

ETA-Danmark A/S Göteborg Plads 1 DK-2150 Nordhavn Tel. +45 72 24 59 00 Fax +45 72 24 59 04 Internet www.etadanmark.dk 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



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 60mm 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 ≥ 1000°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	Armaflex Ultima
materials for metal pipes	AF/Armaflex
	Armaflex protect
	Armaflex LS
	NH/Armaflex
Inorganic insulation	ProRox PS 960
materials for metal pipes	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	The mineral wool board, ProRox PS960 15 is classified as Euroclass A1 in accordance with EN 13501-1
	The cellular glass slaps, FOAMGLAS®T4+ is classified as Euroclass A1 in accordance with EN 13501-1
	The FLAMRO BMA coating for mineral wool board is classified as Euroclass E in accordance with EN 13501-1.
	The FLAMRO BMS and FLAMRO BMK sealant is classified as Euroclass E in accordance with EN 13501-1.
	The FLAMRO UBB (without self-adhesive layer) strip is classified as Euroclass E in accordance with EN 13501-1.
	The rubber insulation material A/F Armaflex is classified as Euroclass B in accordance with EN 13501-1
	The rubber insulation material Armaflex Ultima is classified as Euroclass B in accordance with EN 13501-1
	The rubber insulation material Armaflex Protect is classified as Euroclass E in accordance with EN 13501-1
	The rubber insulation material Armaflex LS is classified as Euroclass B in accordance with EN 13501-1
	The rubber insulation material NH/Armaflex is classified as Euroclass E (Sheet/tape) and D_L -s2,d0 (tubes) in accordance with EN 13501-1
Resistance to fire	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
3.3 Hygiene, health and the environment (BWR 3)	
Release of dangerous substances	The product does not contain/release dangerous substances specified in TR 034, dated October 2015
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 Y_2 (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 Y_2 are met, also the requirements for Type Z_1 and Z_2 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

Managing Director ETA Dan

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	EN 13162
	wide and 60 mm thick	

Product and performance of the FLAMRO BMA or FLAMRO BMS

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

Product and performance of the FLAMRO Variant N II A:

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

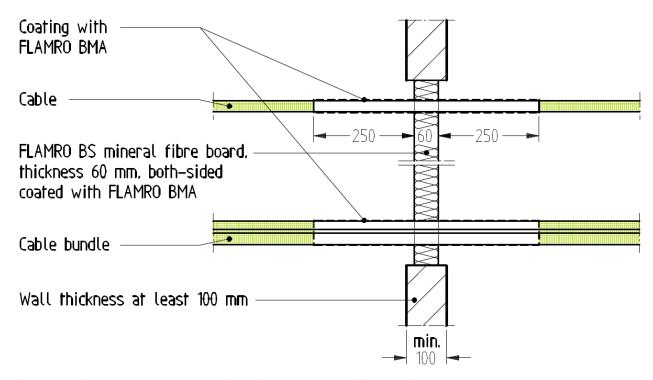
Product and performance of the FLAMRO UBB

Manufacturer	Description
FLAMRO Brandschutz-Systeme	Intumescent material in accordance with data sheet:
GmbH	Content of non-volatile components 97% - 100% EN ISO 3251
Am Sportplatz 2	Weight loss on heating 52% - 62% EN ISO 3451-1
DE-56291 Leiningen	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

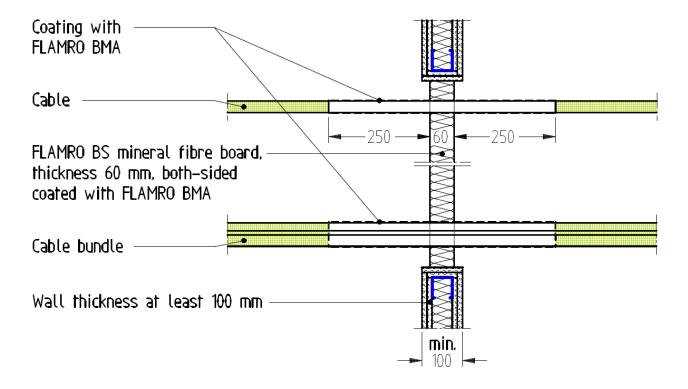
Annex 2
Detailed information for the confirmation of fire resistance

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

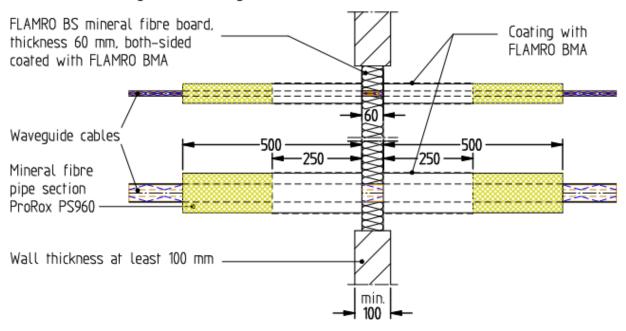
Penetration of cables and cable bundles, rigid wall



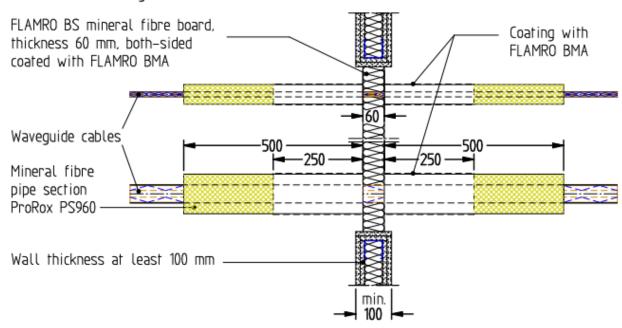
Penetration of cables and cable bundles, flexible wall



Penetration of waveguide cables, rigid wall

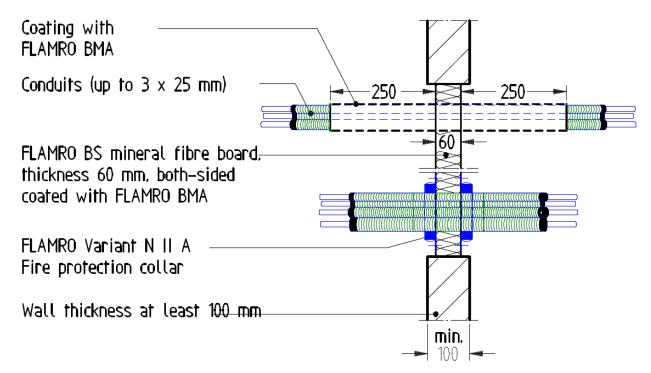


Penetration of waveguide cables, flexible wall

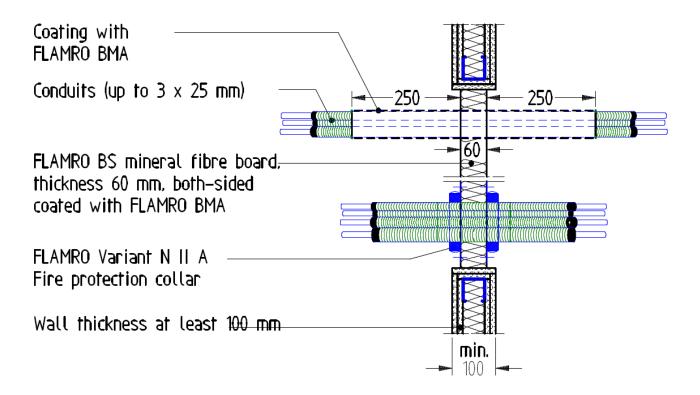


ProRox PS 960, case LI (local interrupted)

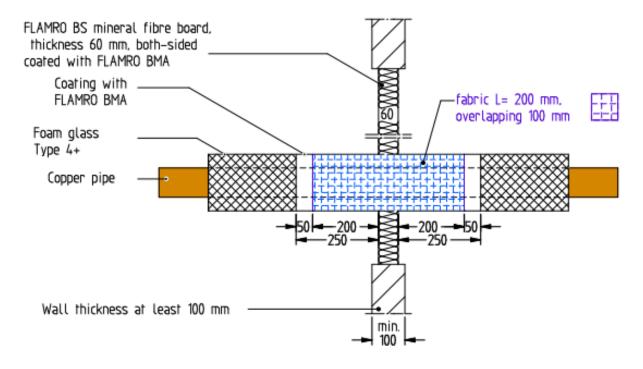
Penetration of conduits, rigid wall



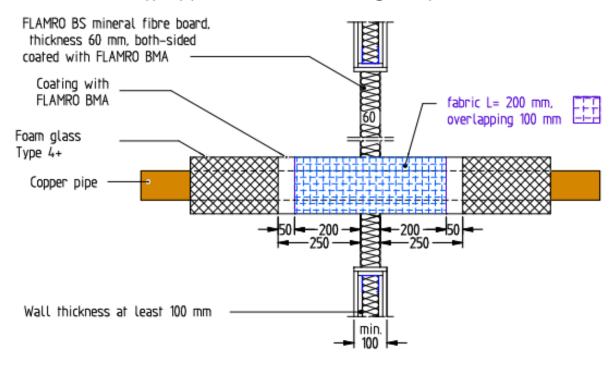
Penetration of conduits, flexible wall



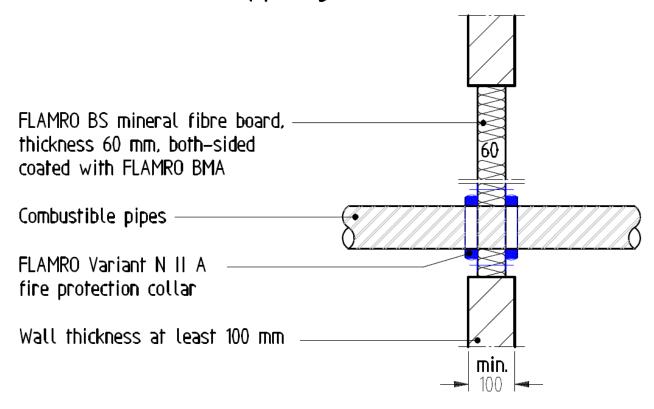
Penetration of copper pipes with insulation of foam glass type 4+, rigid wall



