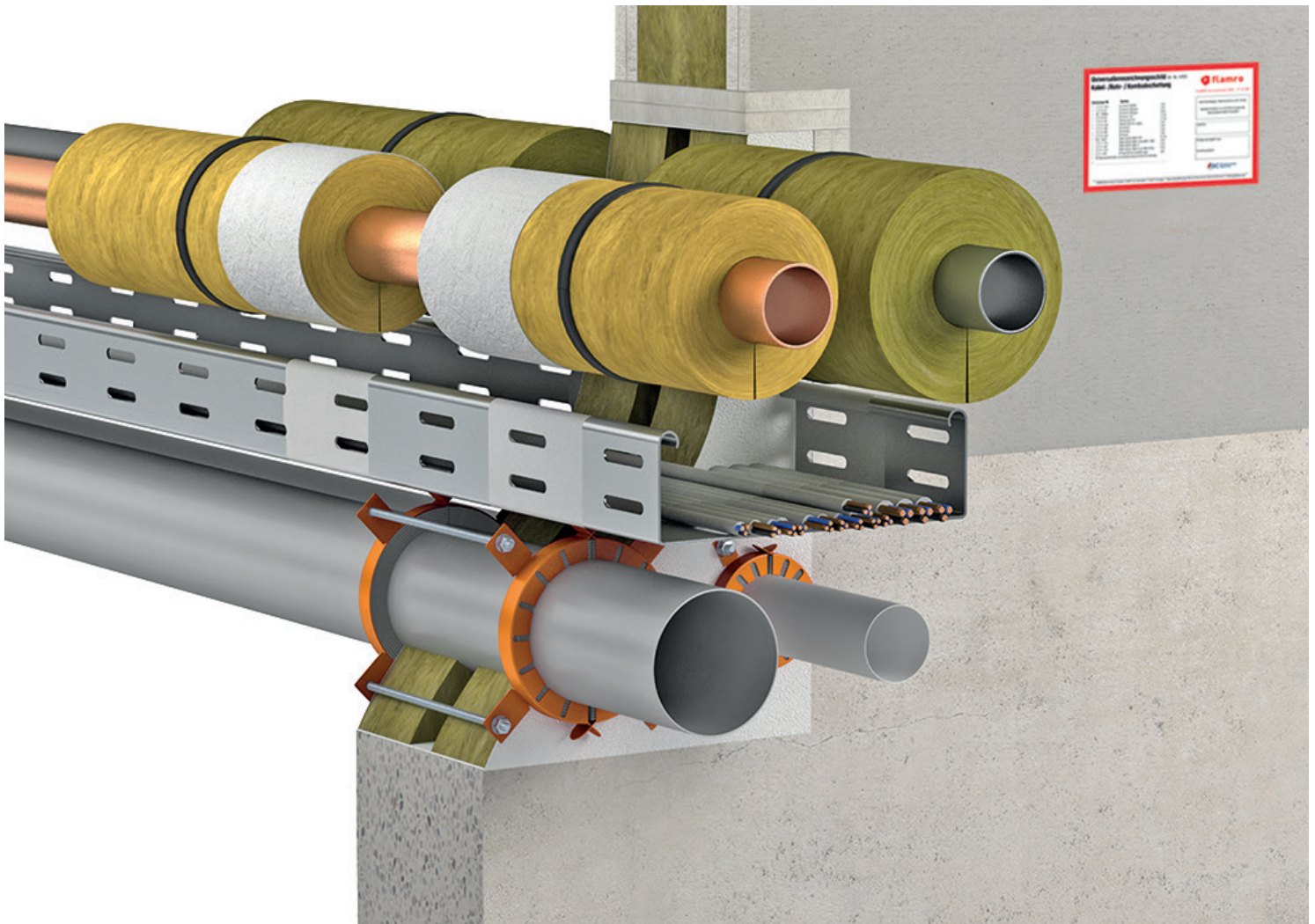


FLAMRO® Multi Combi seal EN

Ablative penetration seal

Versatile penetration sealing system made from mineral fibre boards and an ablation coating for all types of electrical cables and lines, electrical installation pipes, flammable/non-combustible pipes and other services.

