ends and joints between two pipe insulation sections to be closed using Alucoat tape. The pipe insulation shall be fastened with a minimum of 4 wires per full section.
 Distance between the surface of the floor and the first support for the pipes maximum 1100 mm. Clearance in the aperture between the floor and the pipe insulation shall be maximum 50 mm.
 The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the floor around the pipe insulation. The PAROC insulation on the pipe below the seal has to be mounted up to the PAROC FPS 17. If the gap width is smaller than the pipe insulation, the insulation has to be cut to fit in the gap.
 The minimum 60 mm gap on top of the PAROC FPS 17 shall be filled with fiber gypsum designated "Fire Mortar" flush with the floor. The filling has to be free of cavities.

Services	Pipe insulation	Max. aperture	Classification
Single copper pipes ²⁾ OD 12 – 54 mm	60 mm	84 mm	EI 120 C/U ¹⁾
Single steel pipes ²⁾ OD 12 – 219 mm	40 mm	249 mm	EI 120 C/U ¹⁾
Multi-copper pipes ²⁾ OD 12 – 54 mm	20 mm	209 x 164 mm	EI 120 C/U ¹⁾
Multi-steel pipes ²⁾ OD 12 – 54 mm	20 mm	209 x 164 mm	EI 120 C/U ¹⁾

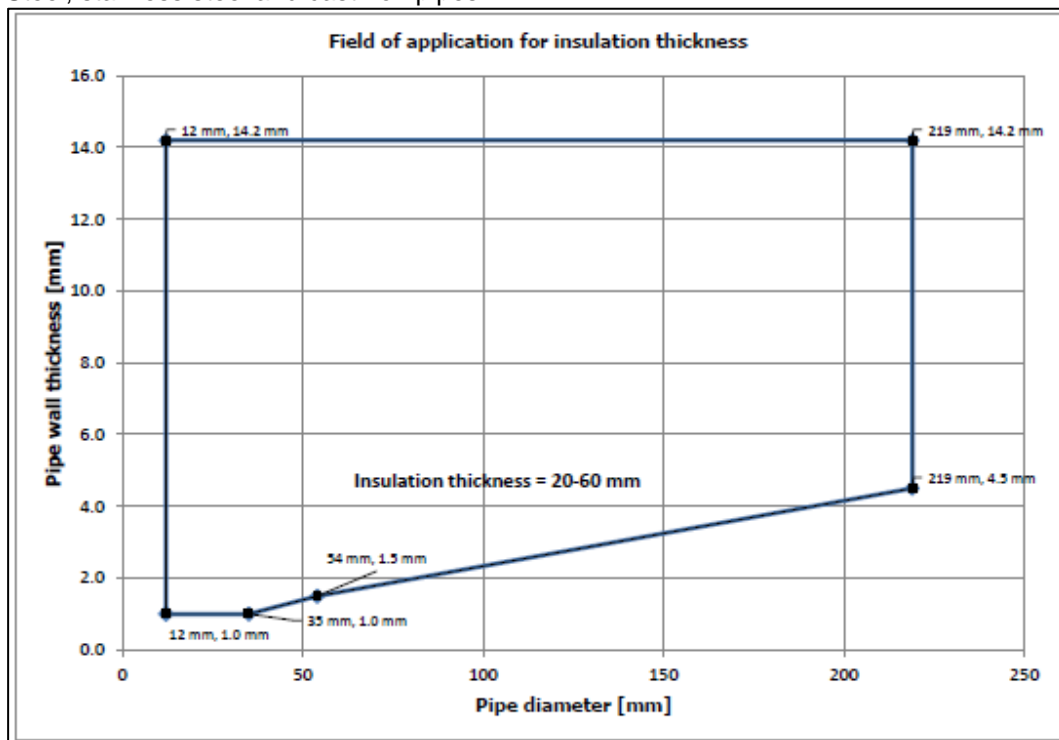
- 1) The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)
- 2) The classification is valid for fire resistance with fire from below
- 3) Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C
- 4) The metal service pipes may be installed in angles between 90-45 degrees from the wall
- 5) In multi-pipe penetrations the pipes may be installed linear or in a cluster, see sketch below. The minimum distance between the outer sides of the pipe insulation a, b and c must be 30 mm.



