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Authorised and notified according
to Article 29 of the Regulation (EU)
No 305/2011 of the European
Parliament and of the Council of 9
March 2011

MEMBER OF EOTA



European Technical Assessment ETA-15/0237 of 2018/10/05

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the
construction product:

FLAMRO BS-MK Schott mixed penetration seal

Product family to which the
above construction product
belongs:

Fire Stopping and Sealing coated mineral wool slabs
used in penetration seals

Manufacturer:

FLAMRO Brandschutz- Systeme GmbH
Am Sportplatz 2
DE-56291 Leiningen
Tel. + 49 6746 9410 - 0
Fax +49 6746 9410 - 10
Internet www.flamro.de

Manufacturing plant:

FLAMRO Brandschutz- Systeme GmbH
Am Sportplatz 2
DE-56291 Leiningen

This European Technical
Assessment contains:

39 pages including 5 annexes which form an integral
part of the document.

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:

The ETA with the same number issued on 2016-06-01

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

The FLAMRO BS-MK Schott penetration seal is a 60-mm thick mineral wool panel with a density of approx. 150 kg/m³. The ProRox PS 960 is a mandrel wound pipe insulation of 1000 mm length. The panels are classified as Euroclass A1 in accordance with EN 13501- 1 and have a melting point $\geq 1000^{\circ}\text{C}$. They are installed in openings in fire classified walls around cables and pipes through walls made from concrete, aerated concrete, masonry or light weight partition structures, thickness ≥ 100 mm, and solid floors made of concrete or aerated concrete, thickness ≥ 150 mm; the joints between the panels and the connection to the surrounding structure is sealed with FLAMRO BMA or FLAMRO BMS. Additionally, the area around the penetration is covered with 2 mm thick layer of FLAMRO BMA or FLAMRO BMS with a width of minimum 20 mm over the joint.

In some application the FLAMRO Variant N IIA collar according to ETA-13/0922 or the FLAMRO Universal fire protection strip, FLAMRO UBB, is used.

Detailed specifications for identification and performance criteria relevant for fire safety about the construction products are given in Annex 1.

Specification of the intended use in accordance with the applicable European Assessment Document

The construction product FLAMRO BS-MK Schott is intended for use as components with a fire protection effect in walls made of concrete, aerated concrete, masonry or light weight partition structures, thickness ≥ 100 mm, and solid floors made of concrete or aerated concrete, thickness ≥ 150 mm, that are subject to requirements related to fire protection. Their fire-resistant capability prevents heat transmission and fire spreading in the event of fire. Within the scope of this ETA, the fire resistance was demonstrated for cables (single or bundled) and pipes which consisted of the components listed in table 1. Cable penetration seals are used to seal off openings in fire resistant walls and floors, which are penetrated by cables, pipes and conduits (mixed penetration seal), and serves to preserve the walls and floors fire resistance in the penetrations.

Table 1 – components of the verified penetration seals

Product type	Trade name
Ablative sealant	FLAMRO BMA or FLAMRO BMS the sealant FLAMRO BMS is delivered in buckets. The same sealant is also delivered in cartridges and is designated FLAMRO BMK
Rubber insulation materials for metal pipes	Armaflex Ultima AF/Armaflex Armaflex protect Armaflex LS NH/Armaflex
Inorganic insulation materials for metal pipes	ProRox PS 960 Foamglas type 4+
Mineral Wool board	Rockwool RPI 15
Collar	FLAMRO Variant N II A
Strip	FLAMRO UBB

Detailed information and data on the verified penetration seals are given in Annexes 1 to 5.

The performances given in Section 3 exclusively relate to this penetration seals (e.g. with respect to the design and arrangement of the components of the penetration seals and the type and position of the services).

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of at least 10 years for FLAMRO BS-MK Schott.

The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as a means for choosing the right product in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic
3.2 Safety in case of fire (BWR 2)	
Reaction to fire	<p>The mineral wool board, ProRox PS960 15 is classified as Euroclass A1 in accordance with EN 13501-1</p> <p>The cellular glass slaps, FOAMGLAS®T4+ is classified as Euroclass A1 in accordance with EN 13501-1</p> <p>The FLAMRO BMA coating for mineral wool board is classified as Euroclass E in accordance with EN 13501-1.</p> <p>The FLAMRO BMS and FLAMRO BMK sealant is classified as Euroclass E in accordance with EN 13501-1.</p> <p>The FLAMRO UBB (without self-adhesive layer) strip is classified as Euroclass E in accordance with EN 13501-1.</p> <p>The rubber insulation material A/F Armaflex is classified as Euroclass B in accordance with EN 13501-1</p> <p>The rubber insulation material Armaflex Ultima is classified as Euroclass B in accordance with EN 13501-1</p> <p>The rubber insulation material Armaflex Protect is classified as Euroclass E in accordance with EN 13501-1</p> <p>The rubber insulation material Armaflex LS is classified as Euroclass B in accordance with EN 13501-1</p> <p>The rubber insulation material NH/Armaflex is classified as Euroclass E (Sheet/tape) and DL-s2,d0 (tubes) in accordance with EN 13501-1</p>
Resistance to fire	<p>The FLAMRO BS-MK Schott used in penetrations seals as described in ETA 15/0237 is classified as described in annex 2 & 3 (walls), annex 4 & 5 (floors) in accordance with EN 13501-2</p>
3.3 Hygiene, health and the environment (BWR 3)	
Release of dangerous substances	<p>The product does not contain/release dangerous substances specified in TR 034, dated October 2015</p>
3.7 Sustainable use of natural resources (BWR 7)	No Performance Assessed

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 General aspects

The verification of durability is part of testing the essential characteristics. The FLAMRO BS-MK Schott may be used in end-use applications according to the provisions for use category Y₂ (temperatures below 0 °C, but no exposure to rain or UV) without expecting significant changes of the characteristics relevant for fire protection. Since the requirements for Type Y₂ are met, also the requirements for Type Z₁ and Z₂ are fulfilled.

4 Assessment and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 1999/454/EC of the European Commission, as amended by 2001/596/EC, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2018-10-05 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex 1

Product details and definitions

Product and performance of the FLAMRO BS-MK Schott and accessory components:

Product and performance of the mineral wool board Rockwool RPI 15

Property	Parameter	Method
Density	Mean 160 kg/m ³	EN 13162
Melting point	Minimum 1000 °C	EN 13162
Dimensional tolerances	Thickness 58 – 62 mm	EN 13162
Dimensions	Approx. 1000 mm long, 625 mm wide and 60 mm thick	EN 13162

Product and performance of the FLAMRO BMA or FLAMRO BMS

Property	Parameter	Method
Density	1550 kg/m ³ ± 70 kg/m ³	EN ISO 2811
Content of non-volatile components	66 - 76 %	EN ISO 3251
Weight loss on heating FLAMRO BMA	31 – 41 %	EN 3451-1
Weight loss on heating FLAMRO BMS/FLAMRO BMK	32 – 42 %	EN 3451-1
Flexibility	≤ 6 mm mandrel	EN ISO 1519

Product and performance of the FLAMRO Variant N II A:

Manufacturer	Description
FLAMRO Brandschutz- Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen	According to ETA-13/0922

Product and performance of the FLAMRO UBB

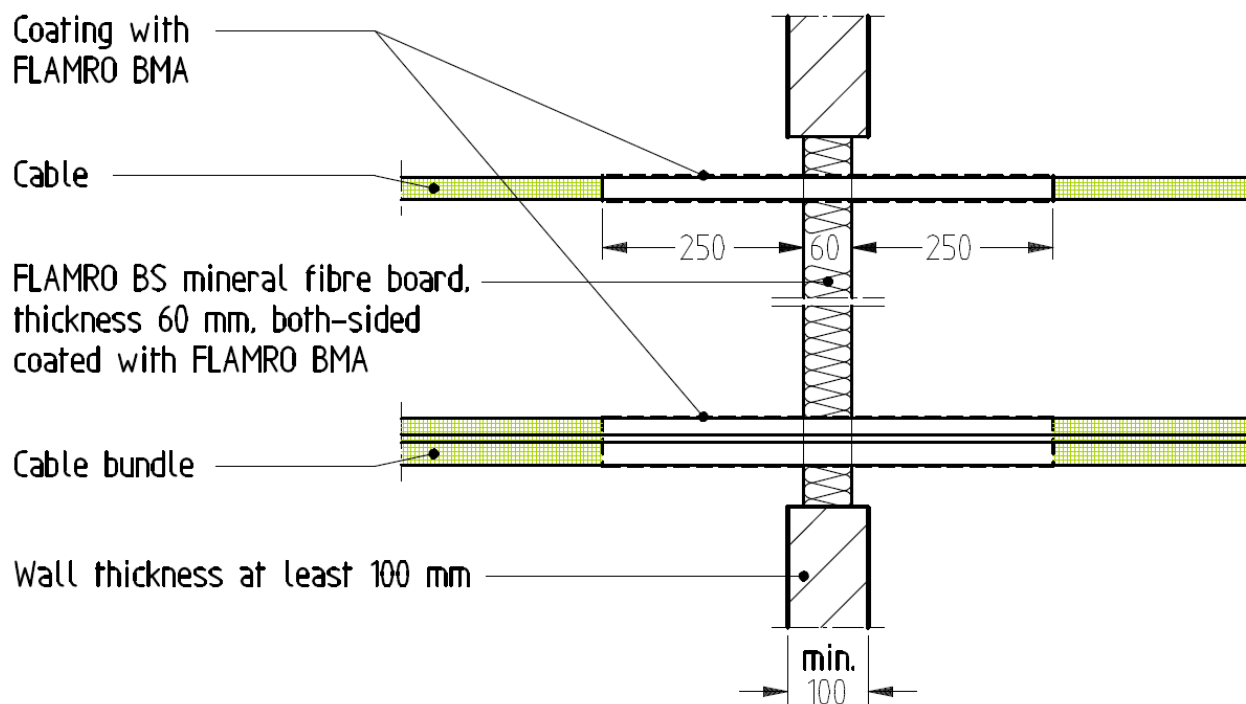
Manufacturer	Description
FLAMRO Brandschutz-Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen	Intumescent material in accordance with data sheet: Content of non-volatile components 97% - 100% EN ISO 3251 Weight loss on heating 52% - 62% EN ISO 3451-1 Dimensions (thickness of the sheet) 1,8mm - 2,2mm ETAG 026-2 clause B 10.1 Weight per unit area 1,7kg/m ² - 2,3kg/m ² TR 024 clause 3.1.5 Expansion ratio 10 - 20 times TR 024 clause 3.1.11 Expansion pressure 1N/mm ² - 2N/mm ² TR 024 clause 3.1.12, Test procedure: B

Annex 2

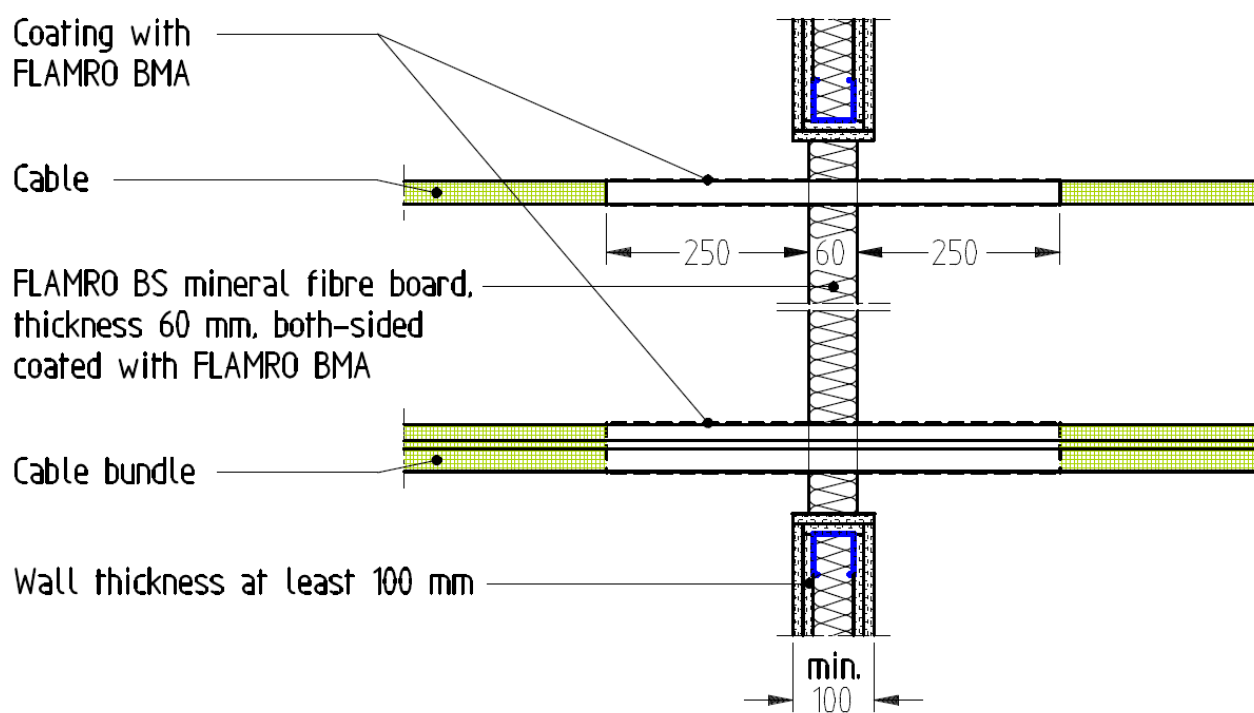
Detailed information for the confirmation of fire resistance

Use as part of a penetration seal for cables (single or bundled), cable carriers, e.g. cable trays, ladders, baskets;
Wall installation - section view

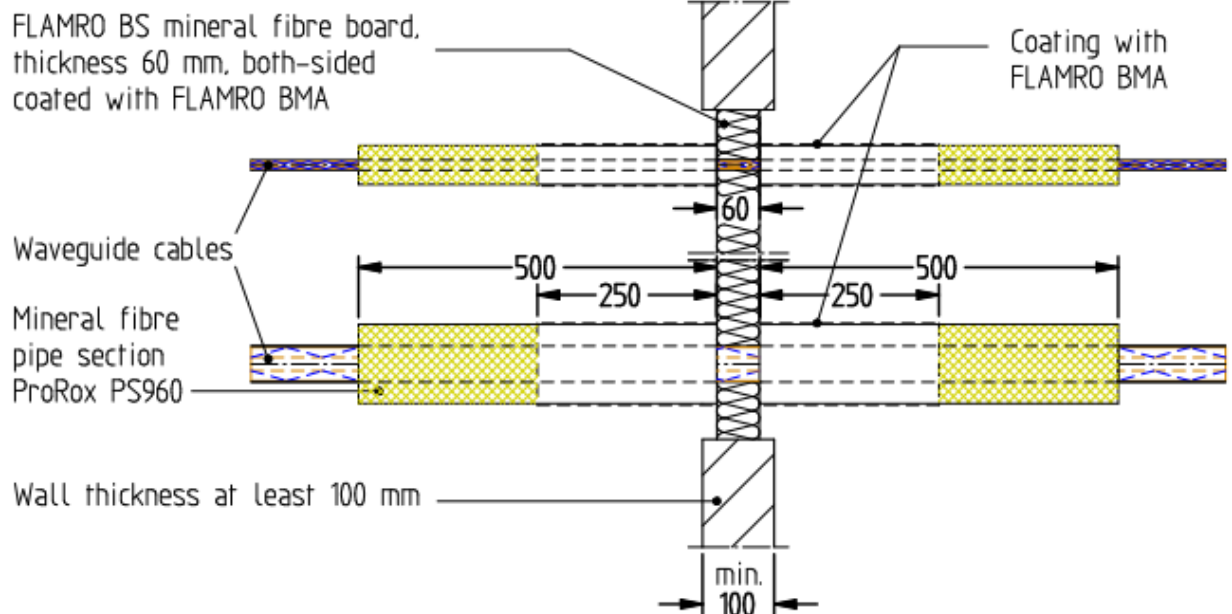
Penetration of cables and cable bundles, rigid wall