Fire resistance: max. EI 120 acc. to EN 13501-2



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Multi Combi seal EN

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FLAMRO® Multi Combi seal EN

1. Preliminary remarks / Overview

1.1 Target group

The installation instructions are exclusively intended for persons who have been given fire safety training.

1.2 Use of the instructions

Before starting the work please read these installation instructions in their entirety. Pay particular attention to the following safety instructions.

The authorisation holder accepts no liability for damage caused by failure to comply with these instructions.

The illustrations are only intended to be examples. The installation results can differ visually.

Unless otherwise shown, all lengths are given in mm

All information in this document corresponds to the state of the technology or the valid standards at the time of creation.

The legal and technical framework conditions or manufacturer information relevant for the respective individual case can be made available on request.

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1.2.1 Safety information

The safety data sheets must be consulted when processing the sealing components.

Personal protective equipment:



Wear protective clothing and non-slip shoes.



Use protective goggles or frame goggles.



With short-term or minor loads, use the P2 particle filter.
Use self-contained breathing apparatus in the event of intensive or prolonged exposure.
Only use respiratory protection in accordance with international/national standards.



Use chemical-resistant protective gloves.
Recommended material: Butyl rubber, nitrile rubber, fluororubber, PVC.

Safety instructions for the installation of floor seals



The area below the floor seal must be cordoned off to prevent entry during the sealing work (warning tape and sign: Warning of possible falling objects, do not enter the area, sealing work is being carried out in the floor component openings!).



The contractor for the production of floor seals must inform the client in writing (to be forwarded to the property developer or his authorised representative) that after the fire seals have been made in the floors, suitable measures must be taken on site to safeguard against loads, particular against being walked on (e.g. using fencing or by covering with gratings).

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1.3 Field of application

The usability of the mixed penetration seal "FLAMRO® Multi Combi Seal EN" has been assessed according to ETAG 026 Part 2 Point 2.4.1 and classified according to EN 13501-1 with regard to the "Fire behaviour", "Fire resistance", "Release of hazardous substances" and "Durability and usability" characteristics.

Fire behaviour

The ablative components "FLAMRO® BMA", "FLAMRO® BMS" and "FLAMRO® BMK" fulfil fire behaviour class E according to EN 13501-1.

The "FLAMRO® UBB" bandage (without self-adhesive device) fulfils fire behaviour class E according to EN 13501-1. The "Rockwool RPI-15" mineral fibre board fulfils fire behaviour class A1 according to EN 13501-1.

The "FLAMRO® Variant N II A" fire protection collars fulfil fire behaviour class E according to EN 13501-1.

Fire resistance

The mixed penetration seal "FLAMRO® Multi Combi seal EN" has been tested in accordance with ETAG 026 part 2 point 2.4.2 and EN 1366-3: 2009 in conjunction with EN 1363-1: 1999. On the basis of the test results obtained and the direct field of application from EN 1366-3: 2009, the mixed penetration seal "FLAMRO® Multi Combi seal EN" was classified according to EN 13501-2: 2007 + A1: 2009.

The "FLAMRO® Multi Combi seal EN" fulfils the requirements of class EI 120 according to EN 13501-2. The fire resistance class EI 120-U/U also covers all other possible endings (C/U, U/C and C/C) according to EN 13501-2. The specified fire resistance class EI-120-C/U also covers the class of the same fire resistance period with ending C/C according to EN 13501-2. The U/C configuration is also valid for C/U and C/C according to EN 13501-2.

The maximum fire resistance class of the penetration seal in vertical or horizontal space-enclosing components depends on the fire resistance class of the implemented elements. The fire resistance class of the penetration seal is reduced to the fire resistance class of the element with the lowest fire resistance classification.

Release of hazardous substances

none

Durability and usability

The ablative fire protection coating "FLAMRO® BMA", the ablative fire protection compounds "FLAMRO® BMS" and "FLAMRO® BMK", the flameproof fire protection fabric "FLAMRO® UBB" and the fire protection collar "FLAMRO® Variant N II A" fulfil the requirements for type Y₂ and Z₂ according to ETAG 026-2.

The penetration seal is suitable for use in interior areas with high humidity and at temperatures below 0 °C, without UV exposure and rain.