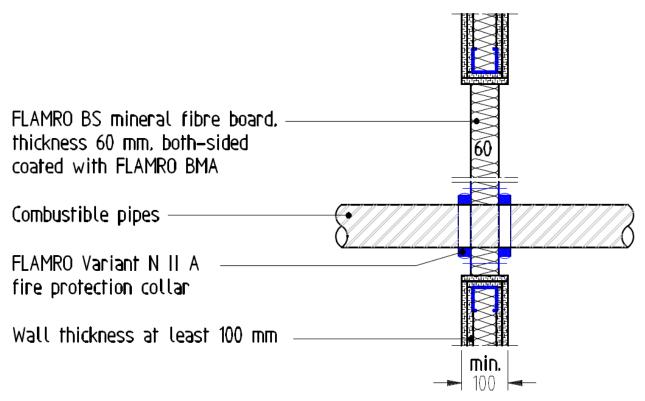
Penetration of copper pipes with insulation of foam glass type 4+, flexible wall



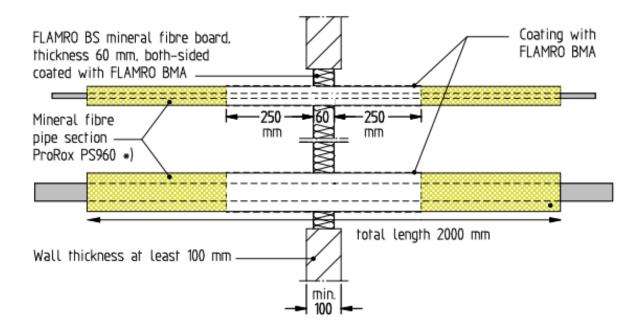
Penetration of combustible pipes, rigid wall



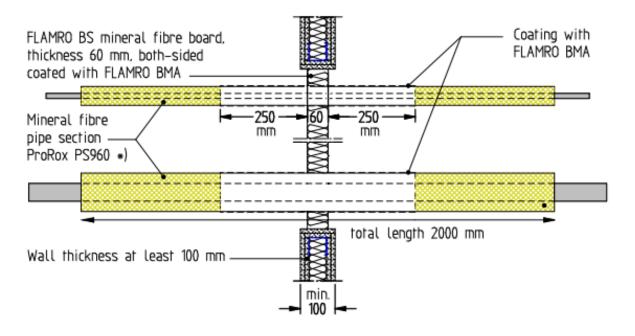
Penetration of combustible pipes, flexible wall



Penetration of non-combustible pipes, rigid wall

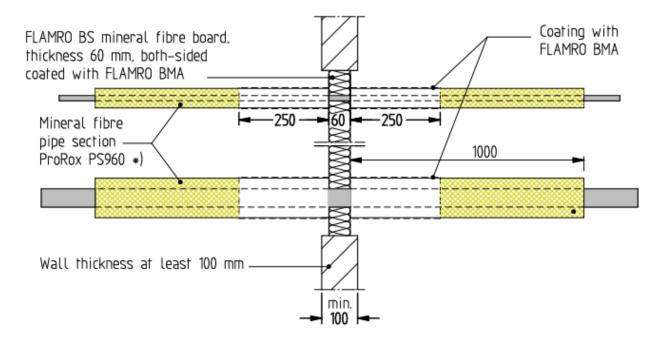


Penetration of non-combustible pipes, flexible wall

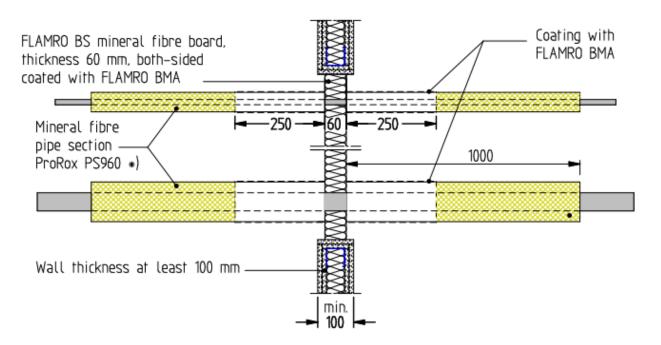


*) mineral fibre pipe section penetrating the penetration seal board (case LS)

Penetration of non-combustible pipes, rigid wall

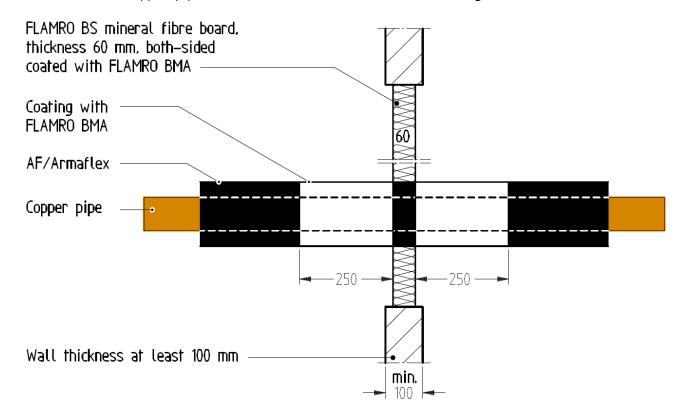


Penetration of non-combustible pipes, flexible wall

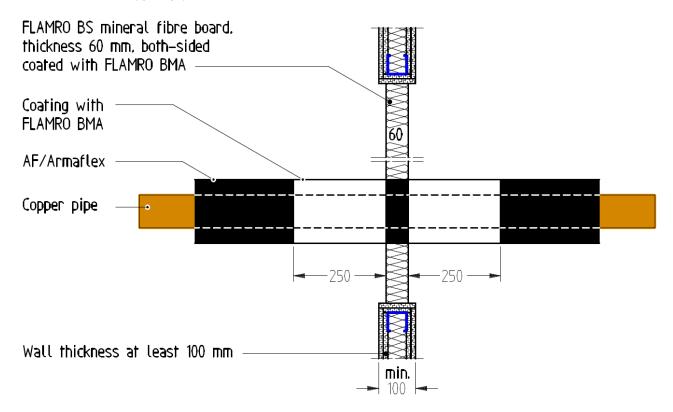


*) ProRox PS 960, case LI (local interrupted)

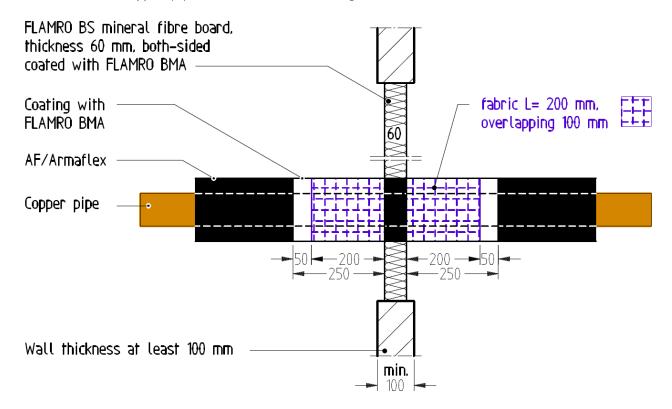
Penetration of copper pipes with AF/Armaflex and FLAMRO BMA, rigid wall



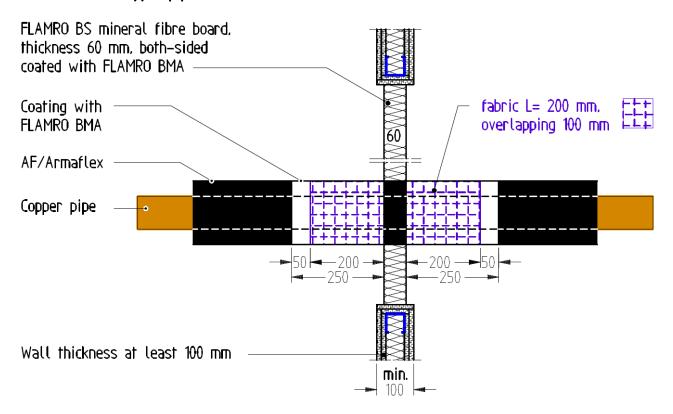
Penetration of copper pipes with AF/Armaflex and FLAMRO BMA, flexible wall



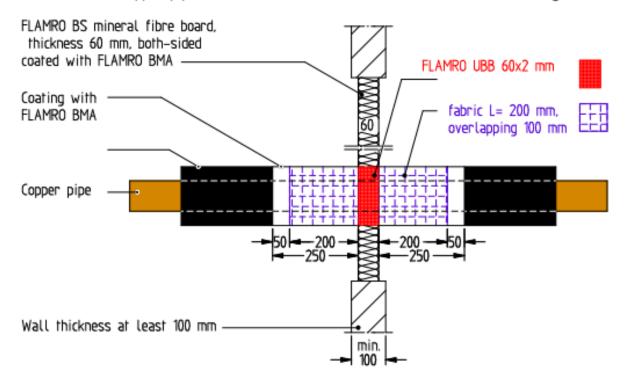
Penetration of copper pipes with AF/Armaflex, rigid wall



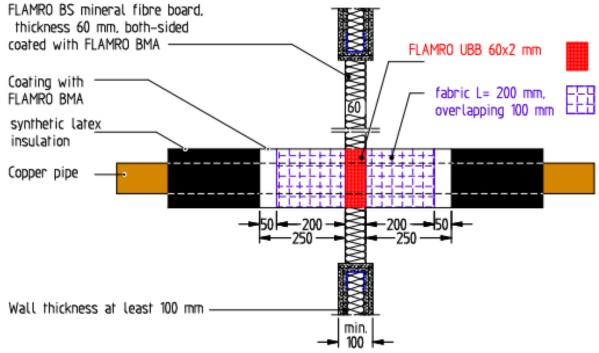
Penetration of copper pipes with AF/Armaflex, flexible wall



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.