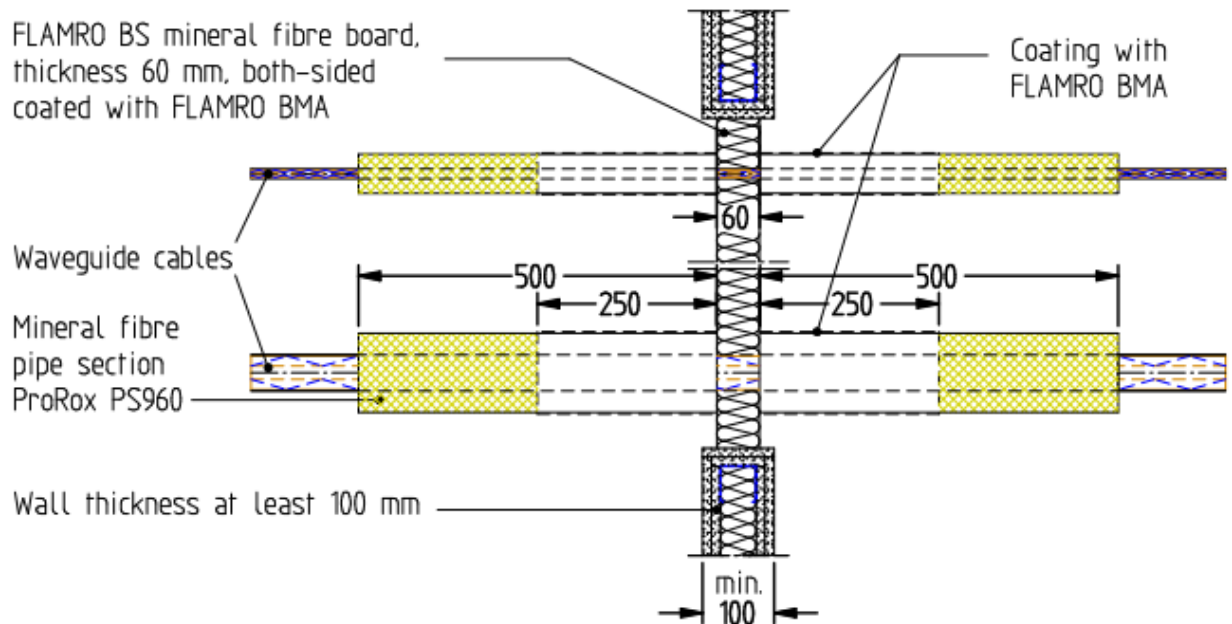
Penetration of cables and cable bundles, flexible wall



Penetration of waveguide cables, rigid wall

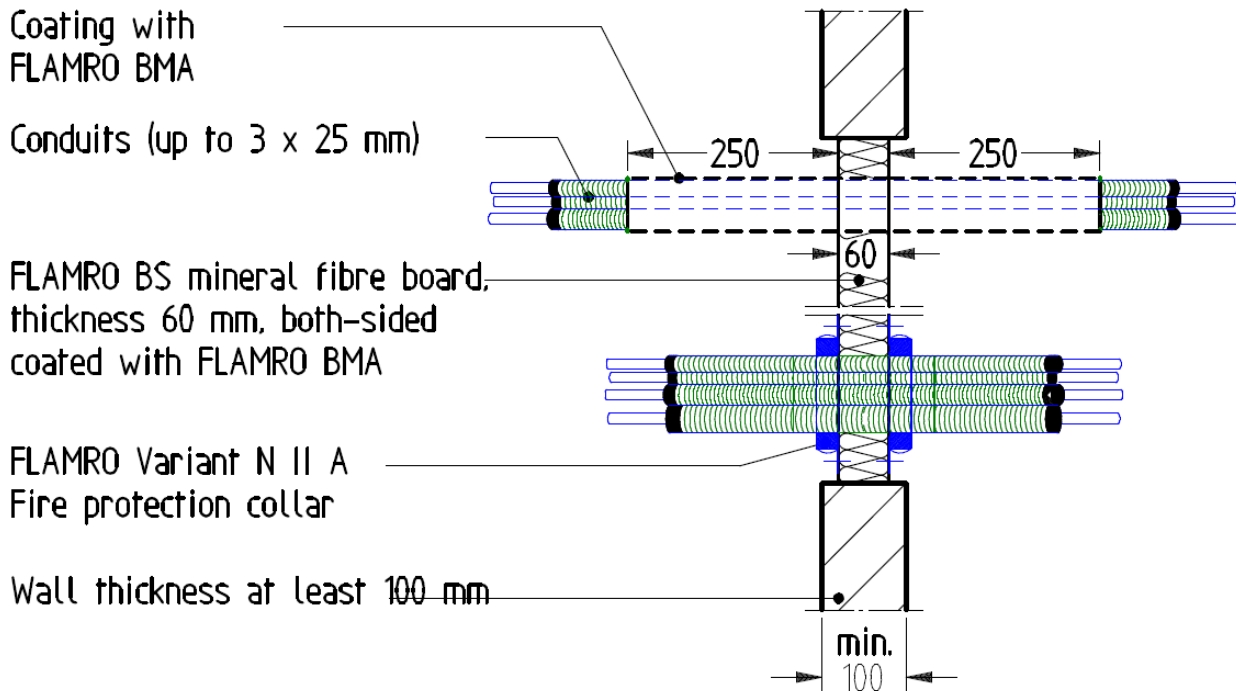


Penetration of waveguide cables, flexible wall

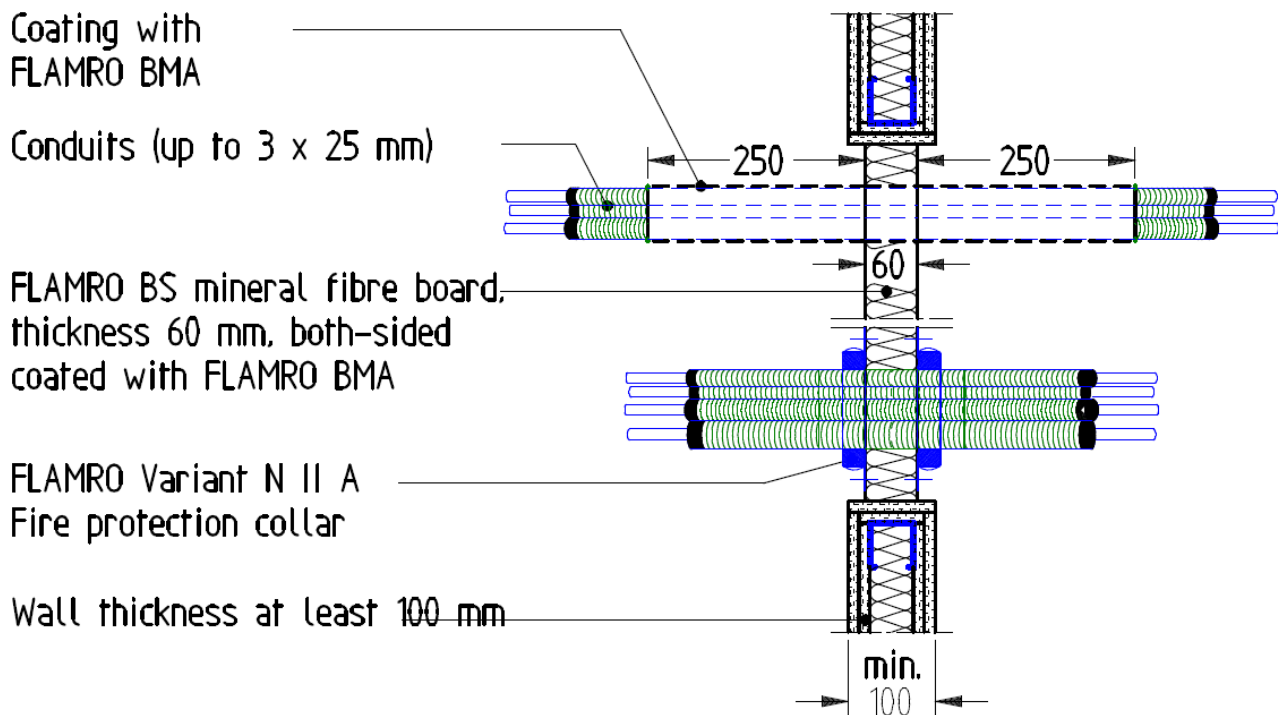


ProRox PS 960, case LI (local interrupted)

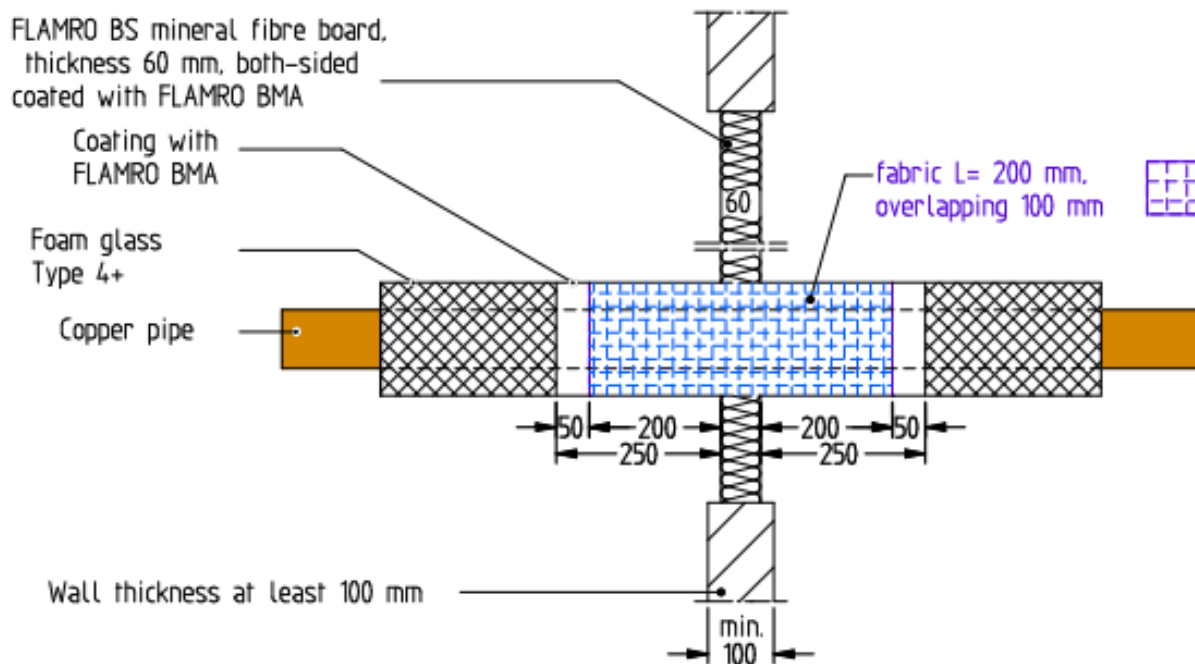
Penetration of conduits, rigid wall



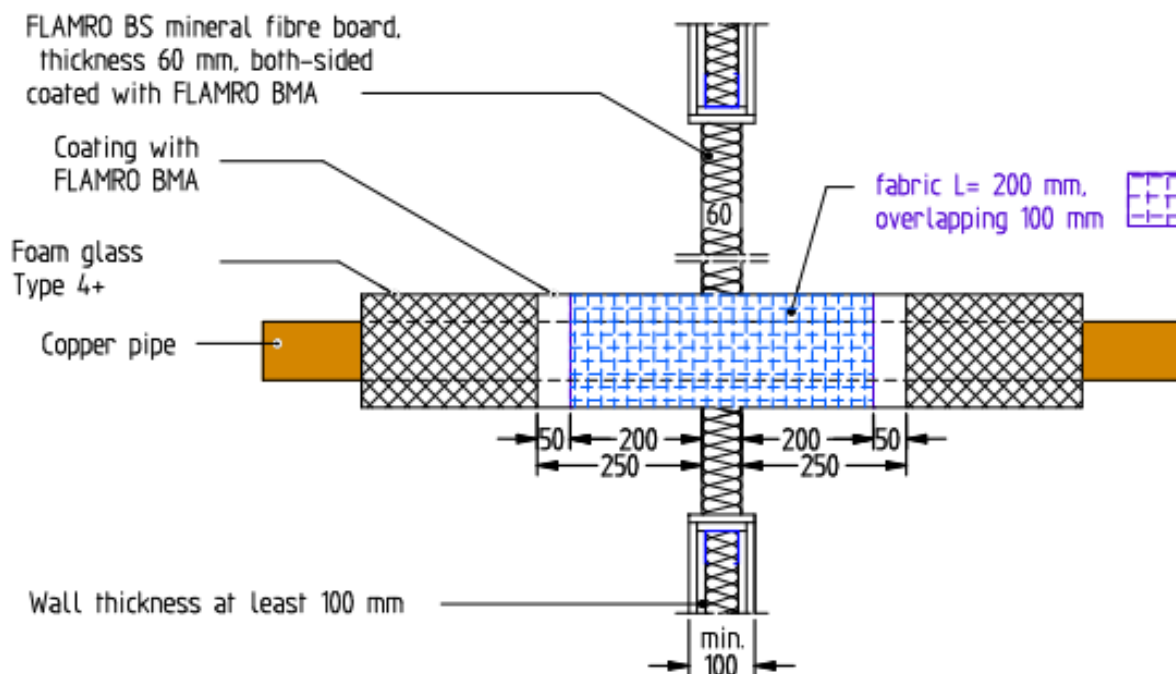
Penetration of conduits, flexible wall



Penetration of copper pipes with insulation of foam glass type 4+, rigid wall



Penetration of copper pipes with insulation of foam glass type 4+, flexible wall



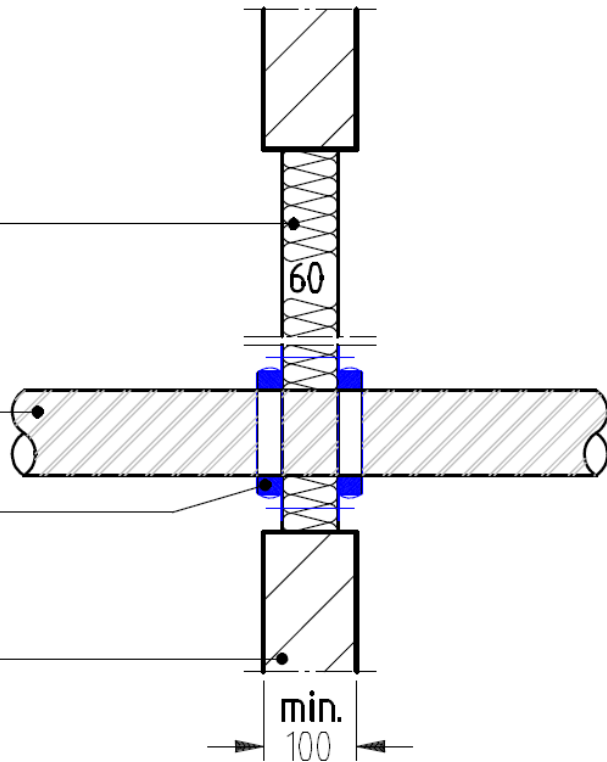
Penetration of combustible pipes, rigid wall

FLAMRO BS mineral fibre board,
thickness 60 mm, both-sided
coated with FLAMRO BMA

Combustible pipes

FLAMRO Variant N II A
fire protection collar

Wall thickness at least 100 mm



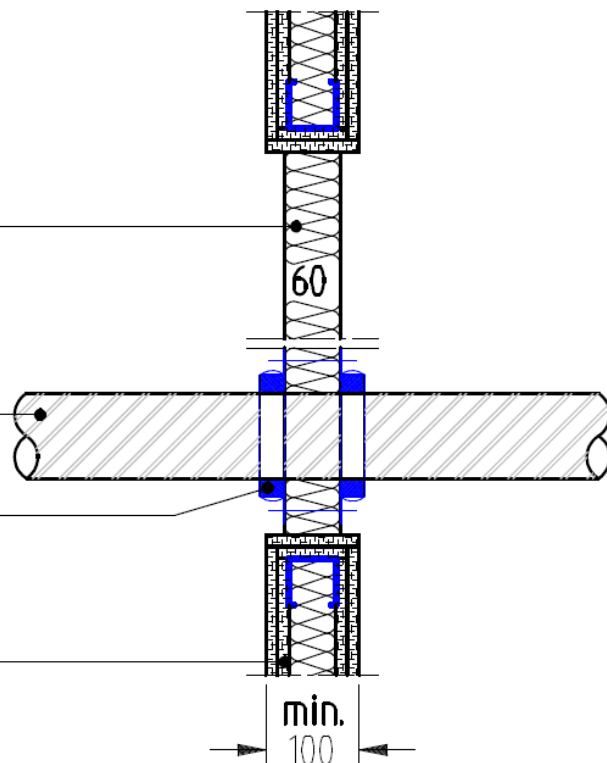
Penetration of combustible pipes, flexible wall

FLAMRO BS mineral fibre board,
thickness 60 mm, both-sided
coated with FLAMRO BMA