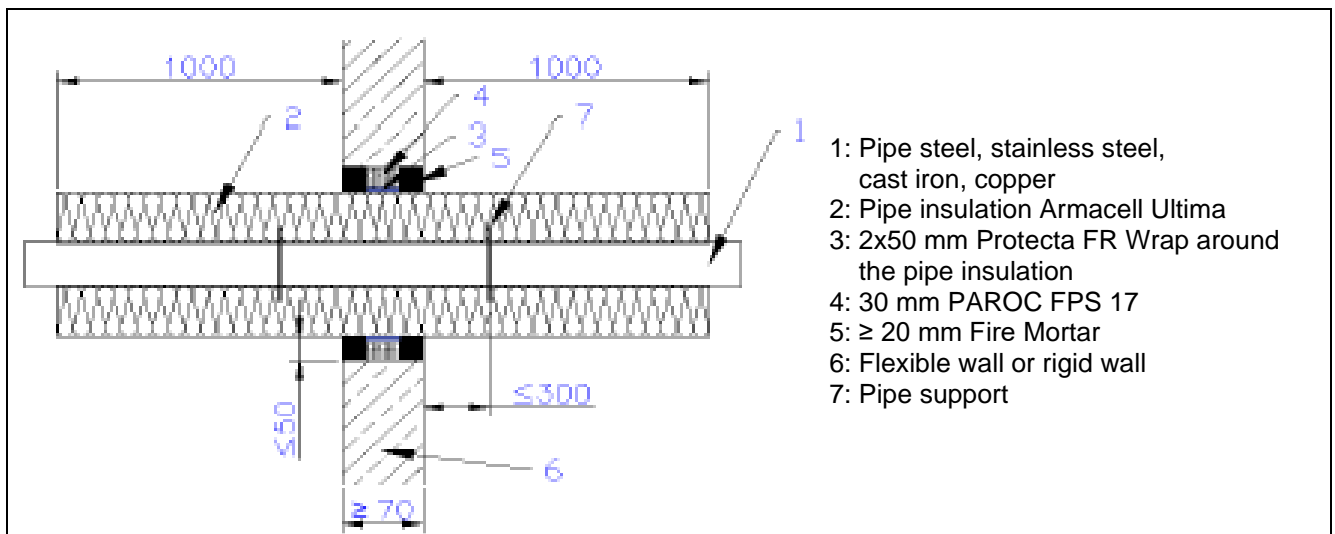
Steel, stainless steel, cast iron and copper pipes



Steel, stainless steel and cast iron pipes



A.5. Penetrations of pipes with sustained insulation through flexible or rigid walls with minimum wall thickness 70 mm



Flexible walls (gypsum plasterboard): minimum one board layer of minimum 12,5 mm thickness on each side, Minimum overall plasterboard thickness 25 mm.

Rigid walls (concrete, masonry or aerated concrete): minimum density 550 kg/m³.

Type of pipe insulation shall be Armacell Ultima with minimum density 58 kg/m³, minimum thickness as indicated in the figures on the next page, minimum length 1000 mm from both sides of the wall penetration.

Ends and joints between two pipe insulation sections to be closed using Armacell Ultima tape. Distance between the surface of the wall and the first support for the pipes maximum 300 mm. Clearance in the aperture between the wall and the pipe insulation shall be between maximum 50 mm.

The intumescent Protecta FR Wrap, width 50 mm and thickness 2 mm, shall be placed in the center of the wall 4 times around the pipe insulation, resulting in a 8 mm thick layer. The remaining aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the wall around Protecta FR Wrap.

The minimum 20 mm gap on both sides shall be filled with fiber gypsum designated "Fire Mortar" flush with the two wall sides. The filling has to be free of cavities.

Services	Pipe insulation	Max. aperture	Classification
Single copper pipes ²⁾ OD 12 – 54 mm	19 - 25 mm	164 mm	EI 60 / E 90 C/U ¹⁾
Single steel pipes ²⁾ OD 12 – 54 mm	19 - 25 mm	164 mm	EI 60 / E 90 C/U ¹⁾
Multi-copper pipes ²⁾ OD 12 – 54 mm	19 - 25 mm	274 x 226 mm	EI 60 / E 90 C/U ¹⁾
Multi-steel pipes ²⁾ OD 12 – 54 mm	19 - 25 mm	274 x 226 mm	EI 60 / E 90 C/U ¹⁾

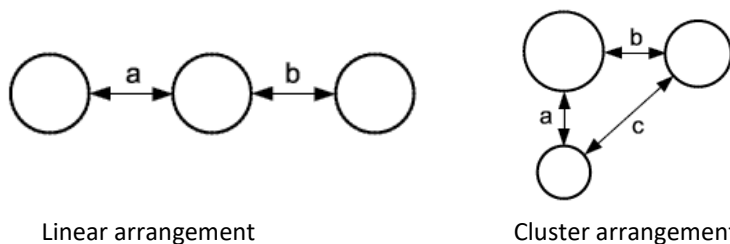
¹⁾ The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)