C

Classification EI 1	20/ E120						
Type of	Description						
installation Cables							
Cables	Cable Penetrations EI120/E120						
	Single cables with diameter up to 21 mm without support construction						
	Waveguide cables	of type Heliflex HCA	158-XX J				
	The cables are insulated with ProRox PS960 with a length of 500 mm on both side the penetration as a local interrupted insulation. The insulation is coated with a 2 thick layer of FLAMRO BMA out to 250 mm from the surface of the penetration						
	Туре	Diameter (Ø, mm Insulation	thickness, mm			
	≤ Heliflex 158	-50 J 50,4		30			
	≤ Heliflex 158	-38 J 14,3		20			
		ed conduits made from have a maximum oute	steel (flexible or rigid), r diameter of 25 mm.	with or without cables.			
		• 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.						
			Variant N II A collar shall o 250 mm from the surfa				
Plastic pipes	Plastic Pipe Penetration	ns EI120/E120					
		MRO Variant N II A	on each side of the penet	ration			
	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm				
	≤ 50	1,8	$6,4 \times 25,4$				
	≤ 110	10,0	19,2 × 25,4				
		d for PE pipes according	C/C ag to EN 12201-2, EN 15 ad SAN+ PVC pipes acco				

Type of nstallation	Description						
Metal pipes	Armaflex Ultima	Total length of sectional insulation partition wall penetration ≥ 2000 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	Wall	Insulation	FLAMRO	Classification	
		mm	thickness	thickness	UBB	Classification	
			mm	mm	layers		
	Cupper	≤ 12	≥ 0,6	19	1	EI 120, E120	
	Steel	<u>−</u> ≤42	≥ 1,0	25	2	EI 90, E120	
	Cast iron	<u>≤ 54</u>	≥ 1,2	25	2	EI 60, E120	
	Stainless	_ 51 ≤ 54	$\geq 1,2$ $\geq 1,2$	25	2	EI 90, E120*	
	steel/first support	≤ 54	≥ 1,2 ≥ 1,2	25	2	EI 60, E120**	
	$\leq 500 \text{ mm from}$	<u>≤ 88,9</u>	$\geq 1,2$ $\geq 2,0$	25	3	EI 60, E120	
	the seal			25	3		
	In pairs	≤ 88,9	≥ 2,0	25	3	EI 60, E120	
	**zero clearance opening	g reveal					
	Armaflex LS	2000 mm.	th of sectional i				
			e mesh, 160 g/m				
			ped around and				
		the penetration; single-layer 2 mm thick "FLAMRO BMA", 560					
			etrically from t				
		Pipe Ø	Wall	Insulation	FLAMRO	Classification	
		mm	thickness	thickness	UBB		
			mm	mm	layers		
	Cupper	≤ 12	≥ 0,6	19	1	EI 60, E120	
	Steel	≤ 42	≥ 1,0	25	2	EI 90, E120	
	Cast iron	≤ 54	\geq 1,2	25	2	EI 60, E120	
	Stainless	≤ 54	$\geq 1,2$	25	2	EI 90, E120*	
	steel/first support	≤ 54	\geq 1,2	25	2	EI 60, E120**	
	\leq 500 mm from	≤ 88,9	≥ 2,0	25	3	EI 60, E120	
	the seal	≤ 88,9	≥ 2,0	25	3	EI 60, E120*	
	*In pairs **zero clearance opening	reveal					
	NH/Armaflex	Total leng	th of sectional i	nsulation par	tition wall pe	netration ≥	
		2000 mm.	a a la 160 a /m	.2	h 1 1	. 460	
			e mesh, 160 g/m				
		long wrapped around and arranged symmetrically to the centre of					
		the penetration; single-layer 2 mm thick "FLAMRO BMA", 560					
) BMA", 560	
		mm symm	etrically from t	he penetration	n centre.		
		mm symm Pipe Ø	etrically from t Wall	he penetration Insulation	r centre. FLAMRO	Classification	
		mm symm	etrically from t Wall thickness	he penetration Insulation thickness	FLAMRO UBB		
		mm symm Pipe Ø mm	etrically from t Wall thickness mm	he penetration Insulation thickness mm	r centre. FLAMRO	Classification	
	Cupper	mm symm Pipe Ø mm ≤ 12	etrically from t Wall thickness mm $\geq 0,6$	he penetration Insulation thickness mm 13	FLAMRO UBB layers	Classification EI 90, E120	
	Steel	mm symm Pipe Ø mm ≤ 12 ≤ 42	etrically from t Wall thickness mm ≥ 0.6 ≥ 1.0	he penetration Insulation thickness mm 13 25	FLAMRO UBB layers 1 2	Classification EI 90, E120 EI 60, E120	
	Steel Cast iron	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54	etrically from t Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2	he penetration Insulation thickness mm 13 25 25	FLAMRO UBB layers 1 2 2	EI 90, E120 EI 60, E120 EI 60, E120	
	Steel Cast iron Stainless	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54	etrically from t Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 1.2	he penetration Insulation thickness mm 13 25 25 25 25	FLAMRO UBB layers 1 2 2 2 2	EI 90, E120 EI 60, E120 EI 60, E120 EI 90, E120*	
	Steel Cast iron Stainless steel/first support	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54	etrically from t Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2	he penetration Insulation thickness mm 13 25 25	FLAMRO UBB layers 1 2 2	EI 90, E120 EI 60, E120 EI 60, E120	
	Steel Cast iron Stainless steel/first support ≤ 500 mm from	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54	etrically from t Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 1.2	he penetration Insulation thickness mm 13 25 25 25 25	FLAMRO UBB layers 1 2 2 2 2 2 3	EI 90, E120 EI 60, E120 EI 60, E120 EI 90, E120*	
	Steel Cast iron Stainless steel/first support	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 ≤ 54	etrically from t Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 1.2 ≥ 1.2	he penetration Insulation thickness mm 13 25 25 25 25 25 25	FLAMRO UBB layers 1 2 2 2 2 2 2	EI 90, E120 EI 60, E120 EI 60, E120 EI 90, E120* EI 60, E120**	

stallation	Description	Description						
	Armaflex	Total leng	th of sectional i	nsulation par	tition wall pe	${\text{netration} \ge}$		
	Protect	2000 mm.						
		Glass fibro	e mesh, 160 g/n	n², mesh widt	h 4 mm x 4 n	n, 460 mm		
		long wrap	ped around and	arranged syn	nmetrically to	the centre of		
			ation; single-lay			BMA", 560		
		•	etrically from t					
		Pipe Ø	Wall	Insulation	FLAMRO	Classification		
		mm	thickness	thickness	UBB			
			mm	mm	layers			
	Cupper	≤ 12	≥ 0,6	13	1	EI 90, E120		
	Steel	≤ 42	≥ 1,0	25	2	EI 90, E120		
	Cast iron	≤ 54	\geq 1,2	25	2	EI 60, E120*		
	Stainless					do de		
	steel/first support	≤ 54	≥ 1,2	25	2	EI 60, E120**		
	\leq 500 mm from	≤ 88,9	≥ 2,0	25	3	EI 60, E120		
	the seal	≤ 88,9	≥ 2,0	25	3	EI 60, E120*		
		≤ 108	≥ 2,5	2x13	3	EI 60, E120		
	*In pairs	- marra al						
	**zero clearance opening Foam glass		th of sectional i	ngulation nor	tition wall no	natration >		
	Type T4+	1800 mm.	ili of sectional i	insulation pai	illion wan pe	netration <u>></u>		
	Type 141		e mesh, 160 g/n	n² mesh widt	h 4 mm x 4 m	1 460 mm		
			ped around and					
		•	the penetration; single-layer 2 mm thick "FLAMRO BMA", 560 mm symmetrically from the penetration centre.					
		Pipe Ø	Wall	Insulation	FLAMRO	Classification		
		mm	thickness	thickness	UBB			
			mm	mm	layers			
	Cupper	≤ 12	≥ 0,6	23	-	EI 90, E120		
	Cupper Steel				-	EI 90, E120 EI 60, E120		
		≤ 42	≥ 1,0	23	- - -	EI 90, E120 EI 60, E120 EI 60, E120*		
	Steel			23 23		EI 60, E120 EI 60, E120*		
	Steel Cast iron	≤ 42 ≤ 54 ≤ 54	≥ 1,0 ≥ 1,2	23 23 23		EI 60, E120 EI 60, E120* EI 60, E120**		
	Steel Cast iron Stainless	≤ 42 ≤ 54 ≤ 54 ≤ 88,9		23 23 23 37		EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120		
	Steel Cast iron Stainless steel/first support	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9	$\geq 1,0$ $\geq 1,2$ $\geq 2,0$ $\geq 2,0$	23 23 23 37 37	- - - -	EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90*		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	≤ 42 ≤ 54 ≤ 54 ≤ 88,9		23 23 23 37	- - - -	EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening		≥ 1,0 $ ≥ 1,2 $ $ ≥ 2,0 $ $ ≥ 2,0 $ $ ≥ 2,5$	23 23 23 23 37 37 37	- - - -	EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs			23 23 23 23 37 37 37	- - - -	EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening			23 23 23 37 37 37 37	- - - - - tition wall pe	EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 netration ≥		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic		23 23 23 37 37 37 37	- - - - - tition wall pe	EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 netration ≥		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration	$\geq 1,0$ $\geq 1,2$ $\geq 2,0$ $\geq 2,0$ $\geq 2,5$ th of sectional is k "FLAMRO Ben centre.	23 23 23 37 37 37 37 38 37 38 37 38 37	- - - - tition wall pe	EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic		23 23 23 37 37 37 37 38 37 38 37 37 37 37	- - - - tition wall pe	EI 60, E120* EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration ≥ ally from the		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration	≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.0 ≥ 2.5 th of sectional is a centre. Wall thickness	23 23 23 37 37 37 37 Insulation par Insulation thickness		EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm	$\geq 1,0$ $\geq 1,2$ $\geq 2,0$ $\geq 2,0$ $\geq 2,5$ th of sectional is k "FLAMRO Ben centre. Wall thickness mm	23 23 23 37 37 37 37 Insulation par Insulation thickness mm	- - - - tition wall pe	EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper	≤ 42		23 23 23 23 37 37 37 37 Insulation par SMA", 560 mm thickness mm 40		EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54		23 23 23 37 37 37 37 Insulation par MA", 560 mm Insulation thickness mm 40 40		EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120 EI 120, E120*		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54		23 23 23 37 37 37 37 38 38 37 37 38 39 39 40 40 40		EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration ≥ ally from the Classification EI 120, E120* EI 120, E120*		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54		23 23 23 37 37 37 37 Insulation par MA", 560 mm Insulation thickness mm 40 40		EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120 EI 120, E120		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless steel/first support	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54		23 23 23 37 37 37 37 38 38 37 37 38 39 39 40 40 40		EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 netration ≥ ally from the Classification EI 120, E120 EI 120, E120*		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless steel/first support ≤ 500 mm from	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54		23 23 23 37 37 37 37 38 38 37 37 38 39 39 40 40 40		EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration ≥ ally from the Classification EI 120, E120* EI 120, E120*		
	Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless steel/first support	≤ 42 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9 ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54		23 23 23 37 37 37 37 38 38 37 37 38 39 39 40 40 40		EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120* EI 120, E120* EI 120, E120*		