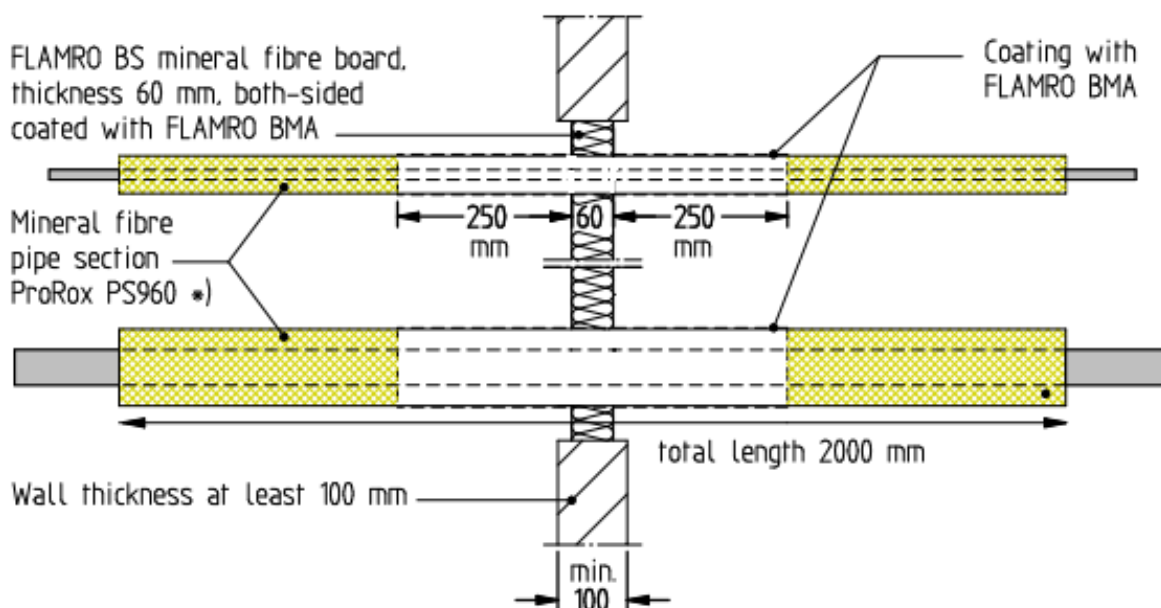
Combustible pipes

FLAMRO Variant N II A
fire protection collar

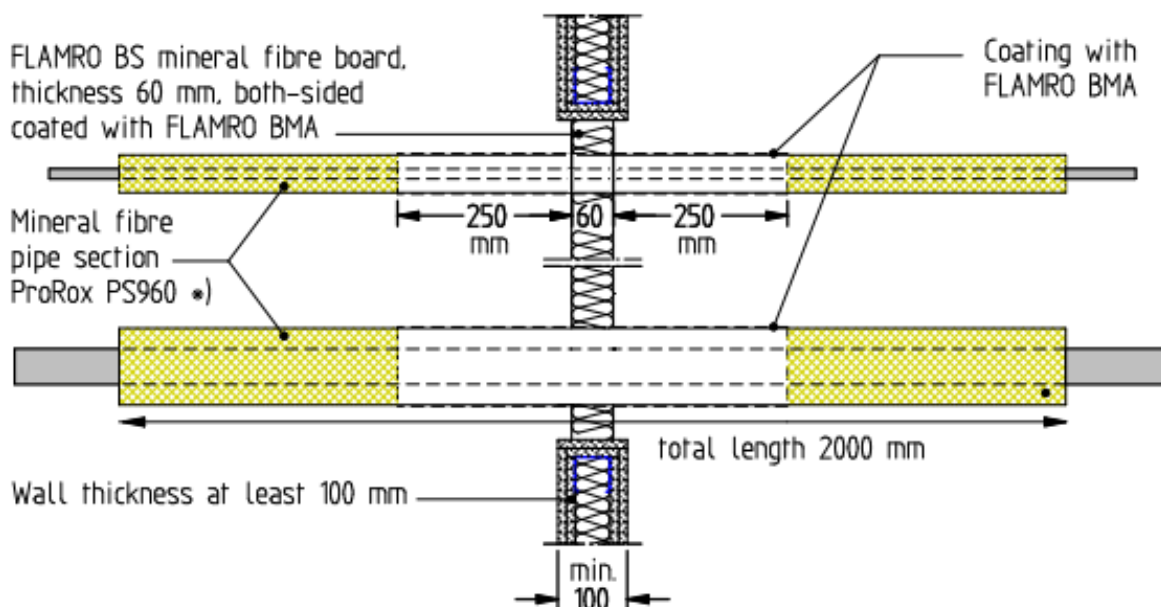
Wall thickness at least 100 mm



Penetration of non-combustible pipes, rigid wall

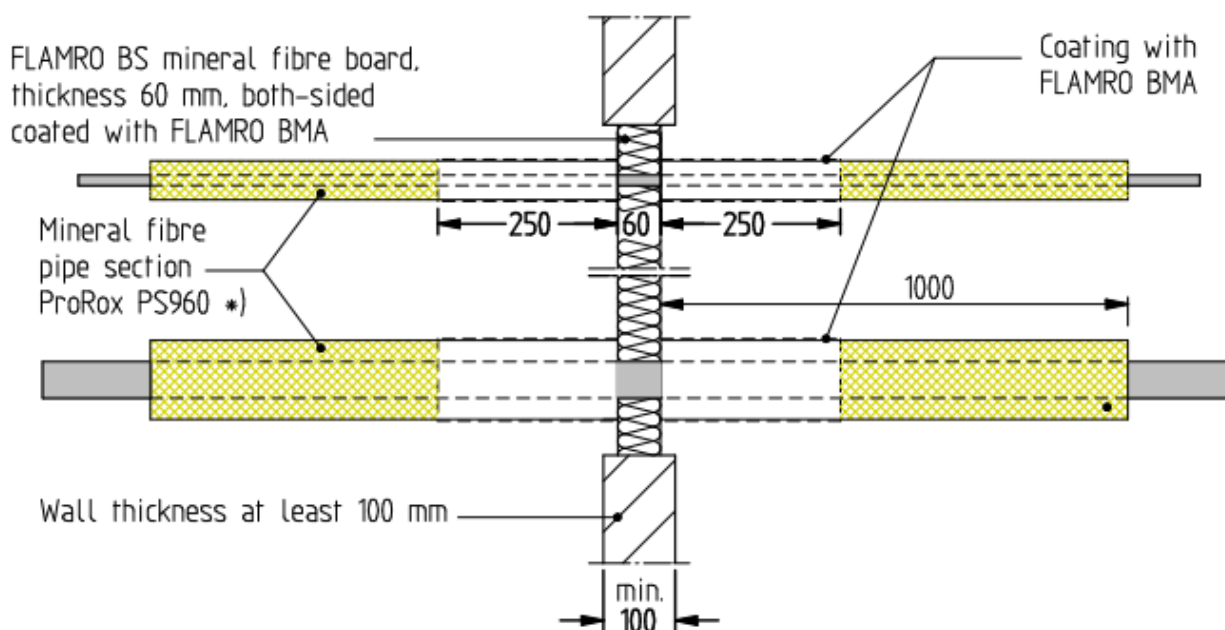


Penetration of non-combustible pipes, flexible wall

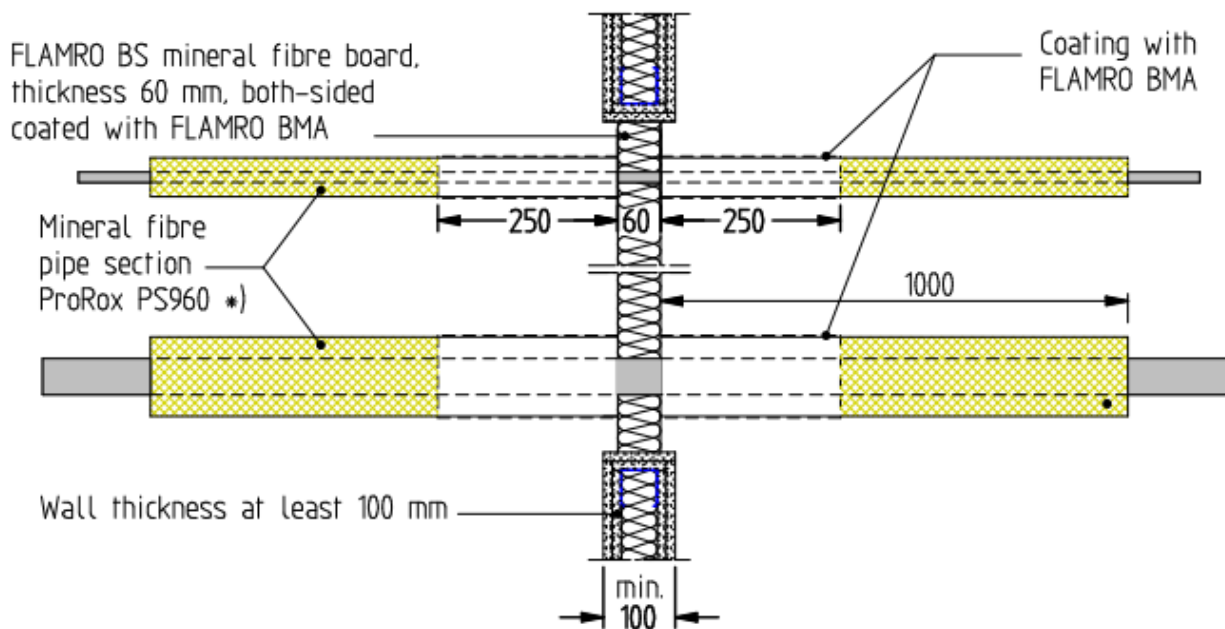


*) mineral fibre pipe section penetrating the penetration seal board (case LS)

Penetration of non-combustible pipes, rigid wall



Penetration of non-combustible pipes, flexible wall



*) ProRox PS 960, case LI (local interrupted)

Penetration of copper pipes with AF/Armaflex and FLAMRO BMA, rigid wall

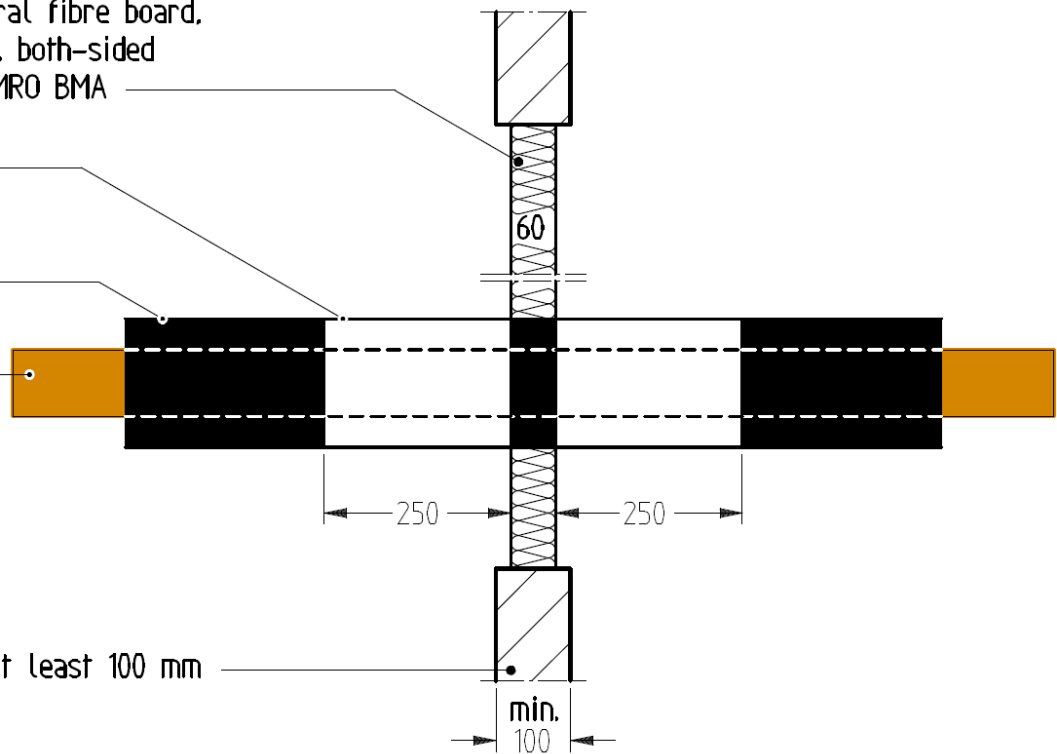
FLAMRO BS mineral fibre board,
thickness 60 mm, both-sided
coated with FLAMRO BMA

Coating with
FLAMRO BMA

AF/Armaflex

Copper pipe

Wall thickness at least 100 mm



Penetration of copper pipes with AF/Armaflex and FLAMRO BMA, flexible wall

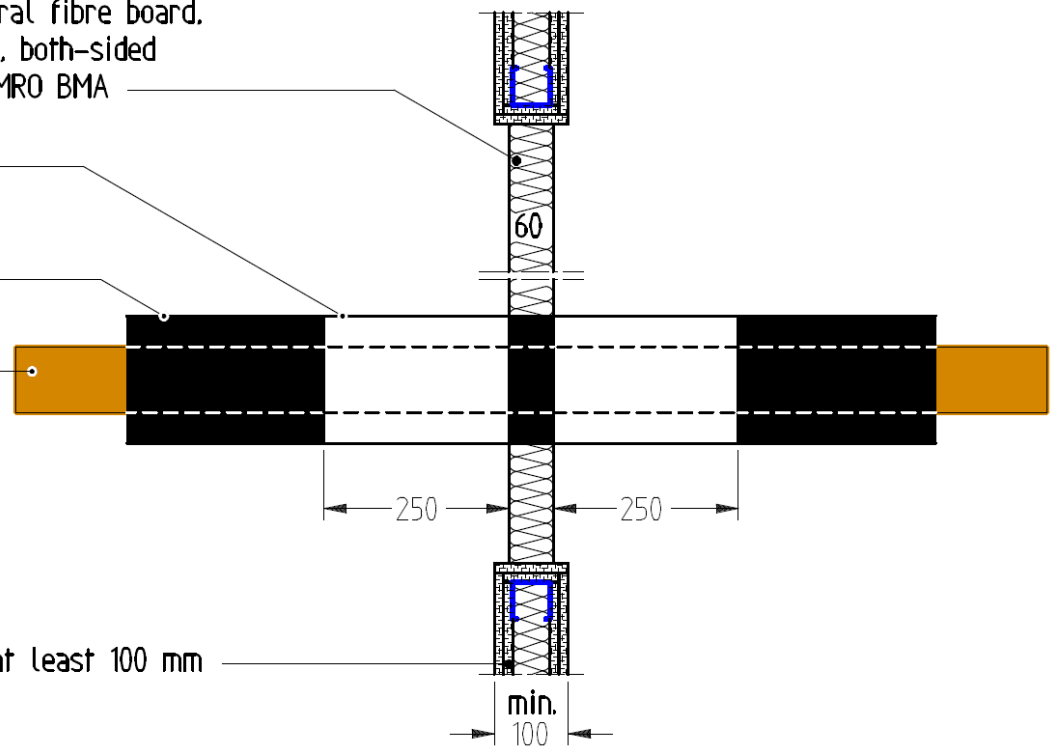
FLAMRO BS mineral fibre board,
thickness 60 mm, both-sided
coated with FLAMRO BMA

Coating with
FLAMRO BMA

AF/Armaflex

Copper pipe

Wall thickness at least 100 mm



Penetration of copper pipes with AF/Armaflex, rigid wall

FLAMRO BS mineral fibre board,
thickness 60 mm, both-sided
coated with FLAMRO BMA

Coating with
FLAMRO BMA

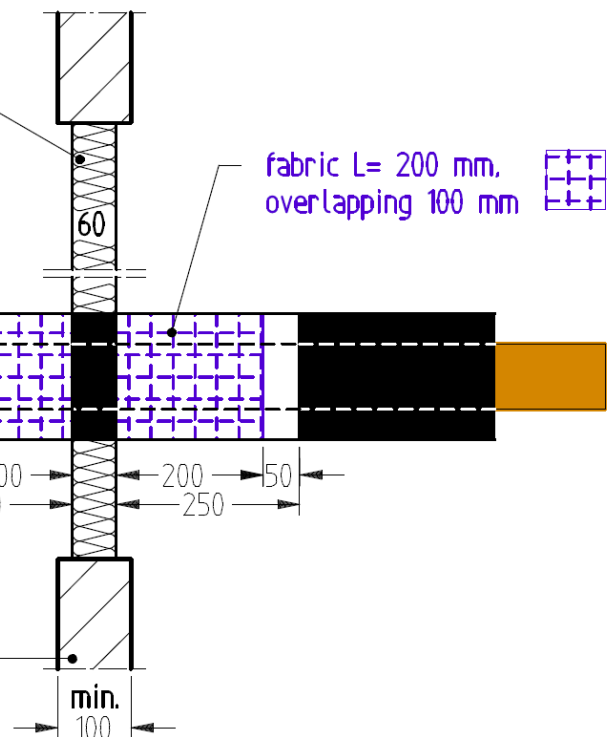
AF/Armaflex

Copper pipe

fabric L= 200 mm,
overlapping 100 mm



Wall thickness at least 100 mm



Penetration of copper pipes with AF/Armaflex, flexible wall

FLAMRO BS mineral fibre board,
thickness 60 mm, both-sided
coated with FLAMRO BMA