²⁾ The classification is valid for fire resistance from both sides

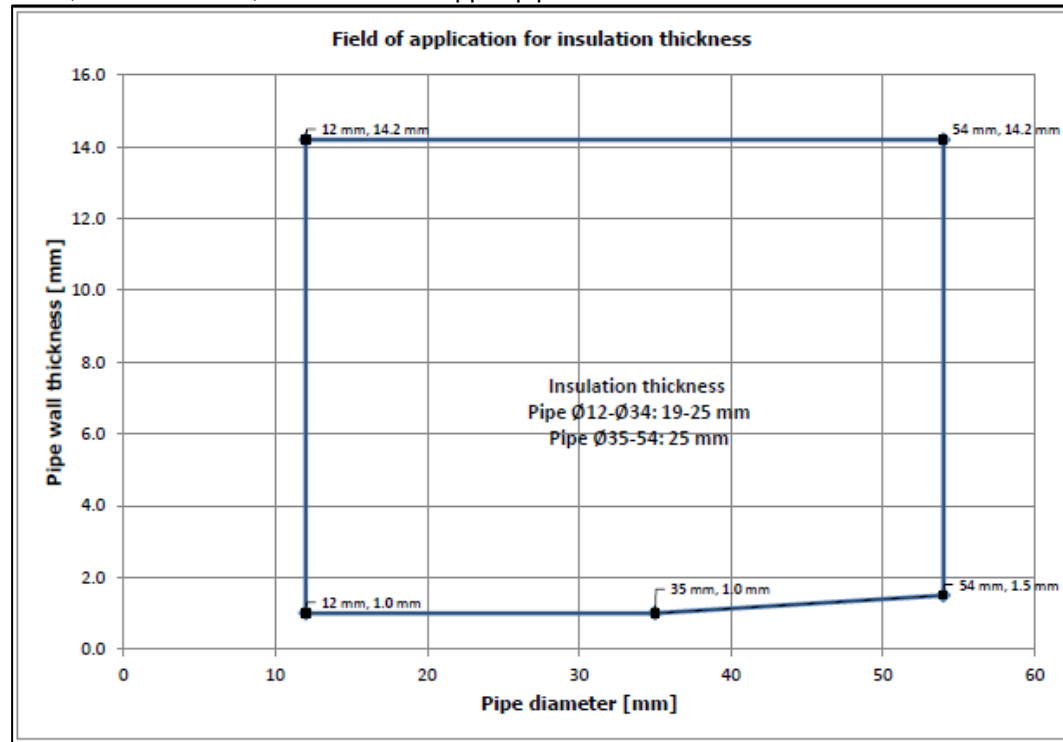
³⁾ Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C

⁴⁾ The metal service pipes may be installed in angles between 90-45 degrees from the wall

⁵⁾ In multi-pipe penetrations the pipes may be installed linear or in a cluster, see sketch below. The minimum distance between the outer sides of the pipe insulation a, b and c must be 30 mm.



Steel, stainless steel, cast iron and copper pipes

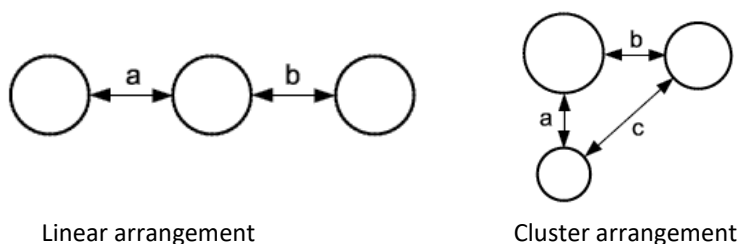


A.6. Penetrations of uninsulated pipes through rigid floors with minimum wall thickness 150 mm

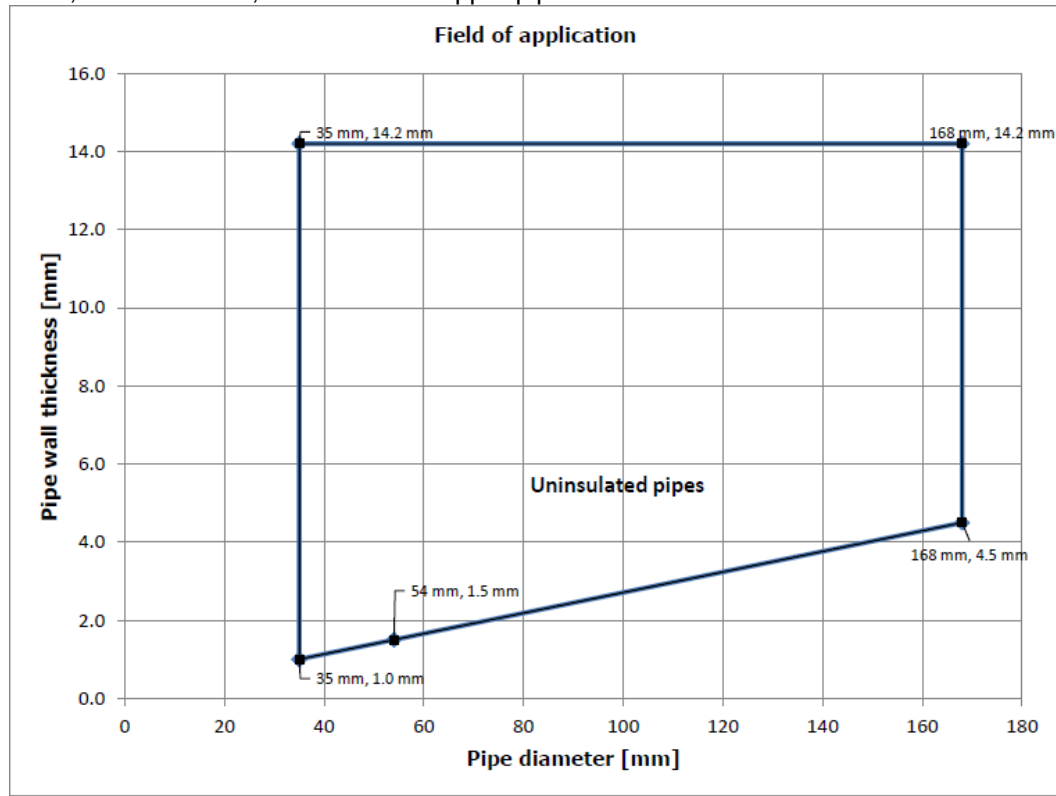
	<p>1: Pipe steel, stainless steel, cast iron, copper 2: 30 mm PAROC FPS 17 3: ≥ 100 mm Fire Mortar 4: Rigid floor 5: Pipe support</p>
	<p>Rigid floors (concrete, masonry or aerated concrete): minimum density 550 kg/m³. Distance between the surface of the floor and the first support for the pipes maximum 1100 mm. Clearance in the aperture between the floor and the pipe insulation shall be between approx. 15-30 mm. The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the floor around the pipe insulation, leaving minimum 100 mm gap to the floor surface. The minimum 100 mm gap on top of the PAROC FPS 17 shall be filled with fiber gypsum designated "Fire Mortar" flush with the floor. The filling has to be free of cavities.</p>