Type of nstallation	Description					
ымананон	ProRox PS960	length of 1	e penetration s coated with tance of 250	ox PS 960 with a as a local a 2 mm thick mm from the		
		Pipe Ø mm	Wall thickness mm	Insulation thickness mm	FLAMRO UBB layers	Classification
	Cupper Steel	≤ 30	1,0-14,3	20	-	EI 120, E120
	Cast iron Stainless	≤ 42 ≤ 89	1,0-14,3 2,0-14,3	30 40		EI90, E120 EI90, E120
	steel/first support ≤ 500 mm from the seal	≤ 108	2,9-14,3	40	-	EI120, E120
	Pipe end configurations: C/U	J and C/C				
	rubber	minimum 470 mm for $\emptyset \le 42$ mm pipes and minimum 970 ≤ 89 mm pipes on both sides of the penetration as a local sinsulation. The insulation is coated with a 2-mm thick layer FLAMRO BMA out to a distance of 250 mm from the sur the penetration. A 200-mm long glass fibre mesh is embedicating				local sustained ck layer of the surface of
		Pipe Ø mm	Wall thicknes	s Insulat		Classification
	Cupper	<u>≤ 12</u>	≥ 0,5	15		EI 60/E 120
	Steel	≤ 4 2	≥ 1,0	36,5		EI 60/E 120
	Cast iron Stainless steel	≤ 89	2,0 – 14-3	41,5		EI 45/E 90
	Pipe end configurations C/U	and C/C				

The classification is declared under the following conditions:

Field of application	Installation in walls: At least 100 mm thick walls made from masonry, concrete or aerated
(Chapter 5.1	concrete or lightweight partition wall with steel or timber studs.
classification	
report)	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.
	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.
	The first suspension of the service support of metal pipes shall be arranged in maximum 300 mm from the penetration seal surface.
Thickness of the	60 mm
penetration seal	
Maximum size of	1200 mm width x 1800 mm height and
the penetration seal	1200 mm height x 1800 mm width
Distances	Lateral distance between the cable trays to seal edge: 0 mm,
	Sideways distance between two adjoining cable trays: min. 0 mm Distance below cable trays
	to seal edge: 0 mm
	Distance of the cables to the upper seal edge: min. 50 mm
	Vertical distance between cable trays: min. 50 mm

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

ables Type of installation	Description					
Cables	Cable penetrations EI 90/E 120					
Cu010 3	•	electrical lines and cable	es (fibre optic cables, a	lso) 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.					
		ed conduits, with or with). All conduits shall have				
	(flexible and rigid	ed conduits, with or with) wrapped with a single num outer diameter of 2	layer of FLAMRO UB			
	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					
		ealed with FLAMRO Va FLAMRO BMA out to				
Plastic pipes	Plastic pipe penetration PVC-U pipes according 15493		29-1, EN 1453-1, EN 1	1452-1 and EN ISO		
	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm			
	≤ 50	1,8 – 5,6	6,4 × 25,4	_		
	≤ 75	> 1,8 - < 8,1	$12,8 \times 25,4$	_		
	<u>≤</u> 90	> 1,8 - < 8,1	$17,1 \times 25,4$	-		
	≤ 110	> 1,8 - < 8,1	$19,2 \times 25,4$			
	Pipe end configurations	s: U/U, C/U, U/C and C/	C	_		
	Classification also valid	l for PVC-C pipes accor	ding to EN 1566-1			
		ng to EN 1519-1 and EN				
		MRO Variant N II A or		ration 7		
	Pipe Ø, mm	Wall thickness, mm	Collar lining, mm	_		
	≤ 50	1,8 > 1,8 - 4,6	6,4 × 25,4			
	≤ 75	1,9 – 10,0	$12,8 \times 25,4$			
	<u>≤</u> 90	2,7 – 10,0	$17,1 \times 25,4$			
	≤ 110	2,7 - < 10,0	19,2 × 25,4]		
	Ding and configurations	10,0	<u> </u>	_		
		s: U/U, C/U, U/C and C/ I for PE pipes according		(10-1 and FN 1266 1		
i	and for ADC mines are		SAN DVC nines seed	17-1 and EN 1200-1,		

and for ABS pipes according to EN 1455-1 and SAN+ PVC pipes according to EN 1565-1

Type of installation	Description						
Metal pipes	Armaflex Ultima	Total leng	th of sectional i	nsulation par	tition wall pe	enetration ≥	
		2000 mm.		1	Γ-	_	
			e mesh, 160 g/n	n², mesh widt	h 4 mm x 4 n	n, 460 mm	
			ped around and	•			
			ation; single-lay				
			netrically from t			,	
		Pipe Ø	Wall	Insulation	FLAMRO	Classification	
		mm	thickness	thickness	UBB		
		******	mm	mm	layers		
	Cupper	≤ 12	≥ 0,6	19	1	EI 120, E120	
	Steel	<u>− 12</u> ≤ 42	≥ 1,0	25	2	EI 90, E120	
	Cast iron	<u>≤ 54</u>	≥ 1,2	25	2	EI 60, E120	
	Stainless	≤ 54 ≤ 54	≥ 1,2 ≥ 1,2	25	2	EI 90, E120*	
	steel/first support	_ 51 ≤ 54	≥ 1,2 ≥ 1,2	25	2	EI 60, E120**	
	$\leq 500 \text{ mm from}$	<u>≤88,9</u>	≥ 2,0	25	3	EI 60, E120	
	the seal	≤ 88,9	≥ 2,0 ≥ 2,0	25	3	EI 60, E120*	
	*In pairs		≥ 2,0	23	3	El 00, E120	
	**zero clearance opening						
	Armaflex LS	Total leng	th of sectional i	nsulation par	tition wall pe	enetration ≥	
		2000 mm.					
		Glass fibro	e mesh, 160 g/n	n², mesh widt	h 4 mm x 4 n	n, 460 mm	
		long wrap	ped around and	arranged syn	nmetrically to	the centre of	
		the penetra	ation; single-lay	ver 2 mm thic	k "FLAMRC	9 BMA", 560	
		mm symm	netrically from t	he penetration	n centre.		
		Pipe Ø	Wall	Insulation	FLAMRO	Classification	
		mm	thickness	thickness	UBB		
			mm	mm	layers		
	Cupper	≤ 12	\geq 0,6	19	1	EI 60, E120	
	Steel	≤ 42	≥ 1,0	25	2	EI 90, E120	
	Cast iron	≤ 54	≥ 1,2	25	2	EI 60, E120	
	Stainless	≤ 54	≥ 1,2	25	2	EI 90, E120*	
	steel/first support	≤ 54	≥ 1,2	25	2	EI 60, E120**	
	\leq 500 mm from	≤ 88,9	≥ 2,0	25	3	EI 60, E120	
	the seal	≤ 88,9	≥ 2,0	25	3	EI 60, E120*	
	*In pairs						
	**zero clearance opening	~					
	NH/Armaflex	Total length of sectional insulation partition wall penetration ≥					
		2000 mm. Glass fibre mesh, 160 g/m², mesh width 4 mm x 4 m, 460 mm					
			ped around and				
			ation; single-lay) BMA", 560	
		•	netrically from t			G1 : 22 :	
		Pipe Ø	Wall	Insulation	FLAMRO	Classification	
		mm	thickness	thickness	UBB		
			mm	mm	layers		
	Cupper	≤ 12	≥ 0,6	13	1	EI 90, E120	
	Steel	≤ 42	≥ 1,0	25	2	EI 60, E120	
	Cast iron	≤ 54	≥ 1,2	25	2	EI 60, E120	
	Stainless	≤ 54	≥ 1,2	25	2	EI 90, E120*	
	steel/first support	≤ 54	≥ 1,2	25	2	EI 60, E120**	
	\leq 500 mm from	≤88,9	≥ 2,0	25	3	EI 60, E120	
	the seal	≤ 88,9	≥ 2,0	25	3	EI 60, E120*	
	*In pairs						
	**zero clearance opening	g reveal					

Type of installation	Description					
	AF/Armaflex	The metal pipes are insulated with AF/Armaflex with a length of minimum 470 mm for $\emptyset \le 42$ 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 Ø, mm	Wall thickness, mm	Insulation thickness, mm	Classification	
	Copper Steel	≤ 12	≥ 0,5	15	EI 60/E 90	
	Cast iron	≤ 42	≥ 1,0	36,5	EI 60/E 60	
	Stainless steel	≤ 89	2,0 – 14-3	41,5	EI 45/E 90	
	Pipe end configuration	ons: C/U and C/C				
	AF/Armaflex	minimum 470 mm pipes on The insulation to a distance of	0 mm for $\emptyset \le 42$ mm both sides of the pen is coated with a 2	h AF/Armaflex with m pipes and minimum netration as a local summ thick layer of FL surface of the penetral in the coating	n 970 mm for ≤ 89 ustained insulation. AMRO BMA out	
		Pipe Ø, mm	Wall thickness, mm	Insulation thickness, mm	Classification	
	Copper Steel	≤ 12	≥ 0,5	15	EI 60/E 120	
	Cast iron	≤ 42	≥ 1,0	36,5	EI 60/E 120	
	Stainless steel	≤ 89	2,0 – 14-3	41,5	EI 45/E 90	
	Pipe end configuration AF/Armaflex	The metal pip minimum 470 mm pipes on The insulation to a distance of long glass fib strip(60 × 2 m penetration. The FLAMRO pipes and 2 ×	bes are insulated with 0 mm for $\emptyset \le 42 \text{ mr}$ both sides of the pen is coated with a 2 of 250 mm from the remesh is embeddenm) is wrapped around 0 UBB thickness is $60 \text{ mm} \times 2,0 \text{ mm}$ for $0 \text{ mm} \times 2,0 \text{ mm}$	h AF/Armaflex with m pipes and minimum netration as a local summ thick layer of FL surface of the penetred in the coating and the insulation in the form of $0 \le 89$ mm pipes.	in 970 mm for ≤ 89 distained insulation. AMRO BMA out ration. A 200 mm the FLAMRO UBB he centre of the	
		Pipe Ø, mm	Wall thickness, mm	Insulation thickness, mm	Classification	
	Copper Steel	≤ 12	≥ 0,5	15	EI 90/E 120	
	Cast iron	≤ 42	≥ 1,0	36,5	EI 90/E 120	
	Stainless	≤ 89	2,0-14-3	41,5	EI 60/E 120	