Coating with
FLAMRO BMA

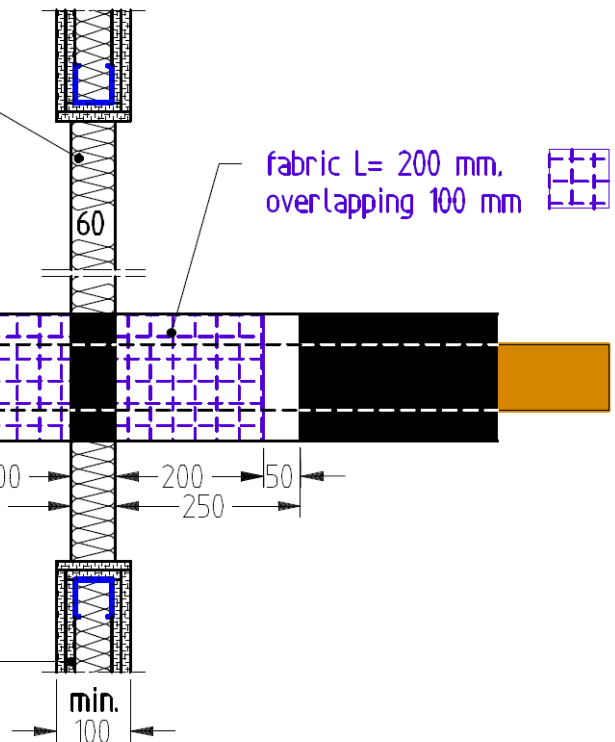
AF/Armaflex

Copper pipe

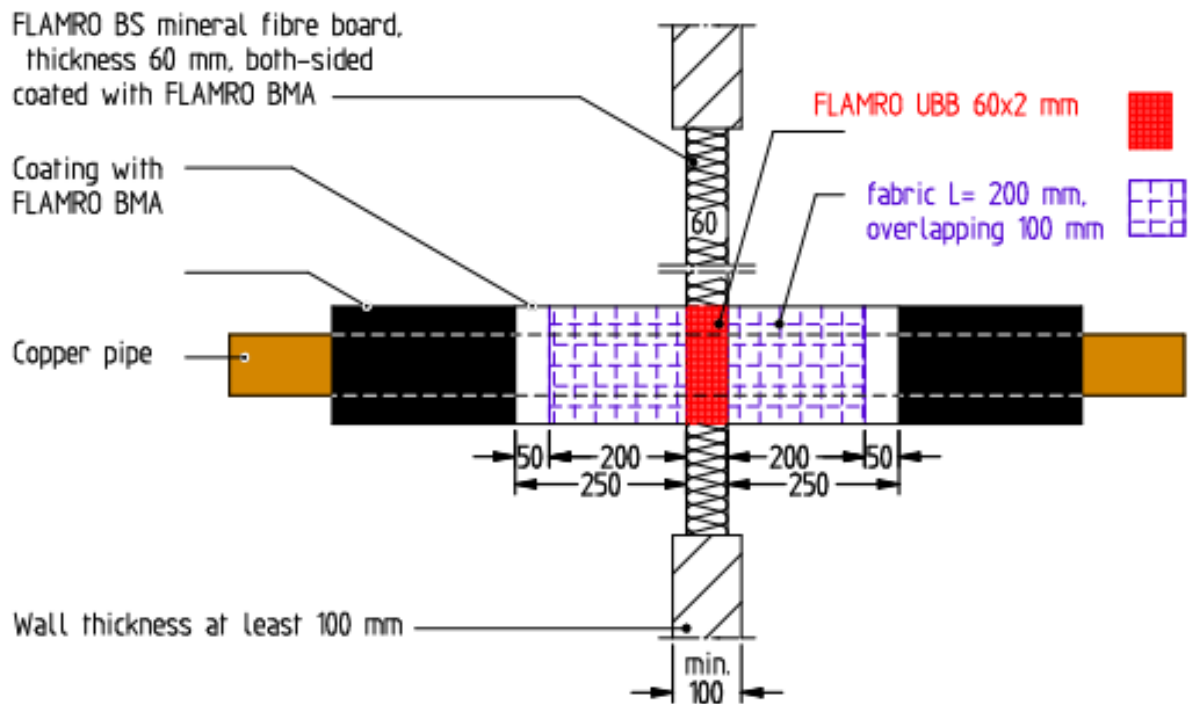
fabric L= 200 mm,
overlapping 100 mm



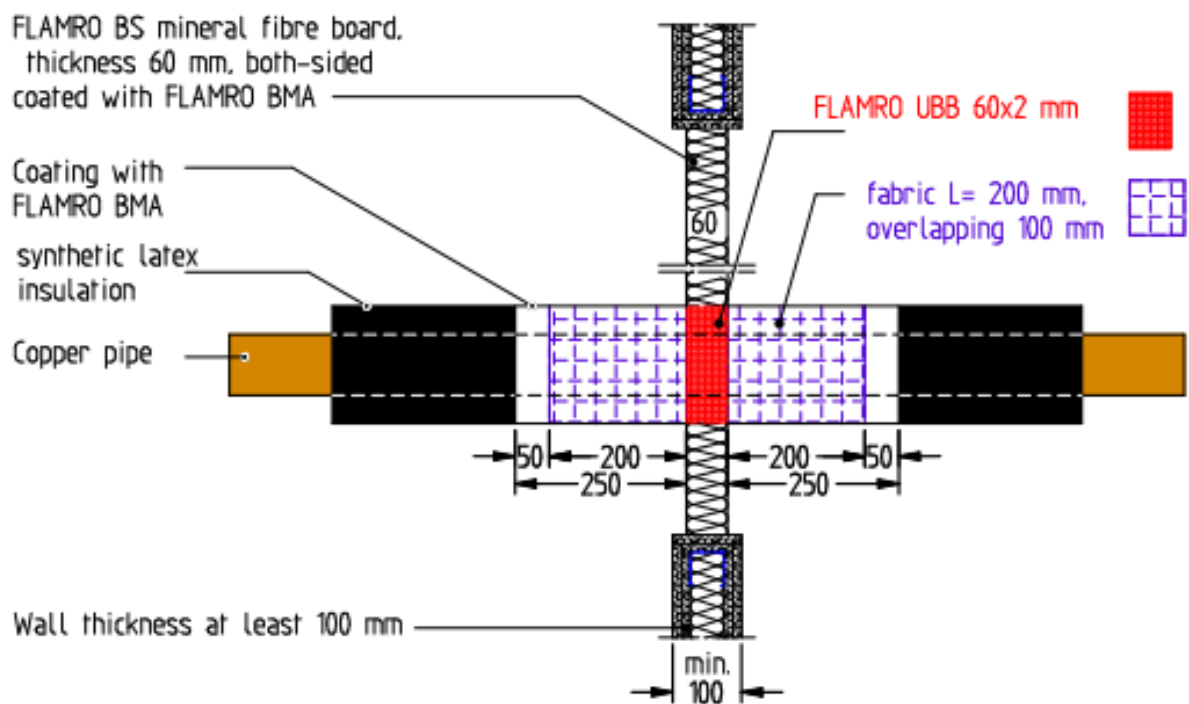
Wall thickness at least 100 mm



Penetration of copper pipes with synthetic latex insulation and FLAMRO UBB, rigid wall



Penetration of copper pipes with synthetic latex insulation and FLAMRO UBB, flexible wall



Synthetic latex insulations: AF/ Armaflex, Armaflex Ultima, Armaflex LS, NH/ Armaflex and Armaflex Protect

Annex 3

Description of the installations for the confirmation of fire resistance

The below applies to seals in at least 100 mm thick walls made from concrete, aerated concrete, masonry or light weight partition structures.

Classification EI 120/ E120

Type of installation	Description									
Cables	<p>Cable Penetrations EI120/E120</p> <ul style="list-style-type: none">Single cables with diameter up to 21 mm without support constructionWaveguide cables of type Heliflex HCA 158-XX J <p>The cables are insulated with ProRox PS960 with a length of 500 mm on both sides of the penetration as a local interrupted insulation. The insulation is coated with a 2-mm thick layer of FLAMRO BMA out to 250 mm from the surface of the penetration.</p> <table><tr><th>Type</th><th>Diameter Ø, mm</th><th>Insulation thickness, mm</th></tr><tr><td>≤ Heliflex 158-50 J</td><td>50,4</td><td>30</td></tr><tr><td>≤ Heliflex 158-38 J</td><td>14,3</td><td>20</td></tr></table> <ul style="list-style-type: none">Up to three bundled conduits made from steel (flexible or rigid), with or without cables. All conduits shall have a maximum outer diameter of 25 mm.Up to three bundled conduits made out polyolefin or PVC (flexible and rigid). All conduits shall have a maximum outer diameter of 16 mm.Up to three bundled conduits made of polyolefin or PVC (flexible and rigid), with or without cables wrapped with a single layer of FLAMRO UBB strip. All conduits shall have a maximum outer diameter of 25 mm, filled or not filled with cables.Flexible conduits up to a diameter of 32 mm and rigid conduits of polyolefin or PVC up to diameter 25 mm with or without cables/bundles of conduits with diameter up to 115 mm sealed with FLAMRO Variant N II A collar. <p>All conduits not sealed with FLAMRO Variant N II A collar shall be coated with a 2-mm thick layer of FLAMRO BMA out to 250 mm from the surface of the penetration</p>	Type	Diameter Ø, mm	Insulation thickness, mm	≤ Heliflex 158-50 J	50,4	30	≤ Heliflex 158-38 J	14,3	20
Type	Diameter Ø, mm	Insulation thickness, mm								
≤ Heliflex 158-50 J	50,4	30								
≤ Heliflex 158-38 J	14,3	20								
Plastic pipes	<p>Plastic Pipe Penetrations EI120/E120</p> <p>PE-HD pipes according to EN 1519-1 and EN ISO 15494</p> <p>Pipe installed with FLAMRO Variant N II A on each side of the penetration</p> <table><tr><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Collar lining, mm</th></tr><tr><td>≤ 50</td><td>1,8</td><td>6,4 × 25,4</td></tr><tr><td>≤ 110</td><td>10,0</td><td>19,2 × 25,4</td></tr></table> <p>Pipe end configurations: U/U, C/U, U/C and C/C</p> <p>Classification also valid for PE pipes according to EN 12201-2, EN 1519-1 and EN 1266-1, and for ABS pipes according to EN 1455-1 and SAN+ PVC pipes according to EN 1565-1</p>	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	≤ 50	1,8	6,4 × 25,4	≤ 110	10,0	19,2 × 25,4
Pipe Ø, mm	Wall thickness, mm	Collar lining, mm								
≤ 50	1,8	6,4 × 25,4								
≤ 110	10,0	19,2 × 25,4								

Type of installation	Description					
Metal pipes	Armaflex Ultima	Total length of sectional insulation partition wall penetration ≥ 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 12	$\geq 0,6$	19	1	EI 120, EI 120
		≤ 42	$\geq 1,0$	25	2	EI 90, EI 120
		≤ 54	$\geq 1,2$	25	2	EI 60, EI 120
		≤ 54	$\geq 1,2$	25	2	EI 90, EI 120*
		≤ 54	$\geq 1,2$	25	2	EI 60, EI 120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI 120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI 120*
	*In pairs					
	**zero clearance opening reveal					
	Armaflex LS	Total length of sectional insulation partition wall penetration ≥ 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 12	$\geq 0,6$	19	1	EI 60, EI 120
		≤ 42	$\geq 1,0$	25	2	EI 90, EI 120
		≤ 54	$\geq 1,2$	25	2	EI 60, EI 120
		≤ 54	$\geq 1,2$	25	2	EI 90, EI 120*
		≤ 54	$\geq 1,2$	25	2	EI 60, EI 120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI 120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI 120*
	*In pairs					
	**zero clearance opening reveal					
	NH/Armaflex	Total length of sectional insulation partition wall penetration ≥ 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 12	$\geq 0,6$	13	1	EI 90, EI 120
		≤ 42	$\geq 1,0$	25	2	EI 60, EI 120
		≤ 54	$\geq 1,2$	25	2	EI 60, EI 120
		≤ 54	$\geq 1,2$	25	2	EI 90, EI 120*
		≤ 54	$\geq 1,2$	25	2	EI 60, EI 120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI 120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI 120*
	*In pairs					
	**zero clearance opening reveal					

Type of installation	Description					
	Armaflex Protect	Total length of sectional insulation partition wall penetration \geq 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support \leq 500 mm from the seal	≤ 12	$\geq 0,6$	13	1	EI 90, E120
		≤ 42	$\geq 1,0$	25	2	EI 90, E120
		≤ 54	$\geq 1,2$	25	2	EI 60, E120*
		≤ 54	$\geq 1,2$	25	2	EI 60, E120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120*
		≤ 108	$\geq 2,5$	2x13	3	EI 60, E120
	*In pairs **zero clearance opening reveal					
	Foam glass Type T4+	Total length of sectional insulation partition wall penetration \geq 1800 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support \leq 500 mm from the seal	≤ 12	$\geq 0,6$	23	-	EI 90, E120
		≤ 42	$\geq 1,0$	23	-	EI 60, E120
		≤ 54	$\geq 1,2$	23	-	EI 60, E120*
		≤ 54	$\geq 1,2$	23	-	EI 60, E120**
		$\leq 88,9$	$\geq 2,0$	37	-	EI 90, E120
		$\leq 88,9$	$\geq 2,0$	37	-	EI 90, E90*
		≤ 108	$\geq 2,5$	37	-	E 90, E120
	*In pairs **zero clearance opening reveal					
	ProRox PS960	Total length of sectional insulation partition wall penetration \geq 2000 mm. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support \leq 500 mm from the seal	≤ 54	$\geq 1,2$	40	-	EI 120, E120
		≤ 54	$\geq 1,2$	40	-	EI 120, E120*
		≤ 54	$\geq 1,2$	40	-	EI 120, E120**
		≤ 108	$\geq 2,5$	40	-	EI 90, E120
	*In pairs **zero clearance opening reveal					

Type of installation	Description					
	ProRox PS960	The metal pipes are insulated with Rockwool ProRox PS 960 with a length of 1000 mm on both sides of the penetration as a local interrupted insulation. The insulation is coated with a 2 mm thick layer of “FLAMRO BMA” out to a distance of 250 mm from the surface of the penetration (wall penetration)				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper	≤ 30	1,0-14,3	20	-	EI 120, E120
	Steel	≤ 42	1,0-14,3	30		EI90, E120
	Cast iron	≤ 89	2,0-14,3	40		EI90, E120
	Stainless	≤ 108	2,9-14,3	40	-	EI120, E120
	steel/first support ≤ 500 mm from the seal					
	Pipe end configurations: C/U and C/C					
	AF/ Armaflex rubber	The metal pipes are insulated with AF/Armaflex with a length of minimum 470 mm for Ø ≤ 42 mm pipes and minimum 970 mm for ≤ 89 mm pipes on both sides of the penetration as a local sustained insulation. The insulation is coated with a 2-mm thick layer of FLAMRO BMA out to a distance of 250 mm from the surface of the penetration. A 200-mm long glass fibre mesh is embedded in the coating				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	Classification	
	Copper	≤ 12	≥ 0,5	15	EI 60/E 120	
	Steel	≤ 42	≥ 1,0	36,5	EI 60/E 120	
	Cast iron	≤ 89	2,0 – 14-3	41,5	EI 45/E 90	
	Stainless steel					
	Pipe end configurations C/U and C/C					

The classification is declared under the following conditions:

Field of application (Chapter 5.1 classification report)	<p>Installation in walls: At least 100 mm thick walls made from masonry, concrete or aerated concrete or lightweight partition wall with steel or timber studs.</p> <p>The light weight partition shall have at least two boards on each side and the total thickness of the boards shall be at least 25 mm on each side. For partitions with timber studs, no part of the penetrations seal may be closer to the studs than 100 mm. The gap between the penetration seal and the stud is closed by using 100 mm insulation with classification A1 or A2 according to EN 13501-1.</p> <p>The first suspension of the service support for the cables, plastic pipes and bundle of conduits shall be arranged at maximum 250 mm from the penetration seal surface.</p> <p>The first suspension of the service support of metal pipes shall be arranged in maximum 300 mm from the penetration seal surface.</p>
Thickness of the penetration seal	60 mm
Maximum size of the penetration seal	1200 mm width x 1800 mm height and 1200 mm height x 1800 mm width
Distances	<p>Lateral distance between the cable trays to seal edge: 0 mm,</p> <p>Sideways distance between two adjoining cable trays: min. 0 mm Distance below cable trays to seal edge: 0 mm</p> <p>Distance of the cables to the upper seal edge: min. 50 mm</p> <p>Vertical distance between cable trays: min. 50 mm</p>