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1.4 Components

Plasterboard walls

Plasterboard walls must have a minimum thickness of ≥ 122 mm and consist of steel supports (U and C profiles; 0.5–1.5 mm thickness) clad with at least two layers of 15.0 mm or 3 layers of 12.5 mm thick panels with classification A2-s1, d0 or A1 according to EN 13501-1 on both sides.

Furthermore, wooden supports may also be used instead of steel supports. It should be noted that there is a minimum distance of 100 mm between the wooden support and the penetration seal. The insulation between the supports must at least correspond to building material class A1 or A2 (according to EN 13501-1) and have a minimum bulk density of 85–115 kg/m³ (according to EN 1363-1).

The opening cladding must be made from steel supports with a thickness of at least 0.6 mm and plates of the same specification as those used for the wall.

The supporting structure must be classified according to EN 13501-2 for the required fire resistance period.

The necessary fire protection measures are shown on the following pages and also apply to subsequent installations.

Solid walls

The wall must have a minimum thickness of ≥ 122 mm and consist of concrete, aerated concrete or masonry. The wall must be classified according to EN 13501-2 for the required fire resistance period.

Solid floors

The floor must have a minimum thickness of ≥ 150 mm and consist of concrete or aerated concrete with a minimum density of 650 kg/m³. The floor must be classified according to EN 13501-2 for the required fire resistance period.

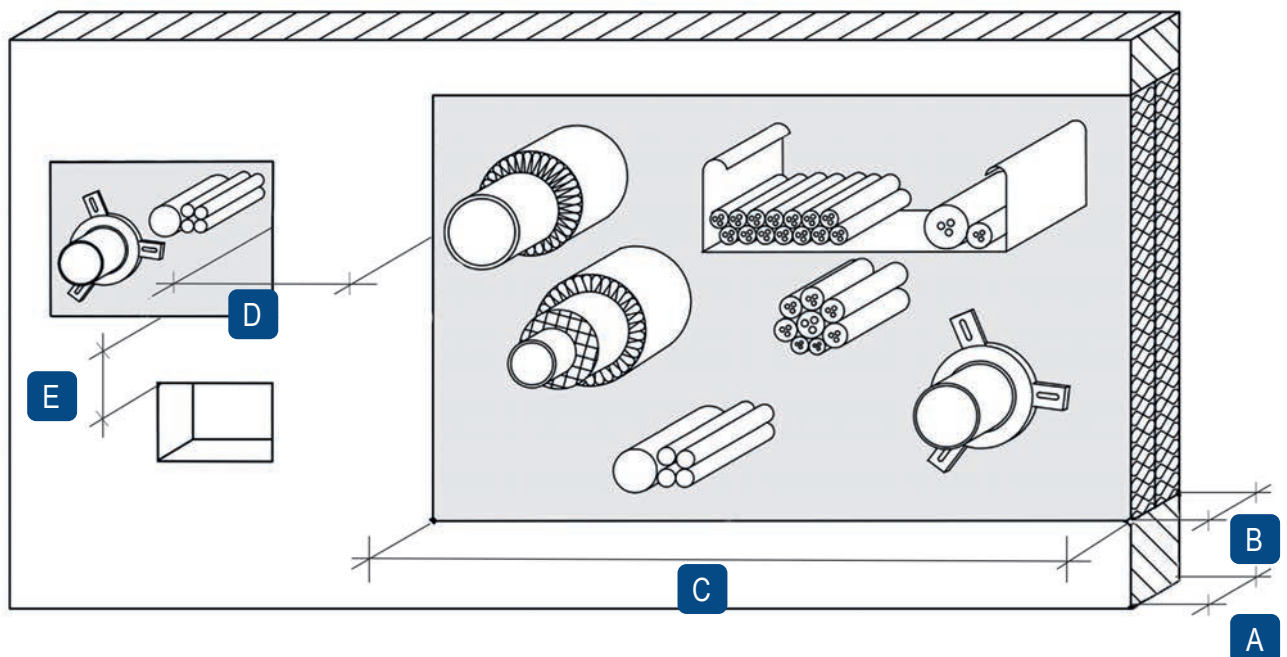
Penetration seals in floors must be safeguarded against loads/walking on using fencing or grating on site.