Description								
Armaflex	Total leng	th of sectional i	nsulation par	tition wall pe	netration >			
Protect	2000 mm.		1	1	_			
			n². mesh widtl	h 4 mm x 4 n	n. 460 mm			
	Glass fibre mesh, 160 g/m², mesh width 4 mm x 4 m, 460 g long wrapped around and arranged symmetrically to the ce							
		ation; single-lay						
		etrically from t			DW11 , 500			
		Wall	Insulation	FLAMRO	Classification			
	Pipe Ø	thickness	thickness	UBB	Classification			
	mm							
	< 10	mm	mm	layers	EL00 E120			
Cupper	≤ 12	≥ 0,6	13	1	EI 90, E120			
Steel	≤ 42	≥ 1,0	25	2	EI 90, E120			
Cast iron	≤ 54	$\geq 1,2$	25	2	EI 60, E120*			
Stainless								
steel/first support	≤ 54	≥ 1,2	25	2	EI 60, E120**			
\leq 500 mm from	≤ 88,9	\geq 2,0	25	3	EI 60, E120			
the seal	≤ 88,9	≥ 2,0	25	3	EI 60, E120*			
	<u>≤ 108</u>	≥ 2,5	2x13	3	EI 60, E120			
*In pairs					1 22, 22			
**zero clearance opening								
Foam glass	Total leng	th of sectional i	nsulation par	tition wall pe	netration ≥			
Type T4+	1800 mm.		•	•				
	Glass fibre	e mesh, 160 g/m	n², mesh widt	h 4 mm x 4 n	n. 460 mm			
		ped around and						
) BMA", 560			
					, Bivin 1 , 500			
	mm symm	etrically from t	he penetration	n centre.				
	mm symm Pipe Ø	etrically from t	he penetration Insulation	r centre. FLAMRO				
	mm symm	etrically from t Wall thickness	he penetration Insulation thickness	FLAMRO UBB				
	mm symm Pipe Ø mm	etrically from t Wall thickness mm	he penetration Insulation thickness mm	r centre. FLAMRO	Classification			
Cupper	mm symm Pipe Ø mm ≤ 12	etrically from t Wall thickness mm $\geq 0,6$	he penetration Insulation thickness mm 23	FLAMRO UBB	Classification EI 90, E120			
Steel	mm symm Pipe Ø mm ≤ 12 ≤ 42	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0	Insulation thickness mm 23 23	FLAMRO UBB	Classification EI 90, E120 EI 60, E120			
Steel Cast iron	mm symm Pipe Ø mm ≤ 12	etrically from t Wall thickness mm $\geq 0,6$	he penetration Insulation thickness mm 23	FLAMRO UBB	Classification EI 90, E120			
Steel Cast iron Stainless	mm symm Pipe Ø mm ≤ 12 ≤ 42	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0	Insulation thickness mm 23 23	FLAMRO UBB	Classification EI 90, E120 EI 60, E120 EI 60, E120*			
Steel Cast iron Stainless steel/first support	mm symm Pipe Ø mm ≤ 12 ≤ 42	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0	Insulation thickness mm 23 23	FLAMRO UBB	Classification EI 90, E120 EI 60, E120			
Steel Cast iron Stainless	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54	the etrically from to wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2	Insulation thickness mm 23 23	FLAMRO UBB	Classification EI 90, E120 EI 60, E120 EI 60, E120*			
Steel Cast iron Stainless steel/first support	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 $\leq 88,9$	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2	he penetration Insulation thickness mm 23 23 23 37	FLAMRO UBB	EI 90, E120 EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 $\leq 88,9$ $\leq 88,9$	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.0	he penetration Insulation thickness mm 23 23 23 37 37	FLAMRO UBB	EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90*			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 $\leq 88,9$	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2	he penetration Insulation thickness mm 23 23 23 37	FLAMRO UBB	EI 90, E120 EI 60, E120 EI 60, E120* EI 60, E120** EI 90, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108	thickness mm ≥ 0.66 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5	he penetration Insulation thickness mm 23 23 23 37 37 37	r centre. FLAMRO UBB layers	EI 90, E120 EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108	tetrically from to Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.0	he penetration Insulation thickness mm 23 23 23 37 37 37	r centre. FLAMRO UBB layers	EI 90, E120 EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108	thickness mm ≥ 0.66 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5	he penetration Insulation thickness mm 23 23 23 37 37 37	r centre. FLAMRO UBB layers	EI 90, E120 EI 60, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120 EI 90, E90* E 90, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm.	the etrically from to wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in	he penetration Insulation thickness mm 23 23 23 37 37 37 37 sulation part	r centre. FLAMRO UBB layers tition wall pe	EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120 EI 90, E90* E 90, E120 netration ≥			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic	the trically from to wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in k "FLAMRO B	he penetration Insulation thickness mm 23 23 23 37 37 37 37 sulation part	r centre. FLAMRO UBB layers tition wall pe	EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120 EI 90, E90* E 90, E120 netration ≥			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thick penetration	thickness $ \begin{array}{r} \text{Wall} \\ \text{thickness} \\ \text{mm} \\ \geq 0,6 \\ \geq 1,0 \\ \geq 1,2 \end{array} $ $ \begin{array}{r} \geq 2,0 \\ \geq 2,0 \\ \geq 2,5 \end{array} $ th of sectional in the following section in the following sec	he penetration Insulation thickness mm 23 23 23 37 37 37 arsulation part MA", 560 mm	r centre. FLAMRO UBB layers tition wall pe	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 enetration \geq ally from the			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe \emptyset	retrically from to Wall thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in K "FLAMRO Benomena." Wall	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm	r centre. FLAMRO UBB layers tition wall pe	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 enetration \geq ally from the			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thick penetration	thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in thickness with thickness with thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 1.2 ≥ 2.0 ≥ 2.5 ≥ 2.5	he penetration Insulation thickness mm 23 23 23 37 37 37 Insulation part MA", 560 mm Insulation thickness	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 enetration \geq ally from the			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960	mm symm Pipe \emptyset mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe \emptyset mm	thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in thickness mm	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm Insulation thickness mm	r centre. FLAMRO UBB layers tition wall pe	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54	thickness $\frac{20,6}{20,0}$ $\frac{20,6}{20,0}$ $\frac{20,0}{20,0}$ $$	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm Insulation thickness mm 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 60, E120** EI 90, E120 EI 90, E90* E 90, E120 Inetration \geq ally from the Classification EI 120, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thice penetration Pipe Ø mm ≤ 54 ≤ 54	thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in thickness mm ≥ 0.6 ≥ 1.2	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm Insulation thickness mm 40 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120 ally from the Classification EI 120, E120 EI 120, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54	thickness mm	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm 40 40 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120* EI 120, E120*			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thice penetration Pipe Ø mm ≤ 54 ≤ 54	thickness mm ≥ 0.6 ≥ 1.0 ≥ 1.2 ≥ 2.0 ≥ 2.5 th of sectional in thickness mm ≥ 0.6 ≥ 1.2	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm Insulation thickness mm 40 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E120 EI 90, E90* E 90, E120 The entration \geq ally from the Classification EI 120, E120 EI 120, E120			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless steel/first support	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54	thickness mm	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm 40 40 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120* EI 120, E120*			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless steel/first support ≤ 500 mm from	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54	thickness mm	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm 40 40 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120* EI 120, E120*			
Steel Cast iron Stainless steel/first support ≤ 500 mm from the seal *In pairs **zero clearance opening ProRox PS960 Cupper Steel Cast iron Stainless steel/first support	mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 $\leq 88,9$ $\leq 88,9$ ≤ 108 Total leng 2000 mm. 2 mm thic penetration Pipe Ø mm ≤ 54 ≤ 54 ≤ 54	thickness mm	he penetration Insulation thickness mm 23 23 23 37 37 37 37 Insulation part MA", 560 mm 40 40 40	r centre. FLAMRO UBB layers tition wall perm symmetric FLAMRO UBB	Classification EI 90, E120 EI 60, E120* EI 60, E120* EI 90, E120 EI 90, E90* E 90, E120 netration \geq ally from the Classification EI 120, E120* EI 120, E120*			

The classification is declared under the following conditions:

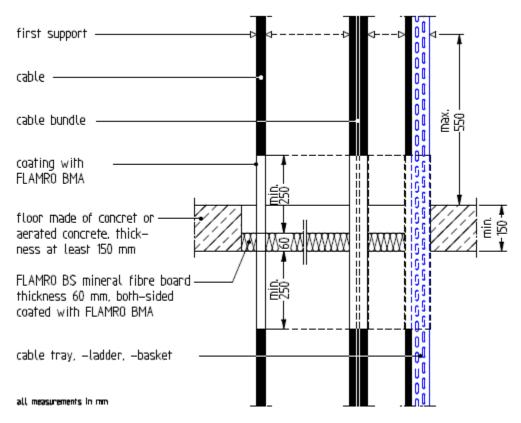
Field of application	Installation in walls: At least 100 mm thick walls made from masonry, concrete or aerated
(Chapter 5.1	concrete or lightweight partition wall with steel or timber studs.
classification	
report)	The light weight partition shall have at least two boards on each side and the total thickness 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.
	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.
	The first suspension of the service support of metal pipes shall be arranged in maximum 300
TD1 1 1 C 1	mm from the penetration seal surface.
Thickness of the	60 mm
penetration seal	
Maximum size of	1200mm width x 1800mm height
the penetration seal	
Distances	Lateral distance between the cable trays to seal edge: 0 mm,
	Sideways distance between two adjoining cable trays: min. 0 mm Distance below cable trays
	to seal edge: 0 mm
	Distance of the cables to the upper seal edge: min. 50 mm
	Vertical distance between cable trays: min. 50 mm

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

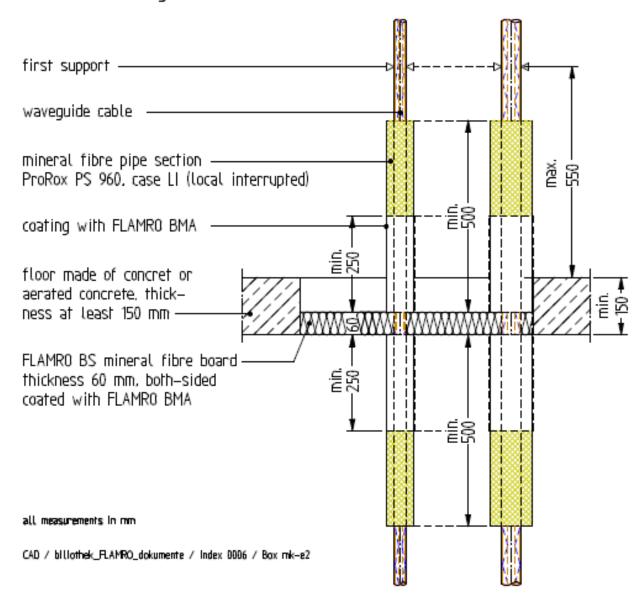
Section view floor installation (rigid floor)