The below installations fulfil the requirements for the above classification unless another is given specifically in the tables

Type of installation	Description																																
Cables	<p>Cable penetrations EI 90/E 120</p> <ul style="list-style-type: none">Single or bundled electrical lines and cables (fibre optic cables, also) up to a maximum diameter of 80 mm for a single cable.Cable bundle up to a maximum diameter of 100 mm with maximum 21 mm for the individual cables.Up to three bundled conduits, flexible or rigid, with or without cables made from steel. All conduits shall have a maximum outer diameter of 25 mm.Up to three bundled conduits, with or without cables made from polyolefin or PVC (flexible and rigid). All conduits shall have a maximum outer diameter of 16 mm.Up to three bundled conduits, with or without cables made from polyolefin or PVC (flexible and rigid) wrapped with a single layer of FLAMRO UBB strip. All conduits shall have a maximum outer diameter of 25 mm.Flexible conduits up to a diameter of 32 mm and rigid conduits made from polyolefin or PVC up to diameter 25 mm with or without cables/bundles of conduits with diameter up to 115 mm sealed with FLAMRO Variant N II A collar.Single core lines with diameter up to 24 mm <p>All conduits not sealed with FLAMRO Variant N II A collar shall be coated with a 2-mm thick layer of FLAMRO BMA out to 250 mm from the surface of the penetration</p>																																
Plastic pipes	<p>Plastic pipe penetrations EI 90/E 120</p> <p>PVC-U pipes according to EN 1452-1, EN 1329-1, EN 1453-1, EN 1452-1 and EN ISO 15493</p> <p>Pipe installed with FLAMRO Variant N II A on each side of the penetration</p> <table><tr><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Collar lining, mm</th></tr><tr><td>≤ 50</td><td>1,8 – 5,6</td><td>6,4 × 25,4</td></tr><tr><td>≤ 75</td><td>> 1,8 - < 8,1</td><td>12,8 × 25,4</td></tr><tr><td>≤ 90</td><td>> 1,8 - < 8,1</td><td>17,1 × 25,4</td></tr><tr><td>≤ 110</td><td>> 1,8 - < 8,1</td><td>19,2 × 25,4</td></tr></table> <p>Pipe end configurations: U/U, C/U, U/C and C/C</p> <p>Classification also valid for PVC-C pipes according to EN 1566-1</p> <p>PE-HD pipes according to EN 1519-1 and EN ISO 15494</p> <p>Pipe installed with FLAMRO Variant N II A on each side of the penetration</p> <table><tr><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Collar lining, mm</th></tr><tr><td rowspan="2">≤ 50</td><td>1,8</td><td rowspan="2">6,4 × 25,4</td></tr><tr><td>> 1,8 – 4,6</td></tr><tr><td>≤ 75</td><td>1,9 – 10,0</td><td>12,8 × 25,4</td></tr><tr><td>≤ 90</td><td>2,7 – 10,0</td><td>17,1 × 25,4</td></tr><tr><td rowspan="2">≤ 110</td><td>2,7 - < 10,0</td><td rowspan="2">19,2 × 25,4</td></tr><tr><td>10,0</td></tr></table> <p>Pipe end configurations: U/U, C/U, U/C and C/C</p> <p>Classification also valid for PE pipes according to EN 12201-2, EN 1519-1 and EN 1266-1, and for ABS pipes according to EN 1455-1 and SAN+ PVC pipes according to EN 1565-1</p>	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	≤ 50	1,8 – 5,6	6,4 × 25,4	≤ 75	> 1,8 - < 8,1	12,8 × 25,4	≤ 90	> 1,8 - < 8,1	17,1 × 25,4	≤ 110	> 1,8 - < 8,1	19,2 × 25,4	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	≤ 50	1,8	6,4 × 25,4	> 1,8 – 4,6	≤ 75	1,9 – 10,0	12,8 × 25,4	≤ 90	2,7 – 10,0	17,1 × 25,4	≤ 110	2,7 - < 10,0	19,2 × 25,4	10,0
Pipe Ø, mm	Wall thickness, mm	Collar lining, mm																															
≤ 50	1,8 – 5,6	6,4 × 25,4																															
≤ 75	> 1,8 - < 8,1	12,8 × 25,4																															
≤ 90	> 1,8 - < 8,1	17,1 × 25,4																															
≤ 110	> 1,8 - < 8,1	19,2 × 25,4																															
Pipe Ø, mm	Wall thickness, mm	Collar lining, mm																															
≤ 50	1,8	6,4 × 25,4																															
	> 1,8 – 4,6																																
≤ 75	1,9 – 10,0	12,8 × 25,4																															
≤ 90	2,7 – 10,0	17,1 × 25,4																															
≤ 110	2,7 - < 10,0	19,2 × 25,4																															
	10,0																																

Type of installation	Description					
Metal pipes	Armaflex Ultima	Total length of sectional insulation partition wall penetration ≥ 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 12	$\geq 0,6$	19	1	EI 120, E120
		≤ 42	$\geq 1,0$	25	2	EI 90, E120
		≤ 54	$\geq 1,2$	25	2	EI 60, E120
		≤ 54	$\geq 1,2$	25	2	EI 90, E120*
		≤ 54	$\geq 1,2$	25	2	EI 60, E120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120*
	*In pairs					
	**zero clearance opening reveal					
	Armaflex LS	Total length of sectional insulation partition wall penetration ≥ 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 12	$\geq 0,6$	19	1	EI 60, E120
		≤ 42	$\geq 1,0$	25	2	EI 90, E120
		≤ 54	$\geq 1,2$	25	2	EI 60, E120
		≤ 54	$\geq 1,2$	25	2	EI 90, E120*
		≤ 54	$\geq 1,2$	25	2	EI 60, E120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120*
	*In pairs					
	**zero clearance opening reveal					
	NH/Armaflex	Total length of sectional insulation partition wall penetration ≥ 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 12	$\geq 0,6$	13	1	EI 90, E120
		≤ 42	$\geq 1,0$	25	2	EI 60, E120
		≤ 54	$\geq 1,2$	25	2	EI 60, E120
		≤ 54	$\geq 1,2$	25	2	EI 90, E120*
		≤ 54	$\geq 1,2$	25	2	EI 60, E120**
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, E120*
	*In pairs					
	**zero clearance opening reveal					

Type of installation	Description			
	AF/Armaflex	The metal pipes are insulated with AF/Armaflex with a length of minimum 470 mm for $\varnothing \leq 42$ mm pipes and minimum 970 mm for ≤ 89 mm pipes on both sides of the penetration as a local sustained insulation. The insulation is coated with a 2-mm thick layer of FLAMRO BMA out to a distance of 250 mm from the surface of the penetration.		
		Pipe \varnothing , mm	Wall thickness, mm	Insulation thickness, mm
	Copper	≤ 12	$\geq 0,5$	15
	Steel			
	Cast iron	≤ 42	$\geq 1,0$	36,5
	Stainless steel	≤ 89	2,0 – 14-3	41,5
				Classification
				EI 60/E 90
				EI 60/E 60
				EI 45/E 90
	Pipe end configurations: C/U and C/C			
	AF/Armaflex	The metal pipes are insulated with AF/Armaflex with a length of minimum 470 mm for $\varnothing \leq 42$ mm pipes and minimum 970 mm for ≤ 89 mm pipes on both sides of the penetration as a local sustained insulation. The insulation is coated with a 2 mm thick layer of FLAMRO BMA out to a distance of 250 mm from the surface of the penetration. A 200 mm long glass fibre mesh is embedded in the coating		
		Pipe \varnothing , mm	Wall thickness, mm	Insulation thickness, mm
	Copper	≤ 12	$\geq 0,5$	15
	Steel			
	Cast iron	≤ 42	$\geq 1,0$	36,5
	Stainless steel	≤ 89	2,0 – 14-3	41,5
				Classification
				EI 60/E 120
				EI 60/E 120
				EI 45/E 90
	Pipe end configurations: C/U and C/C			
	AF/Armaflex	The metal pipes are insulated with AF/Armaflex with a length of minimum 470 mm for $\varnothing \leq 42$ mm pipes and minimum 970 mm for ≤ 89 mm pipes on both sides of the penetration as a local sustained insulation. The insulation is coated with a 2 mm thick layer of FLAMRO BMA out to a distance of 250 mm from the surface of the penetration. A 200 mm long glass fibre mesh is embedded in the coating and the FLAMRO UBB strip(60 × 2 mm) is wrapped around the insulation in the centre of the penetration. The FLAMRO UBB thickness is 1 × 60 mm × 2,0 mm for $\varnothing \leq 42$ mm pipes and 2 × 60 mm × 2,0 mm for $\varnothing \leq 89$ mm pipes		
		Pipe \varnothing , mm	Wall thickness, mm	Insulation thickness, mm
	Copper	≤ 12	$\geq 0,5$	15
	Steel			
	Cast iron	≤ 42	$\geq 1,0$	36,5
	Stainless steel	≤ 89	2,0 – 14-3	41,5
				Classification
				EI 90/E 120
				EI 90/E 120
				EI 60/E 120
	Pipe end configurations: C/U and C/C			

Type of installation	Description					
	Armaflex Protect	Total length of sectional insulation partition wall penetration \geq 2000 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support \leq 500 mm from the seal	\leq 12	\geq 0,6	13	1	EI 90, EI 120
		\leq 42	\geq 1,0	25	2	EI 90, EI 120
		\leq 54	\geq 1,2	25	2	EI 60, EI 120*
		\leq 54	\geq 1,2	25	2	EI 60, EI 120**
		\leq 88,9	\geq 2,0	25	3	EI 60, EI 120
		\leq 88,9	\geq 2,0	25	3	EI 60, EI 120*
		\leq 108	\geq 2,5	2x13	3	EI 60, EI 120
	*In pairs **zero clearance opening reveal					
	Foam glass Type T4+	Total length of sectional insulation partition wall penetration \geq 1800 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support \leq 500 mm from the seal	\leq 12	\geq 0,6	23	-	EI 90, EI 120
		\leq 42	\geq 1,0	23	-	EI 60, EI 120
		\leq 54	\geq 1,2	23	-	EI 60, EI 120*
		\leq 54				EI 60, EI 120**
		\leq 88,9	\geq 2,0	37	-	EI 90, EI 120
		\leq 88,9	\geq 2,0	37	-	EI 90, EI 90*
		\leq 108	\geq 2,5	37	-	E 90, EI 120
	*In pairs **zero clearance opening reveal					
	ProRox PS960	Total length of sectional insulation partition wall penetration \geq 2000 mm. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper Steel Cast iron Stainless steel/first support \leq 500 mm from the seal	\leq 54	\geq 1,2	40	-	EI 120, EI 120
		\leq 54	\geq 1,2	40		EI 120, EI 120*
		\leq 54	\geq 1,2	40		EI 120, EI 120**
		\leq 108	\geq 2,5	40	-	E 90, EI 120
	*In pairs **zero clearance opening reveal					

The classification is declared under the following conditions:

Field of application (Chapter 5.1 classification report)	<p>Installation in walls: At least 100 mm thick walls made from masonry, concrete or aerated concrete or lightweight partition wall with steel or timber studs.</p> <p>The light weight partition shall have at least two boards on each side and the total thickness of the boards shall be at least 25 mm on each side. For partitions with timber studs, no part of the penetrations seal may be closer to the studs than 100 mm. The gap between the penetration seal and the stud is closed by using 100 mm insulation with classification A1 or A2 according to EN 13501-1.</p> <p>The first suspension of the service support for the cables, plastic pipes and bundle of conduits shall be arranged at maximum 250 mm from the penetration seal surface.</p> <p>The first suspension of the service support of metal pipes shall be arranged in maximum 300 mm from the penetration seal surface.</p>
Thickness of the penetration seal	60 mm
Maximum size of the penetration seal	1200mm width x 1800mm height
Distances	<p>Lateral distance between the cable trays to seal edge: 0 mm,</p> <p>Sideways distance between two adjoining cable trays: min. 0 mm Distance below cable trays to seal edge: 0 mm</p> <p>Distance of the cables to the upper seal edge: min. 50 mm</p> <p>Vertical distance between cable trays: min. 50 mm</p>

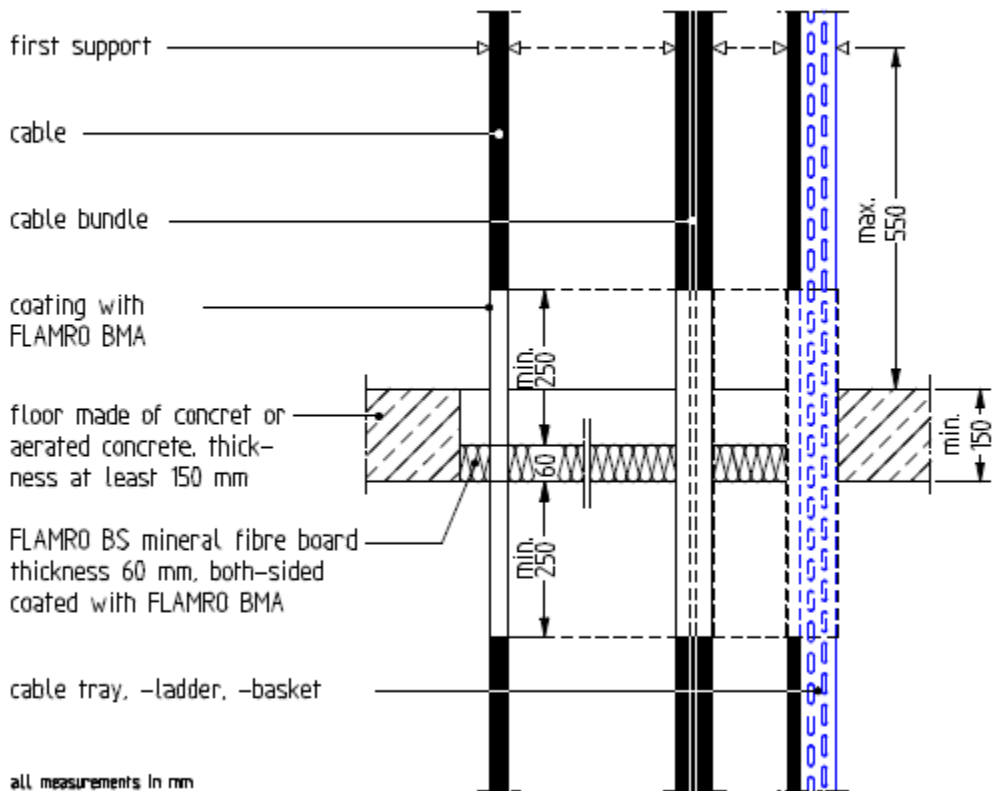
Annex 4

Detailed information for the confirmation of fire resistance

Use as part of a penetration seal for cables (single or bundled), cable carriers, e.g. cable trays, ladders, baskets;
Floor installation - section view

Section view floor installation (rigid floor)