Services	Pipe insulation	Max. aperture	Classification
Single copper pipes ²⁾ OD 35 – 54 mm	none	114 mm	E 120 / EI 15 C/U ¹⁾
Single steel pipes ²⁾ OD 35 – 168 mm	none	228 mm	E 120 / EI 15 C/U ¹⁾

- ¹⁾ The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)
- ²⁾ The classification is valid for fire resistance with fire from below
- ³⁾ Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C
- ⁴⁾ The metal service pipes may be installed in angles between 90-45 degrees from the wall
- ⁵⁾ The pipes cannot be installed linear or in a cluster, unless the minimum distance between the outer sides of the pipes a, b and c is ≥ 200 mm, see sketch below.



Steel, stainless steel, cast iron and copper pipes

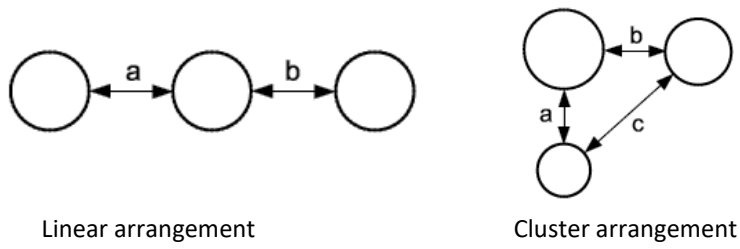


A.7. Penetrations of uninsulated pipes through flexible or rigid walls with minimum wall thickness 70 mm

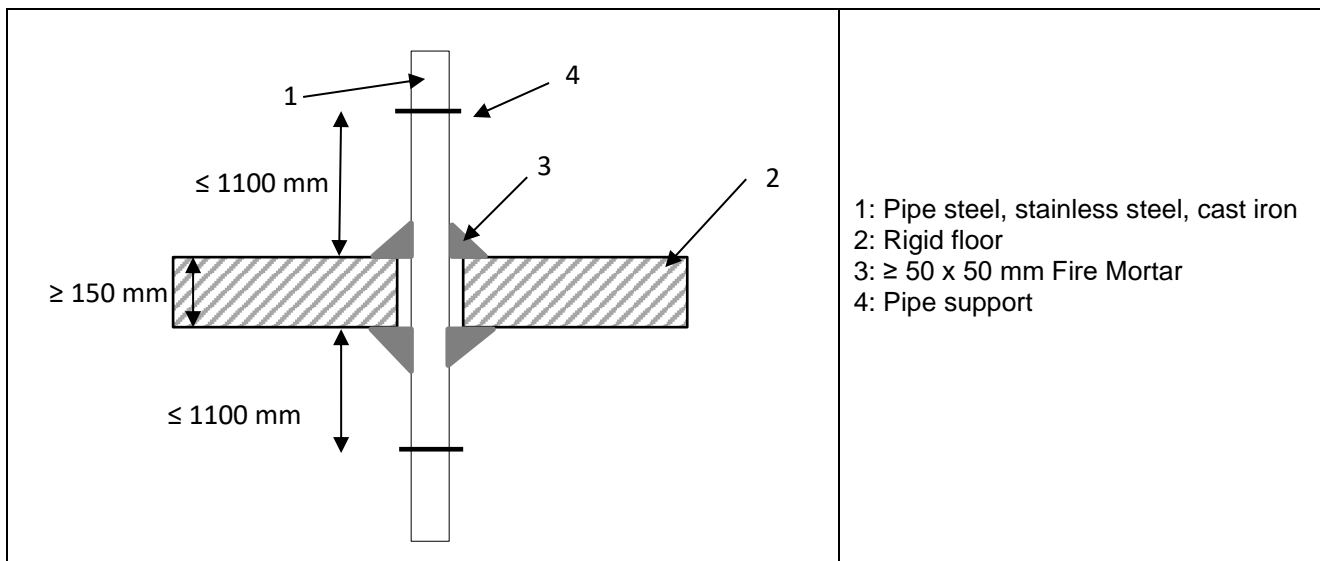
	<p>1: Pipe steel, stainless steel, cast iron 2: Flexible wall or rigid wall 3: $\geq 50 \times 50$ mm Fire Mortar 4: Pipe support</p>
<p>Flexible walls (gypsum plasterboard): minimum one board layer of minimum 12,5 mm thickness on each side, Minimum overall plasterboard thickness 25 mm. Rigid walls (concrete, masonry or aerated concrete): minimum density 550 kg/m³. Distance between the surface of the wall and the first support for the pipe maximum 300 mm. Clearance in the aperture between the wall and the pipe shall be approx. 6 mm. The fiber gypsum designated "Fire Mortar" shall be placed around the pipe with a slope on both sides going 50 mm up/down the pipe and 50 mm out on the wall. The aperture between pipe and wall is not filled.</p>	