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1.5 Component and sealing thickness, sealing spacing

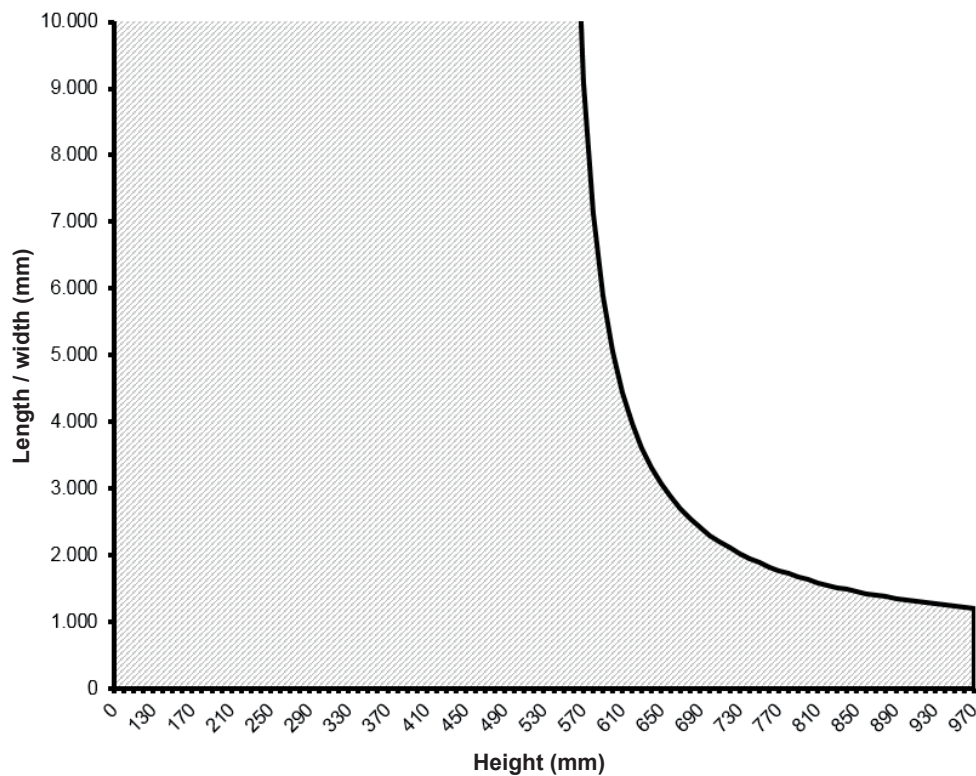
Dimensions			
Item	Designation	Wall [mm]	Floor [mm]
A	Component thickness	≥ 122	≥ 150
B	Sealing thickness	≥ 130	≥ 150
C	Maximum dimension of the component opening (width x height)	970 x 1200 or 1200 x 970	1200 x 970 or 538 x ∞
D	Distance to other cable or pipe seals	200	200
E	Distance to other openings or fixtures	200	200



The total permissible cross section of the installations (external dimensions) is ≤ 60% of the shell opening.

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Maximum dimensions of the mixed penetration seal "FLAMRO® Multi Combi seal EN" in solid floors



The maximum height of the penetration seal in solid floors is 970 mm.

The maximum length (width) of the penetration seal in solid floors must be calculated as follows:

$$\text{Length (width)} = \frac{\text{Height}}{((L_{\text{cert.}}/2) \times \text{height}) - 1}$$

$$C_{\text{cert.}} = \frac{\text{Scope}_{\text{cert.}}}{\text{Sealing area}_{\text{cert.}}} = 3.729 \text{ m/m}^2; \text{ or } 0.003729 \text{ mm/mm}^2.$$

The minimum ratio of circumference to area of the opening in solid floors is 3.729 m/m² or 0.003729 mm/mm².

$C_{\text{cert.}}$ was calculated from the dimensions of the tested seal (1200 mm x 970 mm).

The area on the left side of the diagram gives an overview of all possible combinations of length (width) and height, where the minimum ratio of circumference to area is $\geq C_{\text{cert.}}$. With a length (width) of e.g. 1200 mm, the permissible height is 970 mm; with a length (width) of e.g. 2300 mm, the permissible height is 700 mm. If the height is less than 724 mm, there is no need to limit the length (width).