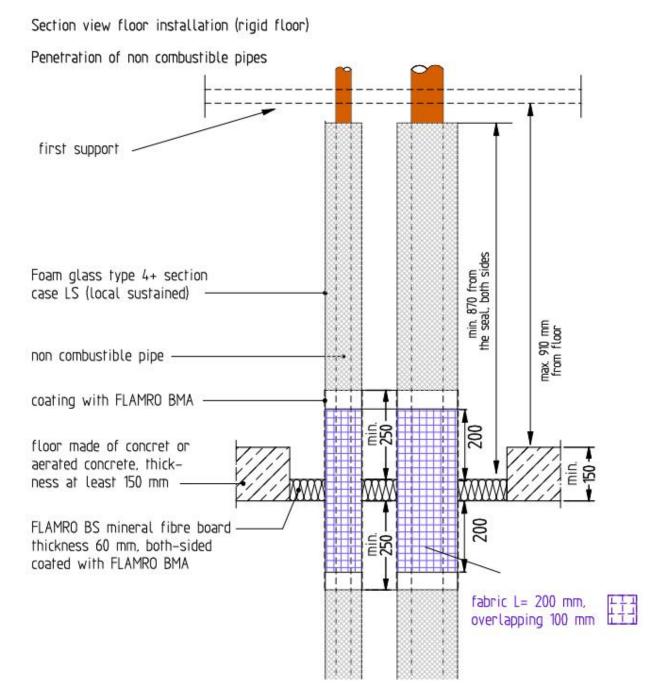
Penetration of cables, cable bundles, cable trays, -ladders, -baskets



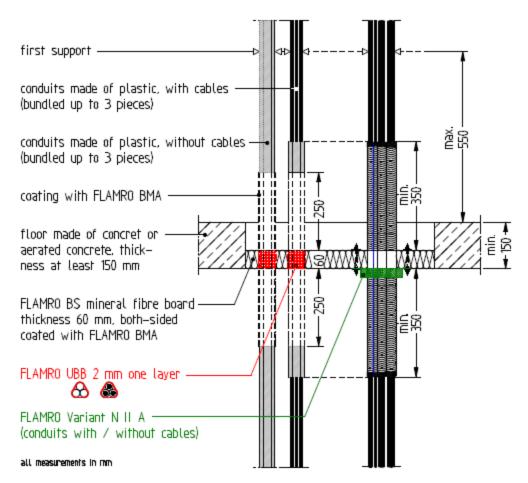
CAD / billiothek_FLAMRO_dokumente / Index 8886 / Box rnk-e1

Penetration of waveguide cables



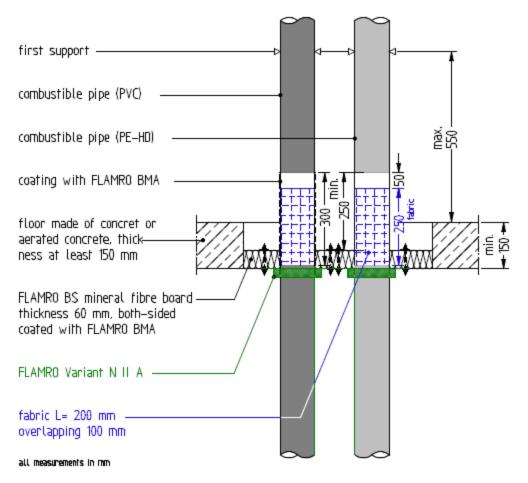


Penetration of conduits made of plastic (with and without cables)



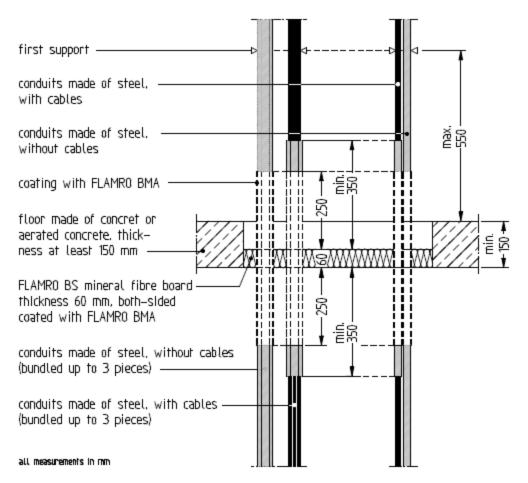
CAD / billothek_FLAMRO_dokumente / Index 8006 / Box mk-e3

Penetration of combustible pipes

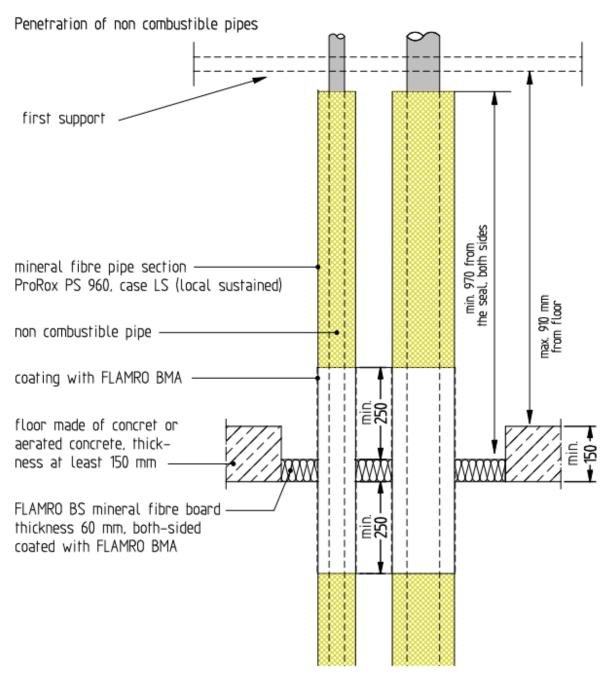


CAD / billothek_FLAMRO_dokumente / index 8006 / Box mk-e5

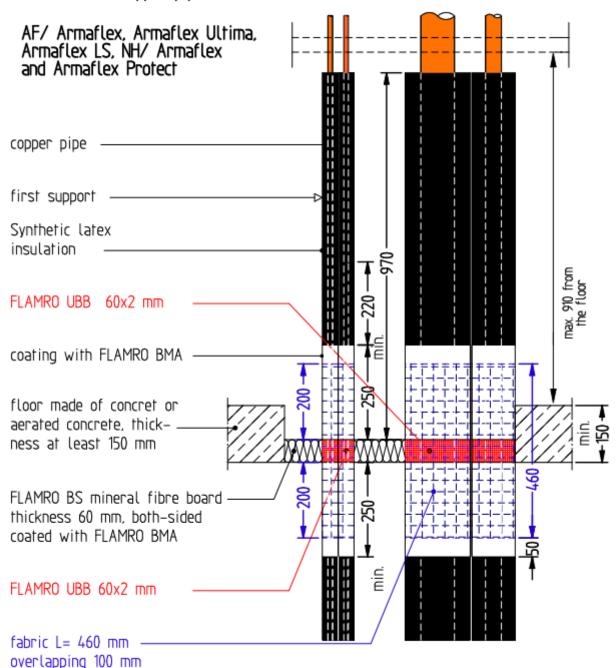
Penetration of conduits made of steel (with and without cables)

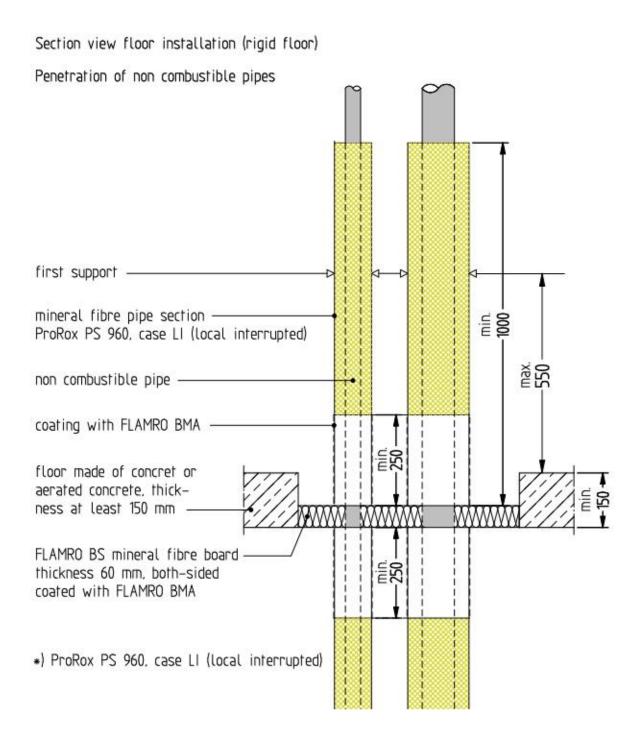


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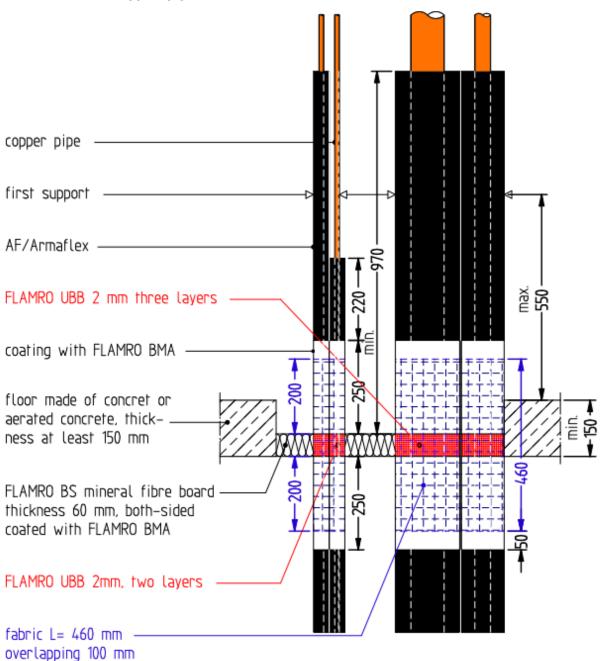


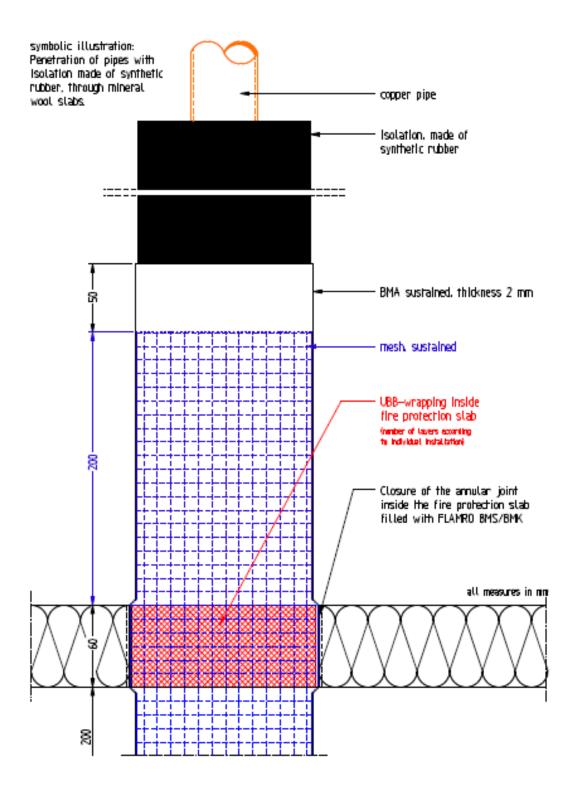
Penetration of copper pipes with synthetic latex insulation and FLAMRO UBB





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





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 ≥ 500 kg/m³. Brick and concrete floors are thus covered. Max. opening size in floors: 1000 mm x 1800 mm.