Services	Pipe insulation	Max. aperture	Classification
Single steel pipes ²⁾ OD 108 mm	none	120 mm	E 90 / EI 15 C/U ¹⁾

- 1) The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)
- 2) The classification is valid for fire resistance from both sides
- 3) Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper 386 W/mK / 1084 °C; steel 43 W/mK / 1425 °C
- 4) The metal service pipes may be installed in angles between 90-45 degrees from the wall
- 5) The pipes cannot be installed linear or in a cluster, unless the minimum distance between the outer sides of the pipes a, b and c is ≥ 200 mm, see sketch below.



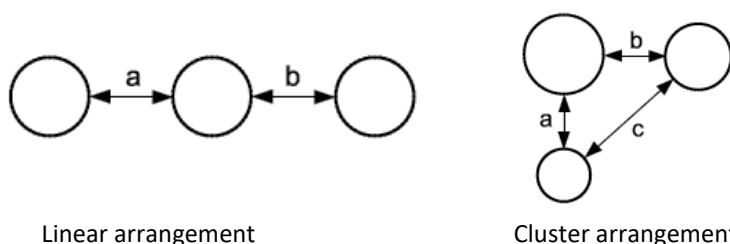
A.8. Penetrations of uninsulated pipes through rigid floors with minimum wall thickness 150 mm



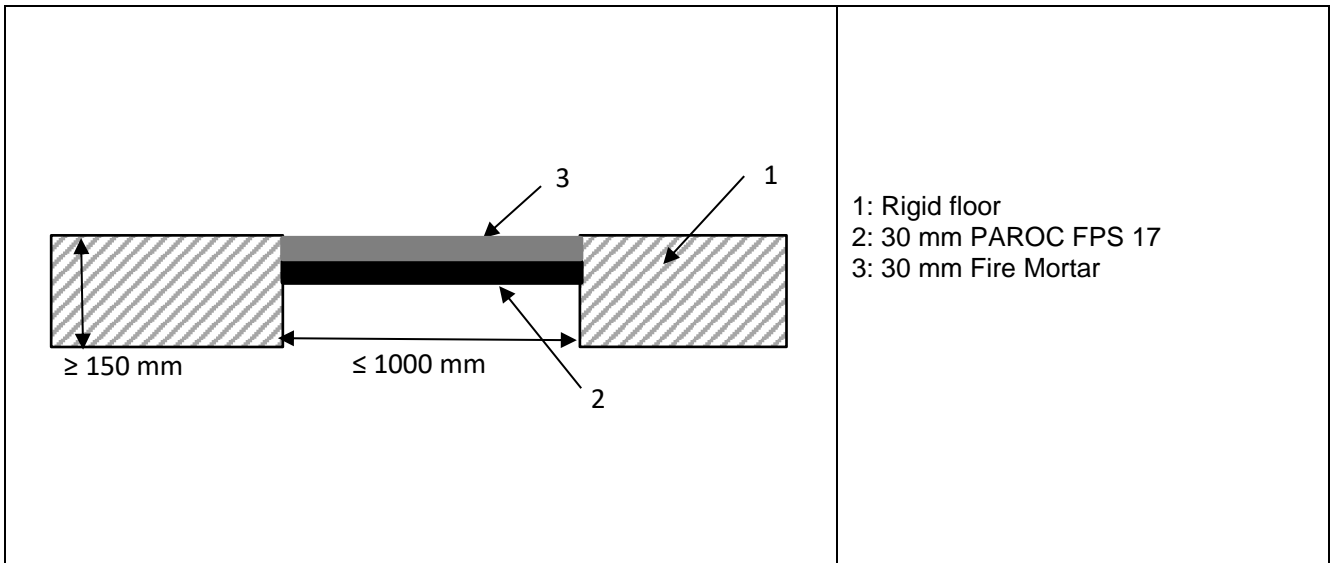
Rigid floors (concrete, masonry or aerated concrete): minimum density 550 kg/m^3 .
 Distance between the surface of the floor and the first support for the pipes maximum 1100 mm. Clearance in the aperture between the floor and the pipe insulation shall be between approx. 6 mm.
 The fiber gypsum designated "Fire Mortar" shall be placed around the pipe with a slope on both sides going 50 mm up/down the pipe and 50 mm out on the floor. The aperture between pipe and floor is not filled.