* Comment: The dimensions of the diagram are not true to size (source: DIN EN 1366-3).

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2. Used products



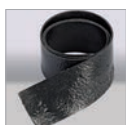
FLAMRO® BMA
fire protection compound
 12.5 kg pail – Art. no. 20125
 5 kg pail – Art. no. 20500



FLAMRO® BMS
filler
 12.5 kg pail – Art. no. 10125
 5 kg pail – Art. no. 10500



FLAMRO® BMK
filler
 0.4 kg cartridge – Art. no. 30004
 1 kg cartridge – Art. no. 30010



FLAMRO® UBB
wrap
 1000 x 60 x 2 mm
 Art. no. 90050



FLAMRO® Variant N II A
fire protection collar
 up to Ø 160 mm - Art. no. 15032–15160



FLAMRO BS 60-1 mineral fibre board
 coated on one side with FLAMRO® BMA
 (dry film thickness = approx. 1.0 mm)
 Format 1000 x 625 x 60 mm – Art. no. 50060



Mineral wool A1
 Fire behaviour class in accordance with
 EN 13501-1: A1
 melting point ≥ 1000 °C
 10 kg bag – Art. no. 01183000



ProRox PS 960 pipe section

according to EN 14303 made from mineral wool
 with A1 classification according to EN 13501-1,
 Nominal density: 100 kg/m³
 Melting point: > 1000 °C
 DoP: PROPS960NL-03
 Corresponding to Rockwool 880

Alternatively, the following mineral fibre mats and pipe sections can be installed.

Product	Bulk density (m ³)	Certificate of usability/standard
ISOVER Schalen Protect 1000 S	≥ 85	DE0002- Pipe_Sections (de-en-fr) 001
ISOVER Schalen Protect 1000 S alu	≥ 85	DE0002- Pipe_Sections (de-en-fr) 001



Section and protective insulation

Closed-cell elastomer foam insulation in the form of hoses and plates with intumescent fire protection additives with classification E according to EN 13501-1 including "Armaflex self-adhesive tape" and "Armaflex adhesive 520" - from manufacturer "Armacell GmbH"

Alternatively, the following mineral fibre mats and pipe sections can be installed.

Designation	DIN/abZ/abP
Armaflex Protect	(0543-CPR-2016-001 from 01/04/2015)

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3. Fire resistance class for wall and floor seals

3.1 Installation in walls

Cables, cable bundles and cable carrier systems				
Service		Measure	Fire resistance class	Source
Cables Ø ≤ 80 mm		Coating on both sides with FLAMRO® BMA/BMS/BMK Length ≥ 250 mm, DFT ≥ 2.0 mm (DFT in seal area ≥ 3.0 mm).	E 120 / EI 90	1
Cable bundles Ø ≤ 100 mm with individual cables Ø ≤ 21 mm			EI 120	1
Electrical installation conduits				
Service		Measure	Fire resistance class	Source
Empty pipes made from plastic or steel Ø ≤ 16 mm with/without configuration		Coating on both sides with FLAMRO® BMA/BMS/BMK Length ≥ 250 mm, DFT ≥ 2.0 mm (DFT in seal area ≥ 3.0 mm).	EI 120 C/C	1
Bundles of up to 3 electrical installation pipes made from steel Ø ≤ 25 mm (with/ without configuration)			EI 120 C/C	1
Bundles of up to 3 electrical installation pipes made from plastic Ø ≤ 25 mm (with/ without configuration)		FLAMRO® UBB 2x single layer, without overlapping	EI 120 C/C	1
Combustible pipes without insulation				
Pipe material	Outer Ø [mm]	Measure	Fire resistance class	Source
PVC-U pipes	≤ 160	FLAMRO® Variant N II A-collar, double-sided	EI 120 U/U	1
PE-HD pipes	≤ 160			1
Combustible pipes with insulation made from FEF “Armaflex Protect”				
Pipe material	Outer Ø [mm]	Measure	Fire resistance class	Source
PVC-U pipes	25	≥ 2000 x 20 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
	32–75	≥ 2000 x 25 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
PE-HD pipes	20–25	≥ 2000 x 20 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
	32–75	≥ 2000 x 25 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
PP pipes	25	≥ 2000 x 20 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1