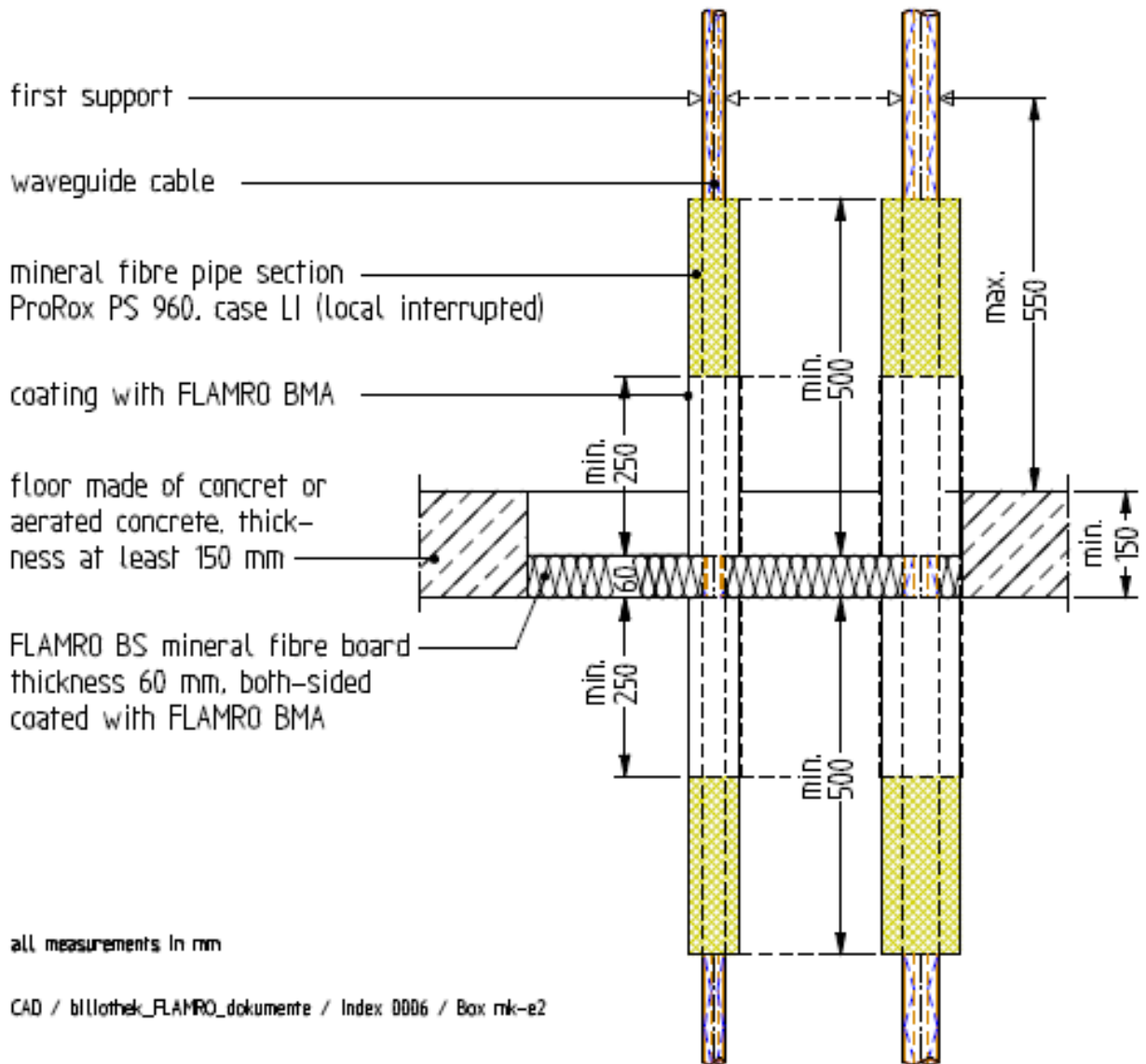
Penetration of cables, cable bundles, cable trays, -ladders, -baskets



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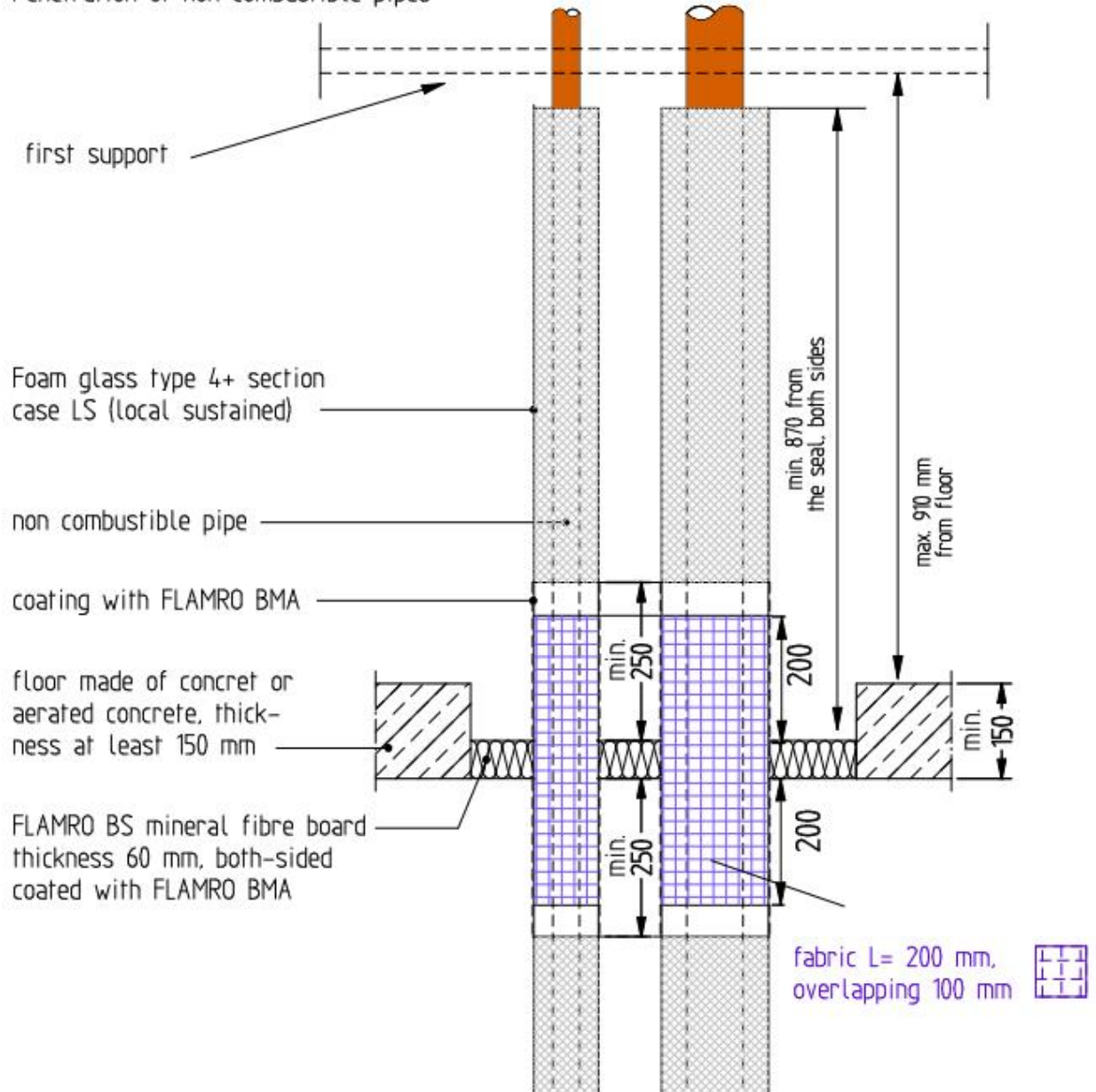
Section view floor installation (rigid floor)

Penetration of waveguide cables



Section view floor installation (rigid floor)

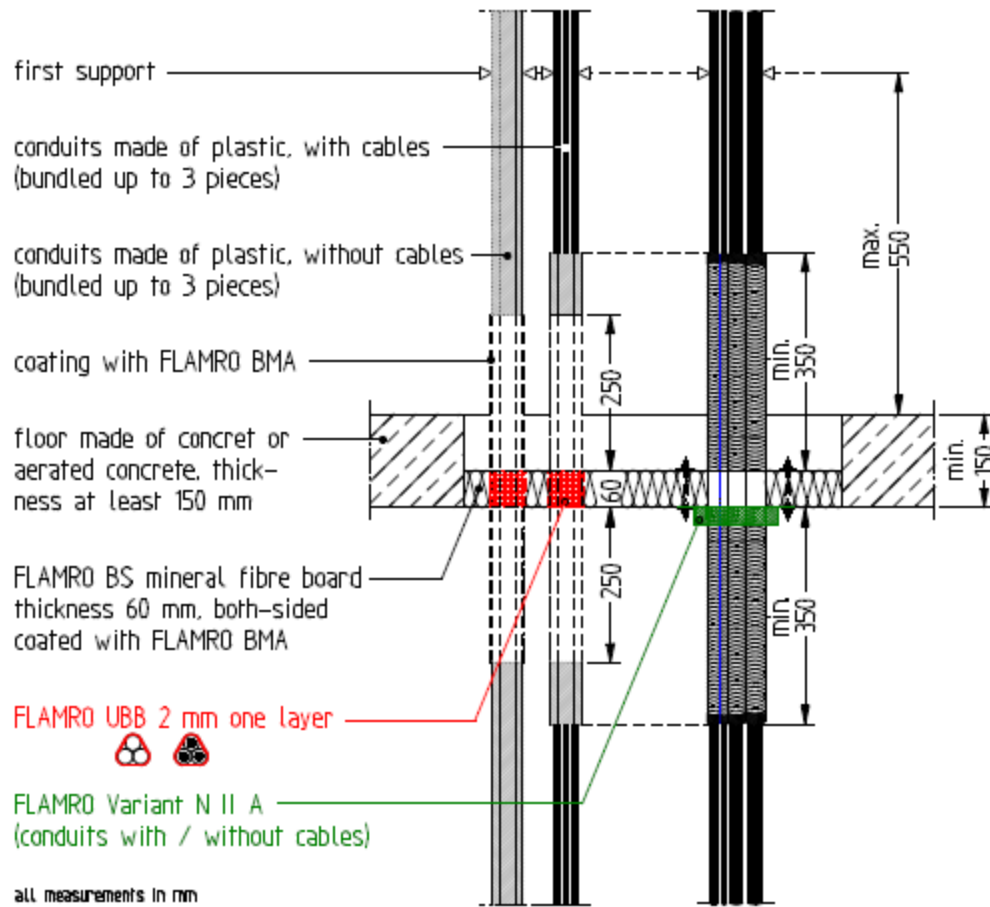
Penetration of non combustible pipes



all measurements in mm

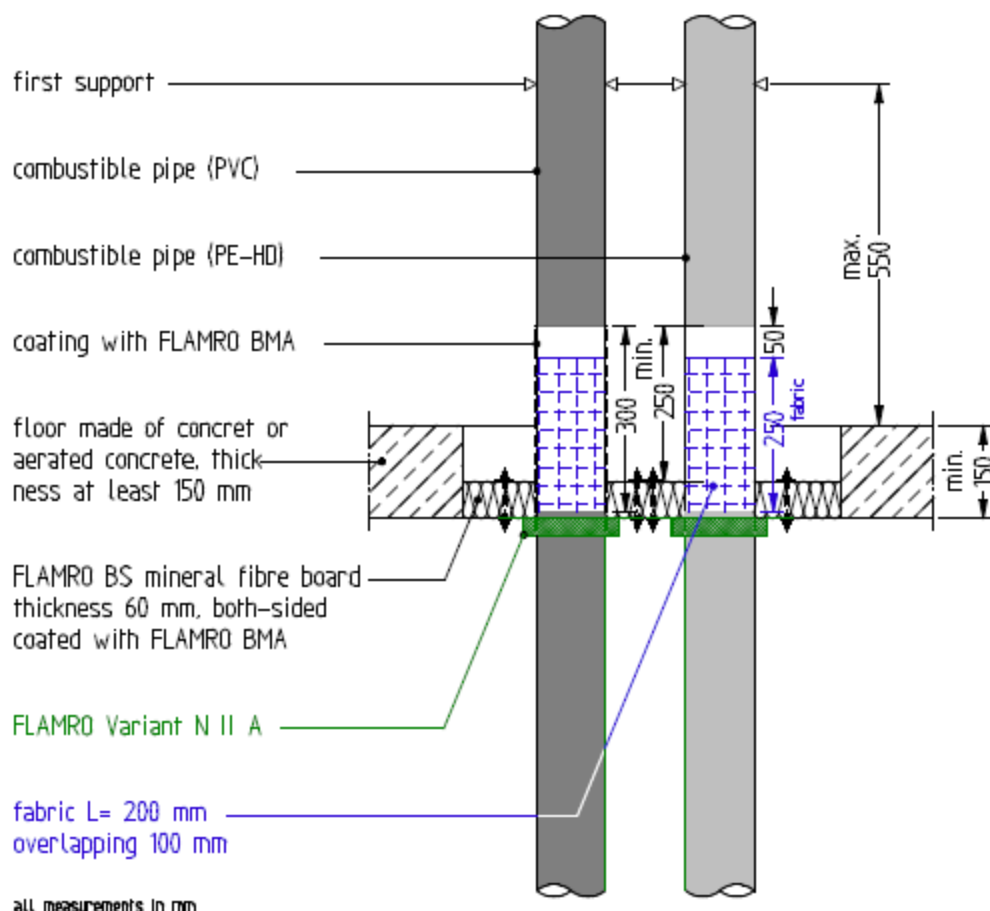
Section view floor installation (rigid floor)

Penetration of conduits made of plastic (with and without cables)



Section view floor installation (rigid floor)

Penetration of combustible pipes

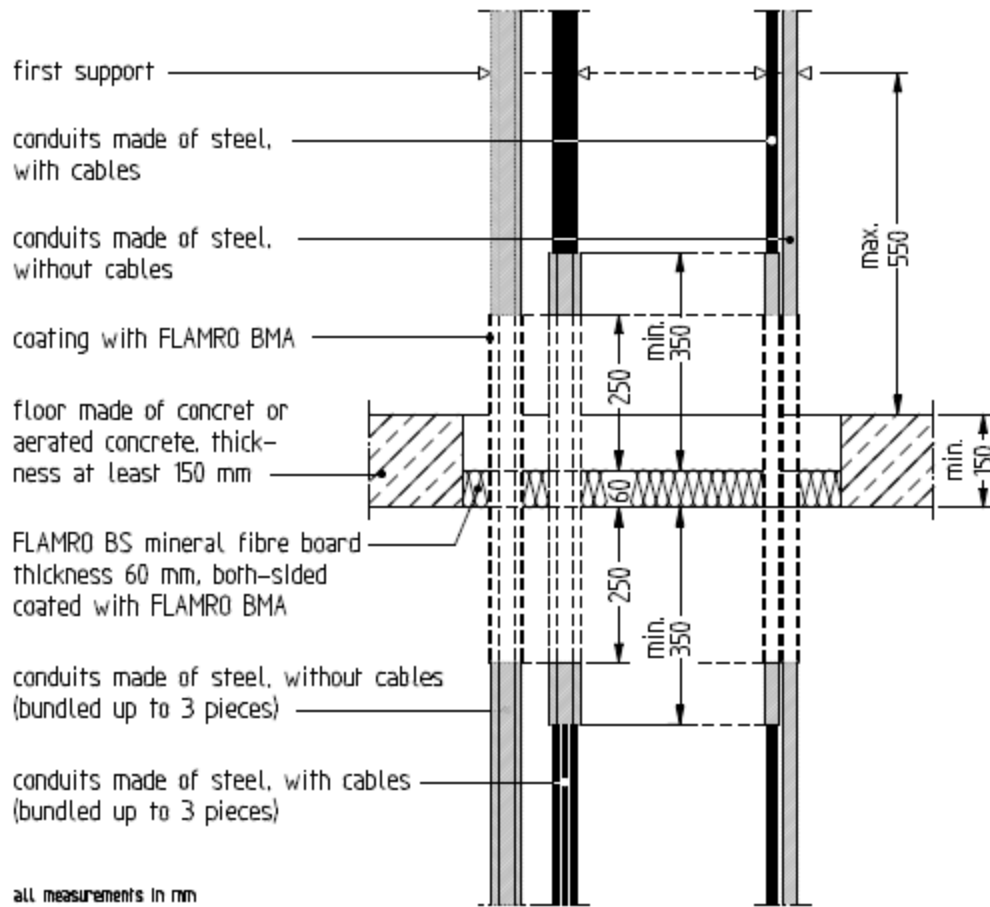


all measurements in mm

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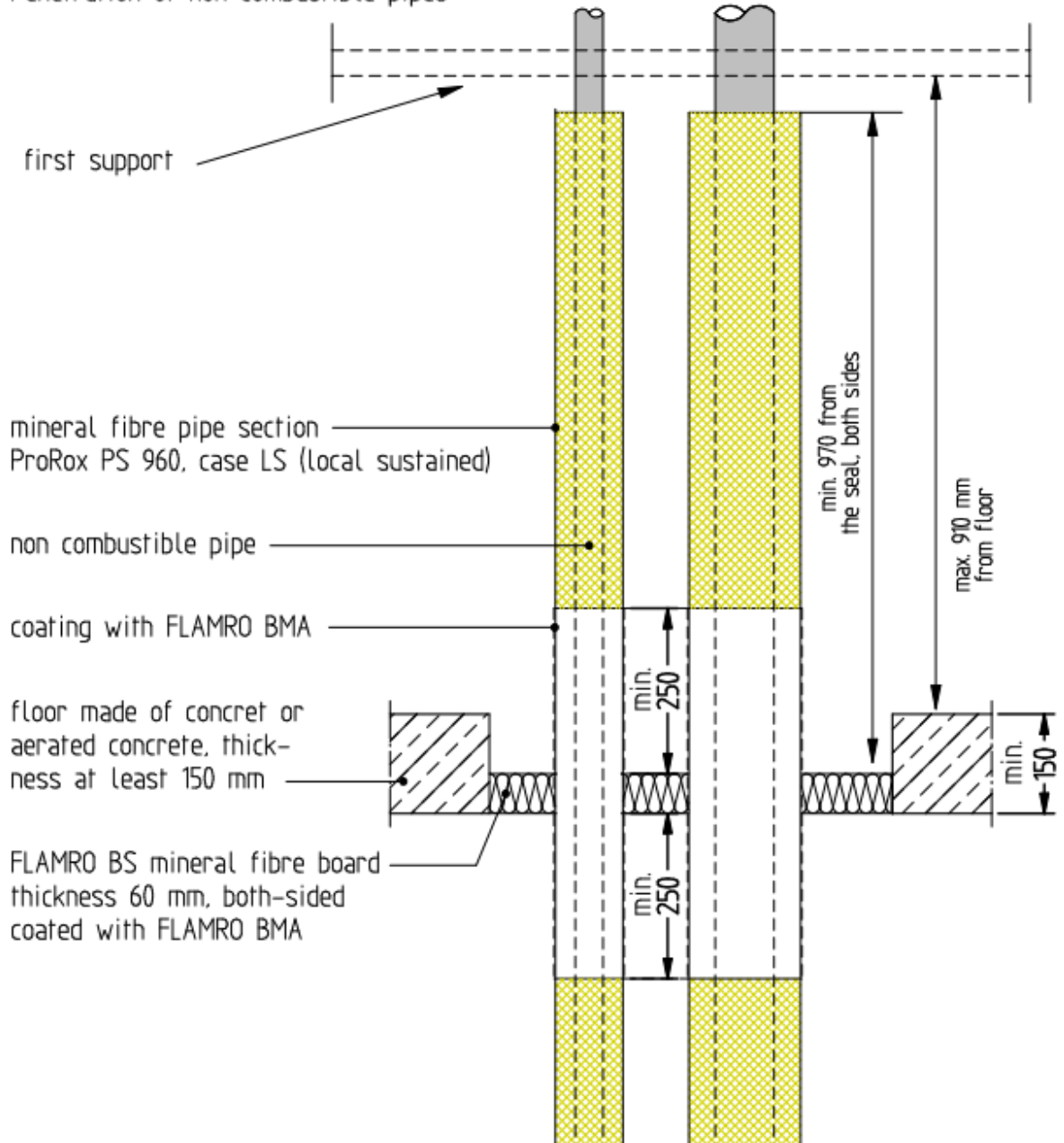
Section view floor installation (rigid floor)