Services	Pipe insulation	Max. aperture	Classification
Single steel pipes ²⁾ OD 108 mm	none	120 mm	E 120 / EI 45 C/U ¹⁾

- 1) The classification is only valid for C/C and C/U (capped inside the furnace, capped or uncapped outside the furnace)
- 2) The classification is valid for fire resistance with fire from below
- 3) Metal pipes may be exchanged with other metals with a higher melting point and lower thermal conductivity. Thermal conductivity / Melting point of copper $386 \text{ W/mK} / 1084 \text{ }^\circ\text{C}$; steel $43 \text{ W/mK} / 1425 \text{ }^\circ\text{C}$
- 4) The metal service pipes may be installed in angles between $90\text{-}45$ degrees from the wall
- 5) The pipes cannot be installed linear or in a cluster, unless the minimum distance between the outer sides of the pipes a, b and c is $\geq 200 \text{ mm}$, see sketch below.



**A.9. Penetrations through rigid floors with minimum wall thickness 150 mm
Blank seal**



Rigid floors (concrete, masonry or aerated concrete): minimum density 550 kg/m³.
 The aperture in the floor shall be maximum 1000 x 1000 mm (length x width).
 A layer of 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³ shall be placed in the aperture, 90 mm above the bottom of the floor, leaving minimum 30 mm gap to the floor surface. The 30 mm gap shall be filled with fiber gypsum designated "Fire Mortar" flush with the floor. The filling has to be free of cavities.

Services	Max. aperture	Classification
None (blank seal)	1000 x 1000 mm	EI 120

- 1) Distance between the services: The blank seals can be installed with a minimum distance of 200 mm between each other
- 2) The classification is valid for fire resistance with fire from below

A.10. Cable penetrations through flexible and rigid walls with minimum wall thickness 70 mm

Flexible walls (gypsum plasterboard): minimum one board layer of minimum 12,5 mm thickness on each side, Minimum overall plasterboard thickness 25 mm.

Rigid walls (concrete, masonry or aerated concrete): minimum density 550 kg/m³.

Cable type and sizes:

All cable types currently and commonly used in building practice in Europe.

All non-sheathed cables/wires.

All cable bundle types.

Cables with a diameter up to 80mm.

Bundles consisting of cables with a diameter up to 21mm.

Non-sheathed cables with a diameter up to 24mm.

Steel conduits and steel tubes with a diameter of up to Ø16mm.

Plastic conduits and plastic tubes with a diameter of up to Ø16mm.

For details on classification see table below.

Cables penetrating the seal on a steel tray or steel ladder as in the test or without a tray or ladder. The results do not cover lidded cable trays/trunkings where the lid passes through the penetration seal.

The distance between supporting construction and the cables or cable trays or ladders shall be minimum 30 mm.

The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the wall around the pipe insulation. On both sides, around each cable, plastic conduit or cable bundle an intumescent sealant designated Protecta FR graphite shall be placed with approx. 10 x 10 mm in height and depth.

The minimum 20 mm gap on both sides of the PAROC FPS 17 shall be filled with fiber gypsum designated "Fire Mortar" flush with the two wall sides. The filling has to be free of cavities.

Cable type	Cable type	Dimensions	Classification
A1	Small sheathed	5x1,5 mm ²	EI 60 / E 90
A2	Small sheathed	5x1,5 mm ²	EI 60 / E 90
A3	Small sheathed	5x1,5 mm ²	EI 60 / E 90
B	Small sheathed	1x95 mm ²	EI 45 / E 90
C1	Medium sheathed	4x95 mm ²	EI 60 / E 90
C2	Medium sheathed	4x95 mm ²	EI 45 / E 90
C3	Medium sheathed	4x95 mm ²	EI 30 / E 90
D1	Large sheathed	4x185 mm ²	EI 60 / E 90
D2	Large sheathed	4x185 mm ²	EI 60 / E 90
D3	Large sheathed	4x18 5mm ²	EI 60 / E 90
E	Medium sheathed	1x185 mm ²	EI 45 / E 90
F	Cable bundle (telecom cable)	20x20x0,6 mm	EI 60 / E 90
G1	Non-sheathed wire	1x9 5mm ²	EI 30 / E 90
G2	Non-sheathed wire	1x185 mm ²	EI 30 / E 90
H	Conduit	steel	EI 30 C/U / E 90 C/U
I	Conduit	plastic	EI 60 U/C / E 90 U/C
T1	Cable tray	500 mm	EI 45 / E90
T2	Perforated tray	500 mm	EI 45 / E90
T3	Cable ladder	300 mm	EI 60 C/U / E 90 C/U
T4	Cable ladder	200 mm	EI 60 C/U / E 90 C/U

1) Types according to Table A1 of EN 1366-3:2009

2) The classification is valid for fire resistance from both sides

A.11. Cable penetrations through rigid floors with minimum wall thickness 150 mm

Rigid floors (concrete, masonry or aerated concrete): minimum density 550 kg/m³.

Cable type and sizes:

All cable types currently and commonly used in building practice in Europe.

All non-sheathed cables/wires.

All cable bundle types.

Cables with a diameter up to 80mm.

Bundles consisting of cables with a diameter up to 21mm.

Non-sheathed cables with a diameter up to 24mm.

Steel conduits and steel tubes with a diameter of up to Ø16mm.

Plastic conduits and plastic tubes with a diameter of up to Ø16mm.

For details on classification see table below.