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Non-combustible pipes with insulation made from FEF "Armaflex Protect"				
Pipe material	Outer Ø [mm]	Measure	Fire resistance class	Source
Copper, steel, stainless steel, cast iron	8	≥ 2000 x 16 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1
	> 8–15	≥ 2000 x 19 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
	> 15–25	≥ 2000 x 20 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
	> 25–88.9	≥ 2000 x 25 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
Steel, stainless steel, cast iron	> 88.9–168.3	≥ 2000 x 26 mm (2 x 13 mm) + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	E 120, EI 90 C/U	1
Non-combustible pipes with insulation made from pipe sections, e.g. "ProRox PS 960"				
Pipe material	Outer Ø [mm]	Measure	Fire resistance class	Source
Copper, steel, stainless steel, cast iron	20–25	≥ 2000 x 30 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1
	> 25–88.9	≥ 2000 x 40 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
Steel, stainless steel, cast iron	> 88.9 – ≤ 168.3	≥ 2000 x 40 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1

* Classification report no.: 1 → KB 13-B-238 efectis france

FLAMRO® Multi Combi seal EN

3.2 Installation in floors

Cables, cable bundles and cable carrier systems				
Service		Measure	Fire resistance class	Source
Cables $\varnothing \leq 80$ mm		Coating on both sides with FLAMRO® BMA/BMS/BMK	EI 120	1
Cable bundles $\varnothing \leq 100$ mm with individual cables $\varnothing \leq 21$ mm		Length ≥ 250 mm, DFT ≥ 2.0 mm (DFT in seal area ≥ 3.0 mm).	EI 120	1
Electrical installation conduits				
Service		Measure	Fire resistance class	Source
Empty pipes made from plastic or steel $\varnothing \leq 16$ mm with/without services		Coating on both sides with FLAMRO® BMA/BMS/BMK	EI 120 C/C	1
Bundles of up to 3 electrical installation pipes made from steel $\varnothing \leq 25$ mm (with/without cable service)		Length ≥ 250 mm, DFT ≥ 2.0 mm (DFT in seal area ≥ 3.0 mm).	EI 120 C/C	1
Bundles of up to 3 electrical installation pipes made from plastic $\varnothing \leq 25$ mm (with/without configuration)		FLAMRO® UBB 2x single layer, without overlapping	EI 120 C/C	1
Combustible pipes without insulation				
Pipe material	Outer \varnothing [mm]	Measure	Fire resistance class	Source
PVC-U pipes	≤ 160	FLAMRO® Variant N II A collar, underside of floor	EI 120 U/U	1
PE-HD pipes	≤ 160	FLAMRO® Variant N II A collar, underside of floor	EI 120 U/U	1
Combustible pipes with insulation made from FEF "Armaflex Protect"				
Pipe material	Outer \varnothing [mm]	Measure	Fire resistance class	Source
PVC-U pipes	25	$\geq 2000 \times 20$ mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
	32–75	$\geq 2000 \times 25$ mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
PE-HD pipes	20–25	$\geq 2000 \times 20$ mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
	32–75	$\geq 2000 \times 25$ mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1
PP pipes	25	$\geq 2000 \times 20$ mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 U/C	1

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Multi Combi seal EN

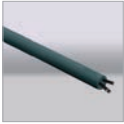
Non-combustible pipes with insulation made from FEF “Armaflex Protect”				
Pipe material	Outer Ø [mm]	Measure	Fire resistance class	Source
Copper, steel, stainless steel, cast iron	8	≥ 2000 x 16 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1
	> 8–15	≥ 2000 x 19 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
	> 15–25	≥ 2000 x 20 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
	> 25–88.9	≥ 2000 x 25 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	E 120, EI 90 C/U	
Steel, stainless steel, cast iron	> 15–28	≥ 2000 x 25 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1
	> 28–88.9	≥ 2000 x 25 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	E 120, EI 90 C/U	1
	> 88.9–168.3	≥ 2000 x 26 mm (2 x 13 mm) + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
Non-combustible pipes with insulation made from pipe sections, e.g. “ProRox PS 960”				
Pipe material	Outer Ø [mm]	Measure	Fire resistance class	Source
Copper, steel, stainless steel, cast iron	20–25	≥ 2000 x 30 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1
	> 25–88.9	≥ 2000 x 40 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT		
Steel, stainless steel, cast iron	> 88.9 – ≤168.3	≥ 2000 x 40 mm + coating of FLAMRO® BMA/BMS/BMK ≥ 100 mm x 2 mm DFT	EI 120 C/U	1