Type of installation	Description
Cables	Cable penetrations EI60 / E120
	 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 group 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 The minimum distance which must be kept are: 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 ≥ 0mm. 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
Penetrations	 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 Cable penetrations EI 120 / E120 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 ≤ Heliflex HCA 158-50J (Ø 50,4 mm) with 30 mm ProRox PS 960 insulation Waveguide cables ≤ Heliflex HCA 158-38J (Ø 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. The minimum distance which must be kept are: a1 distance to other installation ≥ 50 mm. a2 distance of the cables to another parallel arranged cable ≥ 0 mm

Type of installation	Description					
Plastic pipes	PVC-U pipes accor	ding to EN	1452-1, EN 13	329-1. EN 145	53-1. EN 145	22-1 and EN ISO
	15493		,		_,	0
	Pipe installed with F	LAMRO V	ariant N II A or	n each side of	the penetrati	ion
	Pipe Ø, mm		ickness, mm	Collar linin		Max achived
			Í			classification
	≤ 50	1,	,8-5,6	$6,4 \times 2$	5,4	EI 120/E 120
	<u>≤ 75</u>		,8 - < 8,1	$12,8 \times 2$		EI 90/E 120
	≤ 90		,8 - < 8,1	$17,1 \times 2$	5,4	EI 90/E 120
	≤ 110		,8 - < 8,1	$19,2 \times 2$	5,4	EI 90/E 120
	≤ 110		8,1	$19,2 \times 2$		EI 120/E 120
	Pipe end configurations:					
	Classification also valid	for PVC-C pip	es according to EN	N 1566-1		
	DE MD	10 / 7757	4,840.4 1.75	N TGO 4 7 40 4		
	PE-HD pipes accor					
	Pipe installed with F					
	Pipe Ø, mm	Wall th	nickness, mm	Collar linin	ig, mm	Max achieved
	< 50	. 1	1.0.4.6	<i>C</i> 1 · · · 2 ·	= 4	classification
	≤ 50 < 75		$\frac{1,8-4,6}{0,10.0}$	$6,4 \times 2$		EI 120/E 120
	≤ 75		9 – 10,0	$12,8 \times 2$		EI 120/E 120
	≤90 ≤110		7 – 10,0	$17,1 \times 2$		EI 120/E 120
	<u>≤110</u>		7 - 10,0	19,2 × 2	5,4	EI 120/E 120
	Pipe end configurations: Classification also valid			201-2 EN 1519-	1 and EN 1266-	-1 and for ABS pines
	according to EN 1455-1				Tuna Erv 1200	1, and for ABS pipes
	Bundles of conduits				ndle $\emptyset \le 115$	mm
	Closure system colla	ır "FLAMR	O Variant N II	A"		
	Conduits made of pl	astic filled o	or not filled wit			
	Bundle Ø, mm	Wall th	nickness, mm	Collar linin	g, mm	Max achieved
						-1:C:4:
						classification
	≤ 50		-	6,4 × 2		EI 90/E 120
	≤ 75		-	$12,8 \times 2$	5,4	EI 90/E 120 EI 90/E 120
	≤ 75 ≤ 90			$12,8 \times 2$ $17,1 \times 2$	25,4 25,4	EI 90/E 120 EI 90/E 120 EI 90/E 120
	≤ 75 ≤ 90 ≤ 115		-	$12,8 \times 2$	25,4 25,4	EI 90/E 120 EI 90/E 120
Market	≤ 75 ≤ 90	U/U, C/U, U/0	-	$12,8 \times 2$ $17,1 \times 2$	25,4 25,4	EI 90/E 120 EI 90/E 120 EI 90/E 120
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:		- C and C/C	$12,8 \times 2$ $17,1 \times 2$ $19,2 \times 2$	25,4 25,4 25,4	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120
Metal pipes	≤ 75 ≤ 90 ≤ 115	Total leng	-	$12,8 \times 2$ $17,1 \times 2$ $19,2 \times 2$	25,4 25,4 25,4	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng	- C and C/C	$ \begin{array}{r} 12,8 \times 2 \\ \hline 17,1 \times 2 \\ \hline 19,2 \times 2 \end{array} $ Insulation ceil	25,4 25,4 25,4 ing penetrati	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng	- C and C/C th of sectional i	$12,8 \times 2$ $17,1 \times 2$ $19,2 \times 2$ Insulation ceil $12,8 \times 2$ $12,8 \times 2$ $13,1 \times 2$ $14,1 \times 3$ $15,1 \times 4$ $15,1$	ing penetrati h 4 mm x 4 m	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 n, 460 mm
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng mm. Glass fibre long wrap	- C and C/C th of sectional is mesh, 160 g/n ped around and	$12,8 \times 2$ $17,1 \times 2$ $19,2 \times 2$ Insulation ceil $12,8 \times 2$ $13,1 \times 2$ $14,2 \times 2$ $15,2 \times 2$ $15,2 \times 2$ $15,3 \times 2$ $15,3$	ing penetrati h 4 mm x 4 n metrically to	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 on, 460 mm of the centre of
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng mm. Glass fibre long wrapp the penetra	th of sectional is mesh, 160 g/n ped around and ation; single-lay	$12,8 \times 2$ $17,1 \times 2$ $19,2 \times 2$ Insulation ceil $10^{2}, \text{ mesh width}$ arranged synther. 2 mm thick	ing penetration 4 mm x 4 mmetrically took "FLAMRO	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 on, 460 mm of the centre of
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total lengimm. Glass fibre long wrapp the penetra mm symm	- C and C/C th of sectional is mesh, 160 g/n ped around and ation; single-lay tetrically from t	$12,8 \times 2$ $17,1 \times 2$ $19,2 \times 2$ Insulation ceil $12,8 \times 2$ $13,1 \times 2$ Insulation ceil $12,8 \times 2$ $13,1 \times 2$ Insulation ceil $12,8 \times 2$ $13,1 \times 2$ Insulation ceil $13,1 \times 2$ Insulation ceil $14,1 \times 2$ Insulati	ing penetrati h 4 mm x 4 mmetrically to k "FLAMRO	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 on, 460 mm of the centre of D BMA", 560
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng mm. Glass fibre long wrapp the penetra	- C and C/C th of sectional is emesh, 160 g/n ped around and ation; single-lay tetrically from to Wall	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil n², mesh width arranged syndyer. 2 mm thick the penetration of the penetration o	ing penetration 4 mm x 4 mmetrically to k "FLAMRO FLAMRO	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 on, 460 mm of the centre of
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng mm. Glass fibre long wrap the penetra mm symm Pipe Ø	- C and C/C th of sectional is mesh, 160 g/n ped around and ation; single-lay tetrically from t	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil arranged syn yer. 2 mm thiche penetration thickness	ing penetration 4 mm x 4 mmetrically to k "FLAMRO UBB	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 on, 460 mm of the centre of D BMA", 560
Metal pipes		Total lengmm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm	th of sectional is mesh, 160 g/n ped around and ation; single-lay tetrically from the Wall thickness mm	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil n², mesh width arranged syndyer. 2 mm thick the penetration of the penetration o	ing penetration 4 mm x 4 mmetrically to k "FLAMRO FLAMRO	EI 90/E 120 EI 90/E 120 EI 90/E 120 EI 90/E 120 on ≥ 1500 on, 460 mm of the centre of D BMA", 560
Metal pipes	$ \leq 75 $ $ \leq 90 $ $ \leq 115 $ Pipe end configurations:	Total leng mm. Glass fibre long wrap the penetra mm symm Pipe Ø	th of sectional is emesh, 160 g/n ped around and ation; single-lay tetrically from to Wall thickness	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil arranged syn yer. 2 mm thiche penetration thickness mm	ing penetration 4 mm x 4 mm trically to the centre. FLAMRO UBB layers	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification
Metal pipes		Total leng mm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm	- C and C/C th of sectional is e mesh, 160 g/n ped around and ation; single-lay tetrically from to Wall thickness mm ≥ 0,6 ≥ 1,0	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil arranged syn yer. 2 mm thiche penetration thickness mm 19	ing penetration 4 mm x 4 mmetrically to the centre. FLAMRO UBB layers	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120
Metal pipes		Total lengmm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm ≤ 12 ≤ 42	- C and C/C th of sectional is e mesh, 160 g/n ped around and ation; single-lay the trically from to Wall thickness mm ≥ 0,6	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil n², mesh width arranged syntyer. 2 mm thick he penetration thickness mm 19 25	ing penetrati h 4 mm x 4 m metrically to k "FLAMRO UBB layers 1 2 2 2	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120
Metal pipes	≤75 ≤90 ≤115 Pipe end configurations: Armaflex Ultima Cupper Steel Cast iron Stainless steel/first support	Total leng mm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54	th of sectional is e mesh, 160 g/n ped around and ation; single-lay tetrically from to Wall thickness mm	nsulation ceil n², mesh width arranged syn yer. 2 mm thich he penetration thickness mm 19 25 25	ing penetration 4 mm x	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120 EI 60, E120
Metal pipes		Total lengimm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm $ \leq 12 $ $ \leq 42 $ $ \leq 54 $ $ \leq 54 $	th of sectional is e mesh, 160 g/n ped around and ation; single-lay tetrically from to wall thickness mm	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil arranged syntyer. 2 mm thiche penetration thickness mm 19 25 25 25	ing penetration 4 mm x 4 mmetrically took "FLAMRO UBB layers 1 2 2 2 2 3	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120 EI 60, E120 EI 60, E120 EI 60, E120*
Metal pipes		Total lengmm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 ≤ 54	th of sectional is e mesh, 160 g/m ped around and action; single-lay tetrically from the Wall thickness mm ≥ 0,6 ≥ 1,0 ≥ 1,2 ≥ 1,2 ≥ 1,2	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil arranged syn yer. 2 mm thiche penetration thickness mm 19 25 25 25 25	ing penetration 4 mm x	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 90, E120*
Metal pipes	≤75 ≤90 ≤115 Pipe end configurations: Armaflex Ultima Cupper Steel Cast iron Stainless steel/first support ≤910 mm from the ceiling *In pairs	Total leng mm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9	th of sectional is e mesh, 160 g/n ped around and ation; single-lay thickness mm \(\geq 0.6 \) \(\geq 1.0 \) \(\geq 1.2 \) \(\geq 1.2 \) \(\geq 2.0 \)	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil n², mesh width arranged syntyer. 2 mm thick he penetration thickness mm 19 25 25 25 25 25	ing penetration 4 mm x 4 mmetrically took "FLAMRO UBB layers 1 2 2 2 2 3	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 60, E120
Metal pipes		Total leng mm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9	th of sectional is e mesh, 160 g/n ped around and ation; single-lay thickness mm \(\geq 0.6 \) \(\geq 1.0 \) \(\geq 1.2 \) \(\geq 1.2 \) \(\geq 2.0 \)	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil n², mesh width arranged syntyer. 2 mm thick he penetration thickness mm 19 25 25 25 25 25	ing penetration 4 mm x 4 mmetrically took "FLAMRO UBB layers 1 2 2 2 2 3	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 60, E120
Metal pipes	≤75 ≤90 ≤115 Pipe end configurations: Armaflex Ultima Cupper Steel Cast iron Stainless steel/first support ≤910 mm from the ceiling *In pairs	Total lengmm. Glass fibre long wrapp the penetra mm symm Pipe Ø mm ≤ 12 ≤ 42 ≤ 54 ≤ 54 ≤ 54 ≤ 54 ≤ 88,9 ≤ 88,9	th of sectional is e mesh, 160 g/n ped around and ation; single-lay thickness mm \(\geq 0.6 \) \(\geq 1.0 \) \(\geq 1.2 \) \(\geq 1.2 \) \(\geq 2.0 \)	12,8 × 2 17,1 × 2 19,2 × 2 Insulation ceil n², mesh width arranged syntyer. 2 mm thick he penetration thickness mm 19 25 25 25 25 25	ing penetration 4 mm x 4 mmetrically took "FLAMRO UBB layers 1 2 2 2 2 3	EI 90/E 120 on ≥ 1500 n, 460 mm of the centre of D BMA", 560 Classification EI 90, E120 EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 60, E120 EI 60, E120 EI 60, E120* EI 90, E120* EI 60, E120