Cables penetrating the seal on a steel tray or steel ladder as in the test or without a tray or ladder. The results do not cover lidded cable trays/trunkings where the lid passes through the penetration seal.

The distance between supporting construction and the cables or cable trays or ladders shall be minimum 30 mm.

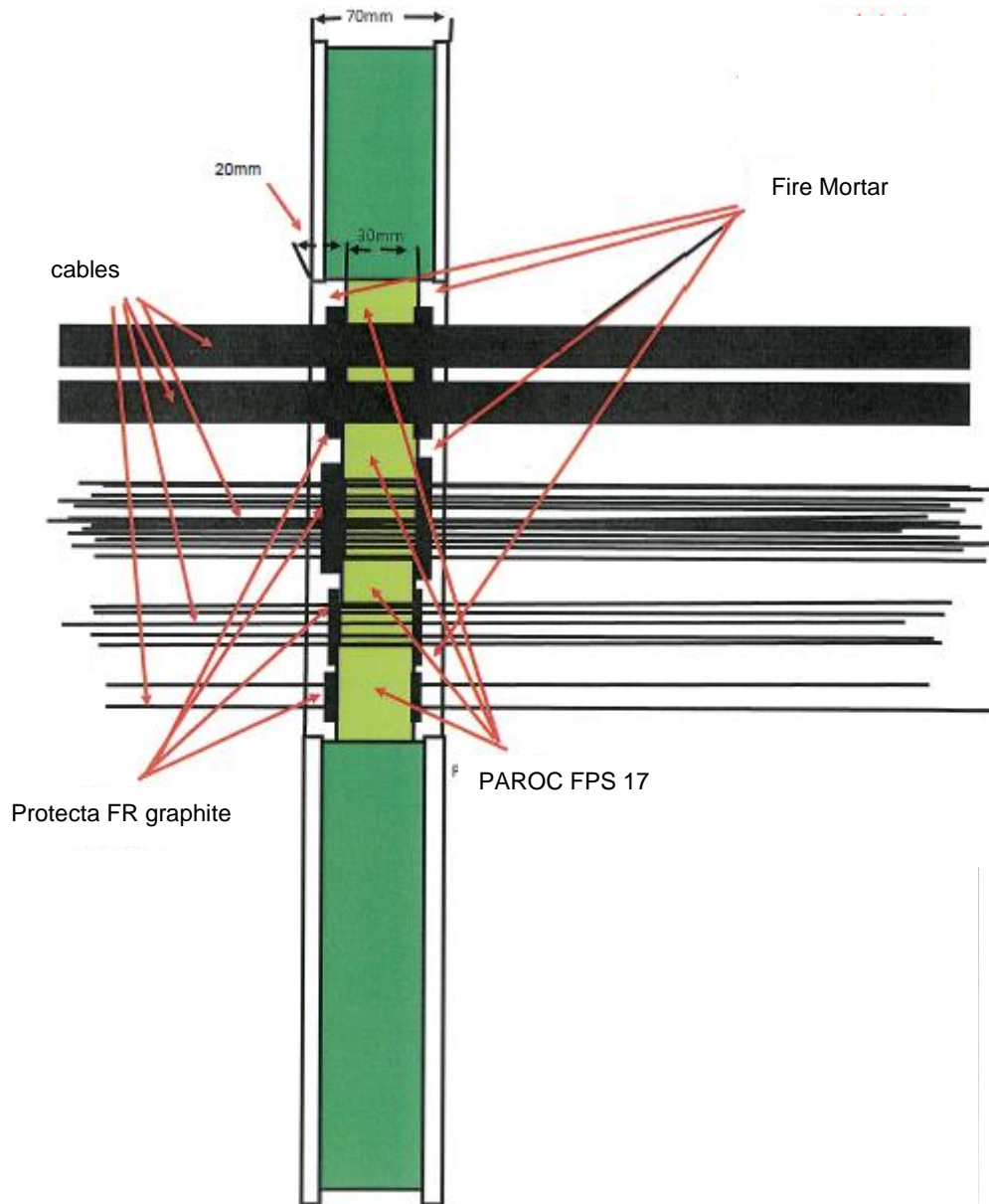
The aperture shall be filled with 30 mm mineral wool designated PAROC FPS 17 with a nominal density of 170 kg/m³, placed in the center of the wall around the pipe insulation. On top of the PAROC FPS 17, around each cable, plastic conduit or cable bundle an intumescent sealant designated Protecta FR graphite shall be placed with approx. 40 x 10 mm in height and depth.

The rest of the minimum 100 mm gap shall be filled with fiber gypsum designated "Fire Mortar" flush with the floor. The filling has to be free of cavities.