* Classification report no.: 1 → KB 13-B-238 efectis france

FLAMRO® **Multi Combi seal EN**

4. Allowed services

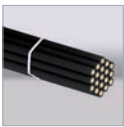
4.1 Cables / Cable bundles / Cable support constructions / Electrical installation pipes



All types of electrical cables and lines (also fibre optic cables)

up to $\varnothing \leq 80$ mm without limitation of the size of the total conductor cross-section of the individual cables.

Wave guides are not permitted.



Cable bundles

Up to $\varnothing \leq 100$ mm

with individual cables $\varnothing \leq 21$ mm



Cable support constructions (cable ducts, racks, conductors)

Steel cable trays (perforated or unperforated) and cable conductors made from steel, with organic coatings if necessary, if the overall fire behaviour corresponds to at least A2 according to EN 13501-1.



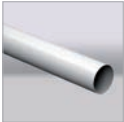
Electric installation conduits

Pipes made from steel or plastic with outer diameter of ≤ 16 mm.

Bundles made from up to 3 plastic or steel pipes according to EN 61386-21 and EN 61386-22 with $\varnothing 16$ –25 mm

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4.2 Combustible pipes

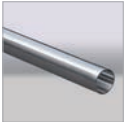


Type of pipe	According to standard/approval	External pipe Ø [mm]	Pipe wall thickness [mm]
PVC-U pipes (version with variant N II A)	EN ISO 1452-1, DIN 8061 / DIN 8062	Wall	
		≤ 63	1.9–7.0
		> 63–110	1.8–8.2
		> 110–160	1.8–7.7
		Floor	
		≤ 50	1.8–5.6
		> 50–75	1.8–8.2
		> 75–90	1.8–10.0
		> 90–110	1.8–12.3
		> 110–160	3.2–11.9
PVC-U pipes (version with Armaflex Protect)		Wall/floor	
		25	1.5–2.8
		32–75	1.8–5.6
PE-HD pipes (version with variant N II A)	EN 1519-1, EN 12666-1, DIN 8074 / DIN 8075	Wall	
		≤ 63	1.8–5.8
		> 63–110	2.7–10.0
		> 110–160	14.6
		Floor	
		≤ 50	1.8–4.6
		> 50–75	2.7–6.7
		> 75–90	2.7–8.1
		> 90–110	2.7–10.0
		> 110–160	4.0–14.6
PE-HD pipes (version with Armaflex Protect)		Wall/floor	
		20–25	1.9–2.3
		32–75	1.9–6.8
PP pipes	EN 15874-2, DIN 8077 / DIN 8078	Wall/floor	
		25	2.3

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4.3 Non-combustible pipes



Type of pipe	External pipe Ø [mm]	Pipe wall thickness [mm]
Copper, steel, stainless steel, cast iron	Wall/floor	
	≤ 88.9	1.0–14.2
Steel, stainless steel, cast iron	Wall/floor	
	> 88.9 – ≤ 168.3	2.0–14.2

5. Distance controls

FLAMRO® Multi Combi seal EN distance control - wall

 member of svt group									Component opening		
		Individual cables	Cable bundles	Cable carrier systems	Electric installation conduits	Combustible pipes	Non-combustible pipes with FEF insulation	Non-combustible pipes with insulation made from mineral wool	Top	Bottom	Lateral
	Individual cables	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 40	≥ 0	≥ 0	
	Cable bundles	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 40	≥ 0	≥ 0	
	Cable carrier systems	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 40	≥ 0	≥ 0	
	Electric installation conduits	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 40	≥ 0	≥ 0	
	Combustible pipes	≥ 50		≥ 50	≥ 75*	≥ 100	≥ 100	≥ 50			
	Non-combustible pipes with FEF insulation	≥ 100		≥ 100	≥ 100	≥ 100	≥ 100	≥ 0			
	Non-combustible pipes with insulation made from mineral wool	≥ 100		≥ 100	≥ 100	≥ 100	≥ 100	≥ 0			
* Distance between combustible pipes with insulation made from FEF "Armaflex Protect" and distance between combustible pipes with collars for combustible pipes with FEF "Armaflex Protect" ≥ 100.									Dimensions in mm		