Penetration of conduits made of steel (with and without cables)



Section view floor installation (rigid floor)

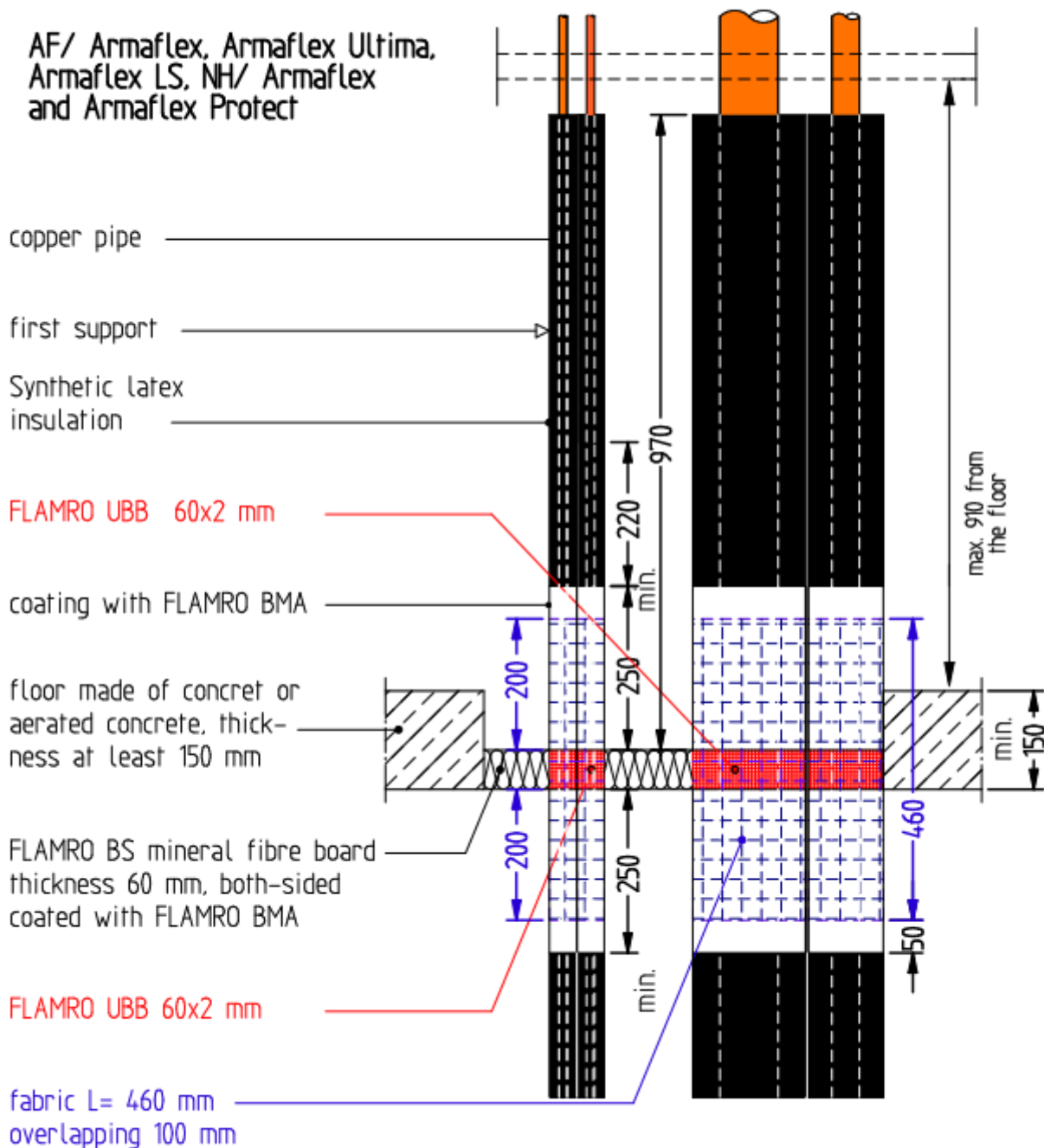
Penetration of non combustible pipes



all measurements in mm

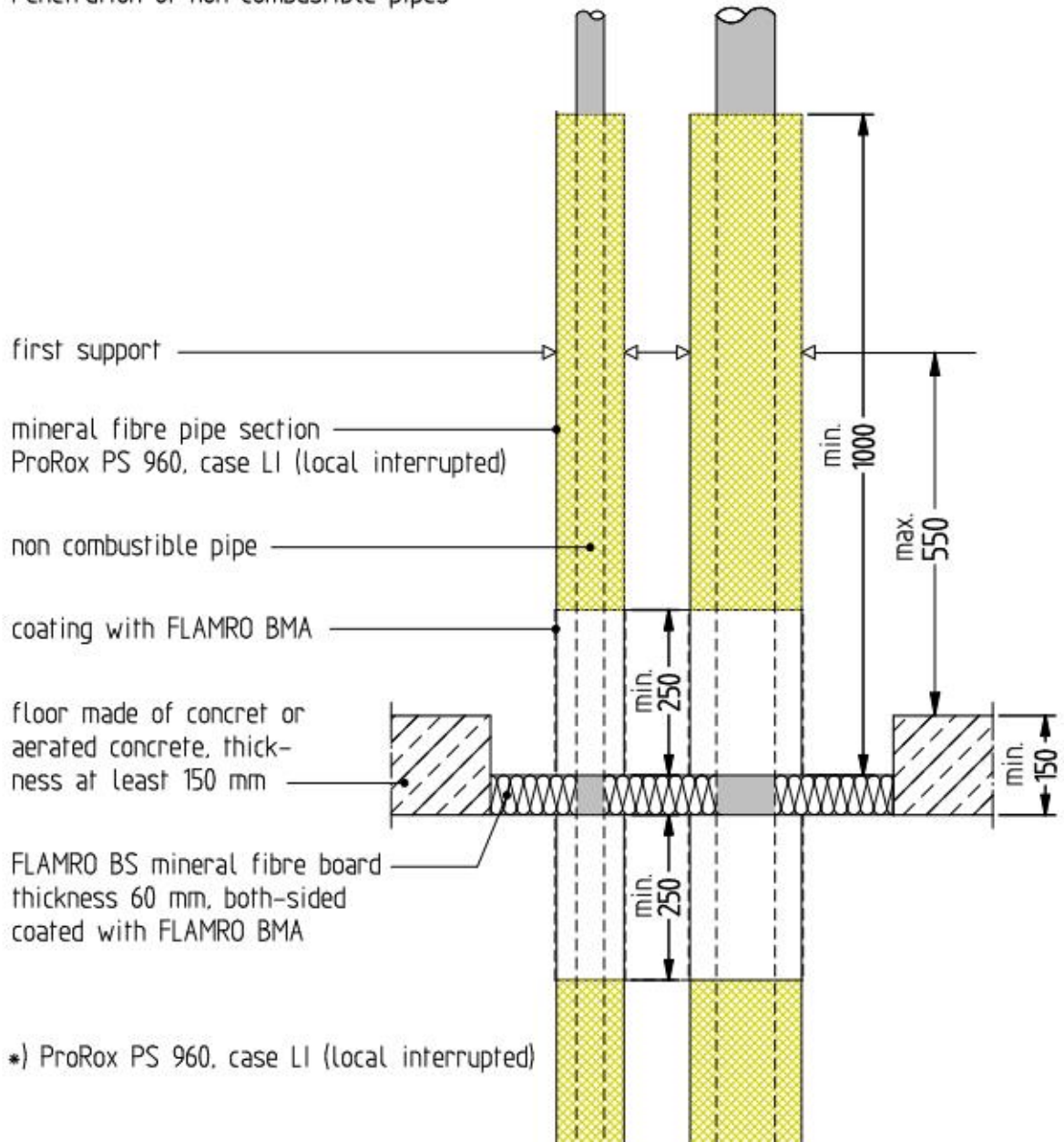
Section view floor installation (rigid floor)

Penetration of copper pipes with synthetic latex insulation and FLAMRO UBB



Section view floor installation (rigid floor)

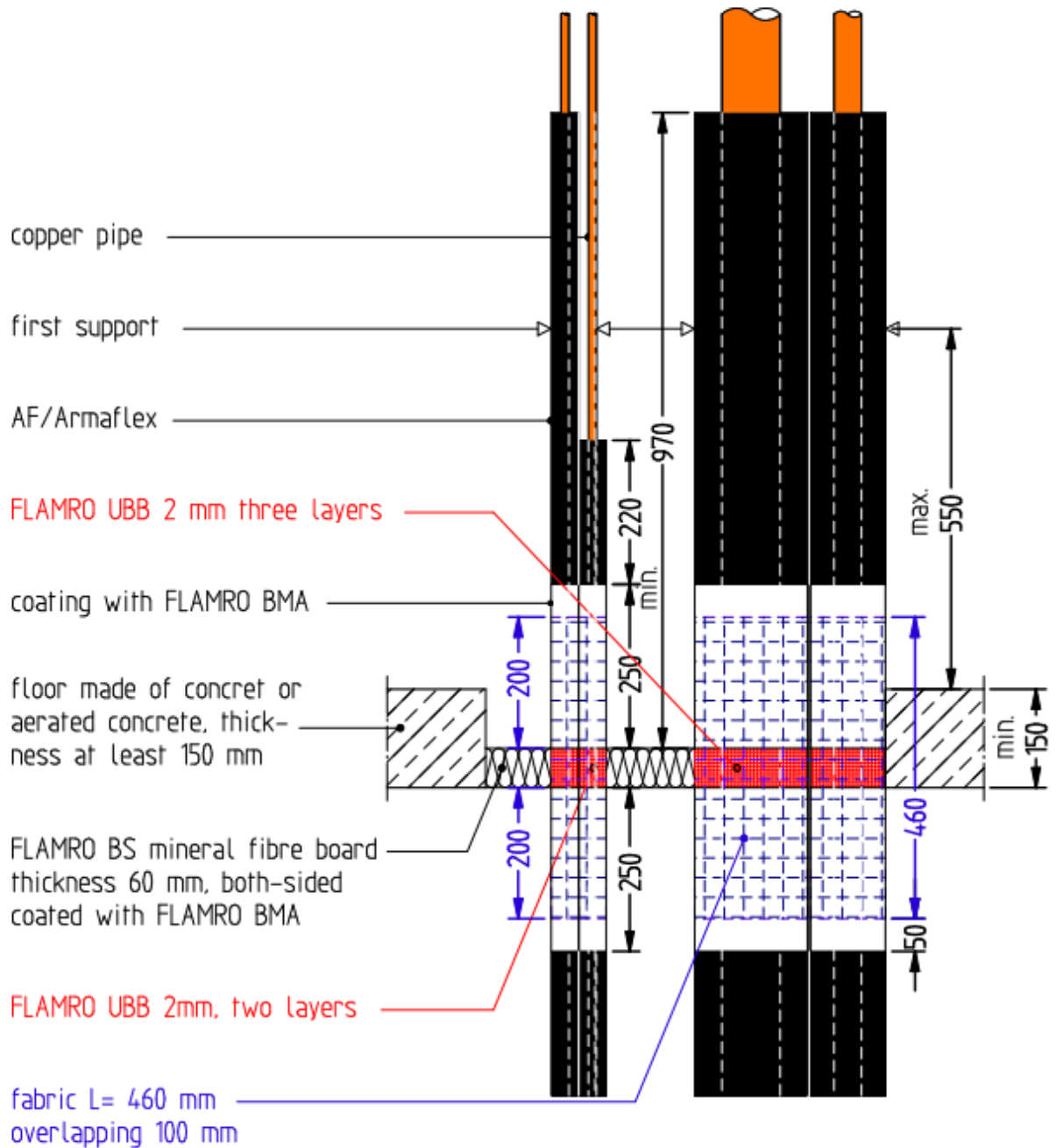
Penetration of non combustible pipes



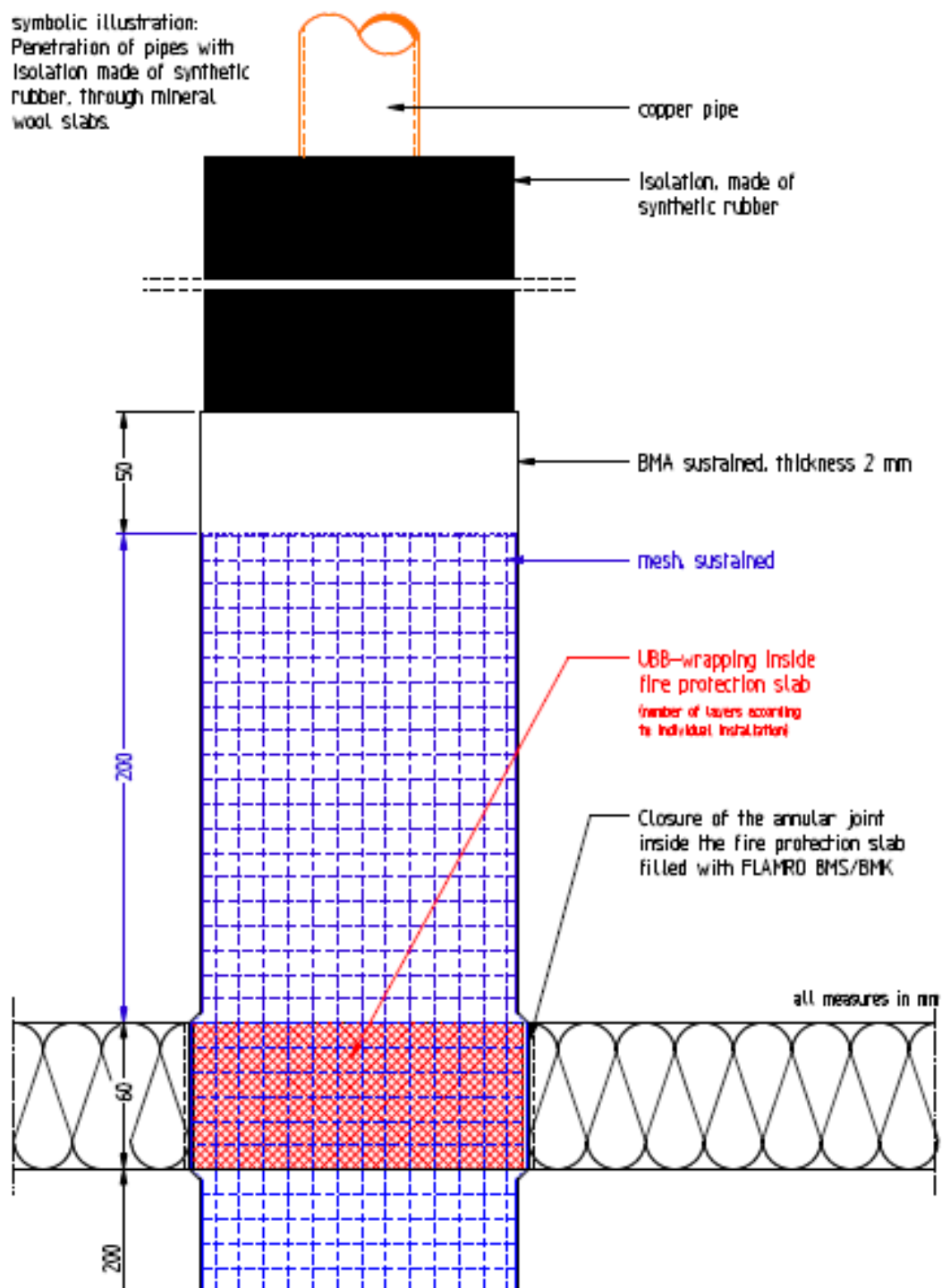
all measurements in mm

Section view floor installation (rigid floor)

Penetration of copper pipes with AF/ Armaflex insulation and FLAMRO UBB



all measurements in mm



Annex 5

Description of the installations for the confirmation of fire resistance

The below applies to seals in at least solid construction floor. The floor must be ≥ 150 mm thick and have a density $\geq 500 \text{ kg/m}^3$. Brick and concrete floors are thus covered. Max. opening size in floors: 1000 mm x 1800 mm.