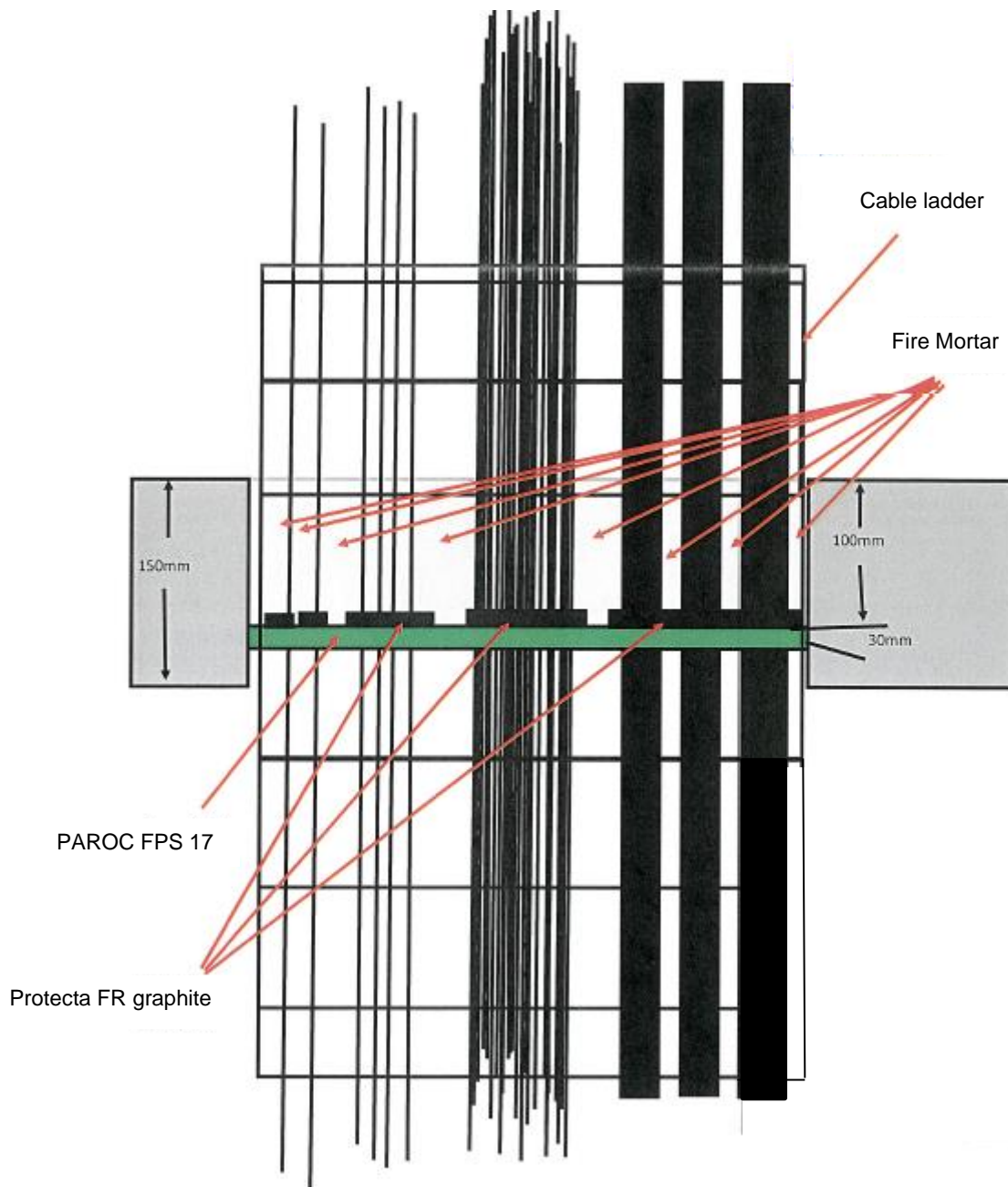
Cable type	Cable type	Dimensions	Classification
A1	Small sheathed	5x1,5 mm ²	EI 120 / E 120
A2	Small sheathed	5x1,5 mm ²	EI 60 / E 120
A3	Small sheathed	5x1,5 mm ²	EI 120 / E 120
B	Small sheathed	1x95 mm ²	EI 120 / E 120
C1	Medium sheathed	4x95 mm ²	EI 120 / E 120
C2	Medium sheathed	4x95 mm ²	EI 60 / E 120
C3	Medium sheathed	4x95 mm ²	EI 60 / E 120
D1	Large sheathed	4x185 mm ²	EI 90 / E 120
D2	Large sheathed	4x185 mm ²	EI 120 / E 120
D3	Large sheathed	4x18 5mm ²	EI 90 / E 120
E	Medium sheathed	1x185 mm ²	EI 60 / E 120
F	Cable bundle (telecom cable)	20x20x0,6 mm	EI 120 / E 120
G1	Non-sheathed wire	1x9 5mm ²	EI 30 / E 120
G2	Non-sheathed wire	1x185 mm ²	EI 30 / E 120
H	Conduit	steel	EI 120 C/U / E 120 C/U
I	Conduit	plastic	EI 120 U/C / E 120 U/C
T1	Cable tray	500 mm	EI 120 / E 120
T2	Perforated tray	500 mm	EI 120 / E 120
T3	Cable ladder	300 mm	EI 90 C/U / E 120 C/U
T4	Cable ladder	200 mm	EI 60 C/U / E 120 C/U

³⁾ Types according to Table A1 of EN 1366-3:2009

⁴⁾ The classification is valid for fire resistance from below



Cable penetrations through flexible and rigid walls with minimum wall thickness 70 mm



Cable penetrations through rigid floors with minimum wall thickness 150 mm