Type of installation	Description					
	Armaflex LS	mm. Glass fibre long wrap; the penetra	th of sectional in the mesh, 160 g/n ped around and ation; single-lay the trically from the section of the sect	n ² , mesh widt arranged syn yer. 2 mm thio	h 4 mm x 4 n nmetrically to ck "FLAMRO	n, 460 mm
		Pipe Ø	Wall	Insulation	FLAMRO	Classification
		mm	thickness	thickness	UBB	Classification
			mm	mm	layers	
	Cupper	≤ 12	≥ 0,6	19	1	EI 90, E120
	Steel	≤ 4 2	≥ 1,0	25	2	EI 60, E120
	Cast iron	≤ 54	≥ 1,2	25	2	EI 60, E120
	Stainless	≤ 54	≥ 1,2	25	2	EI 90, E120*
	steel/first support	≤ 54	≥ 1,2	25	2	EI 90, E120**
	\leq 910 mm from	≤ 88,9	≥ 2,0	25	3	EI 60, E120
	the ceiling	≤ 88,9	\geq 2,0	25	3	EI 60, E120*
	*In pairs **zero clearance opening	g reveal				
	NH/Armaflex	•	th of sectional i	nsulation ceil	ing penetration	on ≥ 1500
		long wrap	e mesh, 160 g/n ped around and ation; single-lay petrically from t	arranged syn yer. 2 mm thio	nmetrically to ck "FLAMRO	the centre of
		Pipe Ø	Wall	Insulation	FLAMRO	Classification
		mm	thickness	thickness	UBB	
			mm	mm	layers	
	Cupper	≤ 12	≥ 0,6	13	1	EI 60, E120
	Steel	≤ 42	≥ 1,0	25	2	EI 90, E120
	Cast iron	≤ 54	≥ 1,2	25	2	EI 60, E120
	Stainless	≤ 54	\geq 1,2	25	2	EI 90, E120*
	steel/first support	≤ 54	≥ 1,2	25	2	EI 90, E120**
	\leq 910 mm from	≤ 88,9	≥ 2,0	25	3	EI 60, E120
	the ceiling	≤ 88,9	\geq 2,0	25	3	EI60, E120*
	*In pairs **zero clearance opening					
	Armaflex Protect	mm. Glass fibre long wrap the penetra	th of sectional is e mesh, 160 g/n ped around and ation; single-lay netrically from t	n², mesh widt arranged syn yer. 2 mm thio	h 4 mm x 4 n nmetrically to ck "FLAMRO	n, 460 mm
		Pipe Ø	Wall	Insulation	FLAMRO	Classification
		mm	thickness	thickness	UBB	
			mm	mm	layers	
	Cupper	≤ 12	≥ 0,6	19	1	EI 120, E120
	Steel	≤ 42	≥ 1,0	25	2	EI 90, E120
	Cast iron	≤ 54	≥ 1,2	25	2	EI 90, E120*
	Stainless	≤ 54	≥ 1,2	25	2	EI 60, E120**
	steel/first support	≤ 88,9	≥ 2,0	25	3	EI 60, E120
	\leq 910 mm from	≤ 88,9	≥ 2,0	25	3	EI 60, E120*
	the ceiling	≤ 108	≥ 2,5	2x13	3	EI 60, E120
	*In pairs	1				
	**zero clearance opening	g reveai				

voc oi mstananon	Description								
ype of installation	Foam glass	Total leng	th of sectional i	nsulation cei	ling penetrati	on > 1800			
	Type T4+	mm.	ui oi sectionai i		img peneduan				
	Type 141	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							
						J BIVIA , 300			
			etrically from t	Insulation		Classification			
		Pipe Ø	Wall		FLAMRO	Classification			
		mm	thickness	thickness	UBB				
			mm	mm	layers				
	Cupper	≤ 12	≥ 0,6	23	-	EI 90, E120			
	Steel	≤ 42	≥ 1,0	23	-	EI 90, E120			
	Cast iron	≤ 54	$\geq 1,2$	23	-	EI 90, E120			
	Stainless	≤ 54	$\geq 1,2$	23		EI 90, E120*			
	steel/first support	≤ 54	$\geq 1,2$	23		EI 60, E60**			
	\leq 910 mm from	≤88,9	≥ 2,0	37	-	EI 60, E120			
	the ceiling	≤ 88,9	≥ 2,0	37	-	EI 60, E120*			
		<u>≤ 108</u>	≥ 2,5	37	_	EI 90, E120			
	*In pairs	_ 100			ı	,			
	**zero clearance opening	g reveal_							
	ProRox PS 960	Total leng	th of sectional i	nsulation ceil	ling penetrati	on \geq 2000 mm.			
		2 mm thic	k "FLAMRO B	3MA", 560 m	m symmetric	ally from the			
		penetration		,	J	J			
		Pipe Ø	Wall	Insulation	FLAMRO	Classification			
		mm	thickness	thickness	UBB				
		11111	mm	mm	layers				
	Cupper	≤ 54	≥ 1,2	40	-	EI 60, E120			
	Steel	≤ 54 ≤ 54		40	_	EI 30, E120*			
	Cast iron	≤ 54 ≤ 54		40		EI 30, E120 EI 120, E120**			
	Stainless	≥ 3 4	≥ 1,2	40		EI 120, E120			
		< 100	> 2.5	40		ELOO E100*			
	steel/first support ≤ 500 mm from	≤ 108	≥ 2,5	40	-	EI 90, E120*			
	_								
	the ceiling *In pairs								
	**zero clearance opening	g reveal							
	ProRox PS960	The metal	pipes are insula	ated with Roc	kwool ProRo	ox PS 960 with a			
		length of 1	1000 mm on bo	th sides of the	e penetration	as a local			
		interrupted	d insulation. Th	e insulation is	s coated with	a 2 mm thick			
		layer of "F	FLAMRO BMA	a" out to a dis	stance of 250	mm from the			
		surface of	the penetration	•					
		Pipe Ø		hickness	Insulation	Classification			
		mm		nm	thickness				
					mm				
	Cupper	≤ 30	1.0	-14,3	20	EI 120, E120			
	Steel		1,0	,-					
	Cast iron	≤ 42	1.0	-14,3	30	EI120, E120			
	Stainless steel	≤ 42 ≤ 89		-14,3	40	EI120, E120 EI120, E120			
		≥ 89	2,0	-14,3	40	E1120, E120			
	Steel Cast iron	≤ 108	2,9	-14,3	40	EI120, E120			
	C 11 0.11			1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					

Type of installation	Description						
	AF/ Armaflex rubber	The metal pipes are insulated with AF/ Armaflex with a length of minimum 470 mm for $\emptyset \le 42$ mm pipes and min. 970 mm for $\emptyset \le 89$ 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 Ø mm	Wall thickness mm	Insulation thickness mm	Intumesent bandage Flamro UBB (2 mm x 60 mm) Layers	Classification	
	Cupper	≤ 12	≥ 0,5	15	2	EI 120/E 120	
	Steel	≤ 4 2	≥ 1,0	36,5	2	EI 90/ E 120	
	Cast iron Stainless steel	≤ 89	2,0 – 14,3	41,5	3	EI 60/ E 120	
	Distance to the sea Distance to each o Distance to other i	Figurations C/U and C/C ne seal edge ≥ 0 mm ach other ≥ 0 mm ther installation ≥ 40 mm ow cable ladders/trays ≥ 40 mm					

The classification is declared under the following conditions:

	Installation in floors of solid construction floor. The floor must be ≥ 150 mm thick and have
(Chapter 5.2	a density $\geq 500 \text{ kg/m}^3$. Brick and concrete floors are thus covered.
classification	
report)	