Type of installation	Description
Cables	<p><u>Cable penetrations EI60 / E120</u></p> <ul style="list-style-type: none"> • Cables up to max. diameter of 80 mm, except tied cable bundles, waveguides and single-core lines subject to the following regulations. • Optical fibre cables are covered • Tied bundles with a diameter ≤ 100 mm provided that the diameter of the single cable is not more than 21 mm. • Empty conduits made of steel or steel pipes up to a diameter of 25 mm single. In groups without distance side by side or as bundle (max. 3 pieces) filled or not with cables. • Empty conduits made of plastic with a diameter up to 16 mm. • Flexible and rigid conduits up to a diameter of 25 mm filled or not with or without cables, wrapped single-layer with the intumescent bandage FLAMRO UBB single or in groups ≤ 3 pieces without distance to each other. • Flexible conduits up to a diameter of 32 mm and rigid conduits made of plastic up to a diameter of 25 mm filled or not with cables as bundle with a diameter and ≤ 115 mm sealed with the penetration seal system (collar) FLAMRO Variant NIIA. • Single-core lines with a diameter ≤ 24 mm <p>The minimum distance which must be kept are:</p> <ul style="list-style-type: none"> • a1 lateral distance cable ladder / cable tray to the seal edge ≥ 25 mm. • a2 distance between two adjoining cable ladders/cable trays ≥ 0 mm. • a3 distance below cable ladders / cable trays to the seal edge ≥ 0 mm. • a4 distance of the cables to the seal edge ≥ 25 mm, with cable ladder / cable tray which is put in between ≥ 0 mm. • a5 Distance of the cables to a further parallel arranged cable ladder/cable tray ≥ 100 mm. <p>All conduits not sealed with FLAMRO Variant N II KS collar shall be coated on both sides of the penetration seal surface with FLAMRO BMA out to a distance of ≥ 250 mm from the surface of the penetration</p>
Penetrations	<p>Cable penetrations EI 120 / E120</p> <ul style="list-style-type: none"> • Insulation material: ProRox PS960. Insulation length on both sides of the penetration seal ≥ 500 mm as local interrupted insulation (case LI) with a two-sided coating FLAMRO BMA 2 mm thick and 250 mm long from the penetration seal surface. • Waveguide cables \leq Heliflex HCA 158-50J ($\varnothing 50,4$ mm) with 30 mm ProRox PS 960 insulation <p>and</p> <ul style="list-style-type: none"> • Waveguide cables \leq Heliflex HCA 158-38J ($\varnothing 14,3$ mm) with 20 mm ProRox PS 960 • The first service support has to be arranged in a distance of ≤ 25 cm on both sides of the penetration seal. <p>The minimum distance which must be kept are:</p> <ul style="list-style-type: none"> • a1 distance to other installation ≥ 50 mm. • a2 distance of the cable to the seal ≥ 0 mm. • a3 distance of the cables to another parallel arranged cable ≥ 0 mm

Type of installation	Description																																																						
Plastic pipes	PVC-U pipes according to EN 1452-1, EN 1329-1, EN 1453-1, EN 1452-1 and EN ISO 15493 Pipe installed with FLAMRO Variant N II A on each side of the penetration																																																						
	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	Max achieved classification	≤ 50	1,8 – 5,6	6,4 × 25,4	EI 120/E 120	≤ 75	> 1,8 - < 8,1	12,8 × 25,4	EI 90/E 120	≤ 90	> 1,8 - < 8,1	17,1 × 25,4	EI 90/E 120	≤ 110	> 1,8 - < 8,1	19,2 × 25,4	EI 90/E 120	≤ 110	8,1	19,2 × 25,4	EI 120/E 120																															
	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	Max achieved classification																																																			
	≤ 50	1,8 – 5,6	6,4 × 25,4	EI 120/E 120																																																			
	≤ 75	> 1,8 - < 8,1	12,8 × 25,4	EI 90/E 120																																																			
	≤ 90	> 1,8 - < 8,1	17,1 × 25,4	EI 90/E 120																																																			
	≤ 110	> 1,8 - < 8,1	19,2 × 25,4	EI 90/E 120																																																			
	≤ 110	8,1	19,2 × 25,4	EI 120/E 120																																																			
	Pipe end configurations: U/U, C/U, U/C and C/C Classification also valid for PVC-C pipes according to EN 1566-1																																																						
	PE-HD pipes according to EN 1519-1 and EN ISO 15494 Pipe installed with FLAMRO Variant N II A on each side of the penetration																																																						
	<table><tr><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Collar lining, mm</th><th>Max achieved classification</th></tr><tr><td>≤ 50</td><td>> 1,8 – 4,6</td><td>6,4 × 25,4</td><td>EI 120/E 120</td></tr><tr><td>≤ 75</td><td>1,9 – 10,0</td><td>12,8 × 25,4</td><td>EI 120/E 120</td></tr><tr><td>≤ 90</td><td>2,7 – 10,0</td><td>17,1 × 25,4</td><td>EI 120/E 120</td></tr><tr><td>≤ 110</td><td>2,7 - 10,0</td><td>19,2 × 25,4</td><td>EI 120/E 120</td></tr></table>				Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	Max achieved classification	≤ 50	> 1,8 – 4,6	6,4 × 25,4	EI 120/E 120	≤ 75	1,9 – 10,0	12,8 × 25,4	EI 120/E 120	≤ 90	2,7 – 10,0	17,1 × 25,4	EI 120/E 120	≤ 110	2,7 - 10,0	19,2 × 25,4	EI 120/E 120																															
	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	Max achieved classification																																																			
	≤ 50	> 1,8 – 4,6	6,4 × 25,4	EI 120/E 120																																																			
	≤ 75	1,9 – 10,0	12,8 × 25,4	EI 120/E 120																																																			
≤ 90	2,7 – 10,0	17,1 × 25,4	EI 120/E 120																																																				
≤ 110	2,7 - 10,0	19,2 × 25,4	EI 120/E 120																																																				
Pipe end configurations: U/U, C/U, U/C and C/C Classification also valid for PE pipes according to EN 12201-2, EN 1519-1 and EN 1266-1, and for ABS pipes according to EN 1455-1 and SAN+ PVC pipes according to EN 1565-1																																																							
Bundles of conduits with a conduit single Ø ≤ 32 mm, bundle Ø ≤ 115 mm Closure system collar “FLAMRO Variant N II A” Conduits made of plastic filled or not filled with cables																																																							
<table><tr><th>Bundle Ø, mm</th><th>Wall thickness, mm</th><th>Collar lining, mm</th><th>Max achieved classification</th></tr><tr><td>≤ 50</td><td>-</td><td>6,4 × 25,4</td><td>EI 90/E 120</td></tr><tr><td>≤ 75</td><td>-</td><td>12,8 × 25,4</td><td>EI 90/E 120</td></tr><tr><td>≤ 90</td><td>-</td><td>17,1 × 25,4</td><td>EI 90/E 120</td></tr><tr><td>≤ 115</td><td>-</td><td>19,2 × 25,4</td><td>EI 90/E 120</td></tr></table>				Bundle Ø, mm	Wall thickness, mm	Collar lining, mm	Max achieved classification	≤ 50	-	6,4 × 25,4	EI 90/E 120	≤ 75	-	12,8 × 25,4	EI 90/E 120	≤ 90	-	17,1 × 25,4	EI 90/E 120	≤ 115	-	19,2 × 25,4	EI 90/E 120																																
Bundle Ø, mm	Wall thickness, mm	Collar lining, mm	Max achieved classification																																																				
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Pipe end configurations: U/U, C/U, U/C and C/C																																																							
Metal pipes	<table><tr><td>Armaflex Ultima</td><td colspan="5">Total length of sectional insulation ceiling penetration ≥ 1500 mm. Glass fibre mesh, 160 g/m², mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.</td></tr><tr><td></td><td>Pipe Ø mm</td><td>Wall thickness mm</td><td>Insulation thickness mm</td><td>FLAMRO UBB layers</td><td>Classification</td></tr><tr><td rowspan="6">Copper Steel Cast iron Stainless steel/first support ≤ 910 mm from the ceiling</td><td>≤ 12</td><td>≥ 0,6</td><td>19</td><td>1</td><td>EI 90, E120</td></tr><tr><td>≤ 42</td><td>≥ 1,0</td><td>25</td><td>2</td><td>EI 60, E120</td></tr><tr><td>≤ 54</td><td>≥ 1,2</td><td>25</td><td>2</td><td>EI 60, E120</td></tr><tr><td>≤ 54</td><td>≥ 1,2</td><td>25</td><td>2</td><td>EI 60, E120*</td></tr><tr><td>≤ 54</td><td>≥ 1,2</td><td>25</td><td>2</td><td>EI 90, E120**</td></tr><tr><td>≤ 88,9</td><td>≥ 2,0</td><td>25</td><td>3</td><td>EI 60, E120</td></tr><tr><td></td><td>≤ 88,9</td><td>≥ 2,0</td><td>25</td><td>3</td><td>EI 90, E120*</td></tr></table>						Armaflex Ultima	Total length of sectional insulation ceiling penetration ≥ 1500 mm. Glass fibre mesh, 160 g/m², mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.						Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification	Copper Steel Cast iron Stainless steel/first support ≤ 910 mm from the ceiling	≤ 12	≥ 0,6	19	1	EI 90, E120	≤ 42	≥ 1,0	25	2	EI 60, E120	≤ 54	≥ 1,2	25	2	EI 60, E120	≤ 54	≥ 1,2	25	2	EI 60, E120*	≤ 54	≥ 1,2	25	2	EI 90, E120**	≤ 88,9	≥ 2,0	25	3	EI 60, E120		≤ 88,9	≥ 2,0	25	3	EI 90, E120*
	Armaflex Ultima	Total length of sectional insulation ceiling penetration ≥ 1500 mm. Glass fibre mesh, 160 g/m², mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick “FLAMRO BMA”, 560 mm symmetrically from the penetration centre.																																																					
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification																																																	
	Copper Steel Cast iron Stainless steel/first support ≤ 910 mm from the ceiling	≤ 12	≥ 0,6	19	1	EI 90, E120																																																	
		≤ 42	≥ 1,0	25	2	EI 60, E120																																																	
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	*In pairs **zero clearance opening reveal																																																						

Type of installation	Description					
	Armaflex LS	Total length of sectional insulation ceiling penetration ≥ 1500 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper	≤ 12	$\geq 0,6$	19	1	EI 90, EI20
	Steel	≤ 42	$\geq 1,0$	25	2	EI 60, EI20
	Cast iron	≤ 54	$\geq 1,2$	25	2	EI 60, EI20
	Stainless	≤ 54	$\geq 1,2$	25	2	EI 90, EI20*
	steel/first support	≤ 54	$\geq 1,2$	25	2	EI 90, EI20**
	≤ 910 mm from the ceiling	$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI20
		$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI20*
	*In pairs					
	**zero clearance opening reveal					
	NH/Armaflex	Total length of sectional insulation ceiling penetration ≥ 1500 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper	≤ 12	$\geq 0,6$	13	1	EI 60, EI20
	Steel	≤ 42	$\geq 1,0$	25	2	EI 90, EI20
	Cast iron	≤ 54	$\geq 1,2$	25	2	EI 60, EI20
	Stainless	≤ 54	$\geq 1,2$	25	2	EI 90, EI20*
	steel/first support	≤ 54	$\geq 1,2$	25	2	EI 90, EI20**
	≤ 910 mm from the ceiling	$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI20
		$\leq 88,9$	$\geq 2,0$	25	3	EI60, EI20*
	*In pairs					
	**zero clearance opening reveal					
	Armaflex Protect	Total length of sectional insulation ceiling penetration ≥ 1500 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.				
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Copper	≤ 12	$\geq 0,6$	19	1	EI 120, EI20
	Steel	≤ 42	$\geq 1,0$	25	2	EI 90, EI20
	Cast iron	≤ 54	$\geq 1,2$	25	2	EI 90, EI20*
	Stainless	≤ 54	$\geq 1,2$	25	2	EI 60, EI20**
	steel/first support	$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI20
	≤ 910 mm from the ceiling	$\leq 88,9$	$\geq 2,0$	25	3	EI 60, EI20*
		≤ 108	$\geq 2,5$	2x13	3	EI 60, EI20
	*In pairs					
	**zero clearance opening reveal					

Type of installation	Description				
	Foam glass Type T4+	Total length of sectional insulation ceiling penetration ≥ 1800 mm. Glass fibre mesh, 160 g/m ² , mesh width 4 mm x 4 m, 460 mm long wrapped around and arranged symmetrically to the centre of the penetration; single-layer. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.			
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers
	Copper Steel Cast iron Stainless steel/first support ≤ 910 mm from the ceiling	≤ 12	$\geq 0,6$	23	-
		≤ 42	$\geq 1,0$	23	-
		≤ 54	$\geq 1,2$	23	-
		≤ 54	$\geq 1,2$	23	-
		≤ 54	$\geq 1,2$	23	-
		$\leq 88,9$	$\geq 2,0$	37	-
		$\leq 88,9$	$\geq 2,0$	37	-
		≤ 108	$\geq 2,5$	37	-
	*In pairs				
	**zero clearance opening reveal				
	ProRox PS 960	Total length of sectional insulation ceiling penetration ≥ 2000 mm. 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.			
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers
	Copper Steel Cast iron Stainless steel/first support ≤ 500 mm from the ceiling	≤ 54	$\geq 1,2$	40	-
		≤ 54	$\geq 1,2$	40	-
		≤ 54	$\geq 1,2$	40	-
		≤ 108	$\geq 2,5$	40	-
	*In pairs				
	**zero clearance opening reveal				
	ProRox PS960	The metal pipes are insulated with Rockwool ProRox PS 960 with a length of 1000 mm on both sides of the penetration as a local interrupted insulation. The insulation is coated with a 2 mm thick layer of "FLAMRO BMA" out to a distance of 250 mm from the surface of the penetration.			
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	Classification
	Copper Steel	≤ 30	1,0-14,3	20	EI 120, EI120
	Cast iron Stainless steel	≤ 42	1,0-14,3	30	EI120, EI120
		≤ 89	2,0-14,3	40	EI120, EI120
	Steel Cast iron	≤ 108	2,9-14,3	40	EI120, EI120

Type of installation	Description					
	AF/ Armaflex rubber	The metal pipes are insulated with AF/ Armaflex with a length of minimum 470 mm for $\varnothing \leq 42$ mm pipes and min. 970 mm for $\varnothing \leq 89$ mm pipes on both sides of the penetration as a local sustained insulation. The insulation is coated with a 2-mm thick layer of FLAMRO BMA out to a distance of 250 mm from the surface of the penetration. FLAMRO UBB strip (60 x 2 mm) is wrapped around the insulation in the centre of the penetration. A 460 mm long glass fibre mesh is embedded in the coating.				
		Pipe \varnothing mm	Wall thickness mm	Insulation thickness mm	Intumescent bandage Flamro UBB (2 mm x 60 mm) Layers	Classification
	Copper	≤ 12	$\geq 0,5$	15	2	EI 120/E 120
	Steel	≤ 42	$\geq 1,0$	36,5	2	EI 90/ E 120
	Cast iron	≤ 89	2,0 – 14,3	41,5	3	EI 60/ E 120
	Stainless steel					
Pipe end configurations C/U and C/C Distance to the seal edge ≥ 0 mm Distance to each other ≥ 0 mm Distance to other installation ≥ 40 mm Distance below cable ladders/trays ≥ 40 mm						

The classification is declared under the following conditions:

Field of application (Chapter 5.2 classification report)	Installation in floors of solid construction floor. The floor must be ≥ 150 mm thick and have a density ≥ 500 kg/m ³ . Brick and concrete floors are thus covered.
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