FLAMRO® Multi Combi seal EN distance control - floor

 member of svt group									Component opening		
		Individual cables	Cable bundles	Cable carrier systems	Electric installation conduits	Combustible pipes	Non-combustible pipes with FEF insulation	Non-combustible pipes with insulation made from mineral wool	Top	Bottom	Lateral
	Individual cables	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 25	≥ 0	≈ 0	
	Cable bundles	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 25	≥ 0	≈ 0	
	Cable carrier systems	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 25	≥ 0	≈ 0	
	Electric installation conduits	≥ 0 (≥ 60 one on top of the other)			≥ 100	≥ 100	≥ 100	≥ 25	≥ 0	≈ 0	
	Combustible pipes	≥ 100		≥ 100	≥ 100	≥ 100	≥ 100	≥ 55			
	Non-combustible pipes with FEF insulation	≥ 100		≥ 100	≥ 100	≥ 100	≥ 100	≥ 0			
	Non-combustible pipes with insulation made from mineral wool	≥ 100		≥ 100	≥ 100	≥ 100	≥ 100	≥ 0			
Dimensions in mm											

FLAMRO® Multi Combi seal EN

6. Design regulations and variants

The mixed penetration seal may be used to close blank penetrations (so-called reserve seals). Subsequent changes to the seal services may be made.

Penetration seals in floors must be safeguarded against loads/walking on using fencing or grating on site.

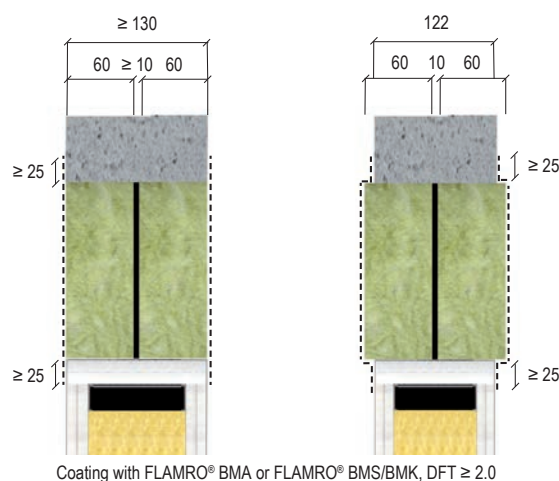
The lintel or the floor above the mixed penetration seal must be assessed structurally and for fire-resistance so that the mixed penetration seal does not receive any additional vertical load (except its own weight).

Feedthroughs must be arranged vertically to the component surface.

In the case of lightweight partition walls according to section 3.1, a surrounding frame whose width must correspond to the wall thickness, made of non-combustible (building material class DIN 4102-A) building slabs (fibreglass, gypsum fibreboard or calcium silicate boards) must be arranged within the shell opening.

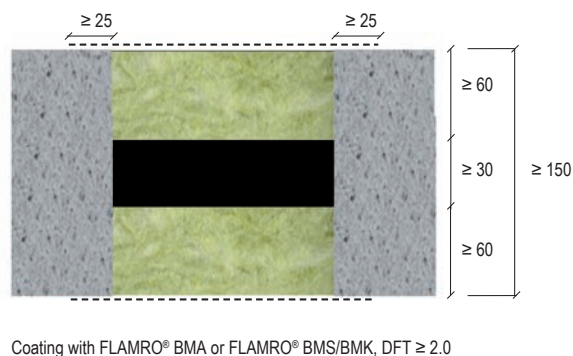
The penetration seal may only be used on pneumatic conveyor systems, compressed air lines, etc. if it is ensured that the pipeline system is switched off in the event of a fire.

Design variants in walls



Dimensions in mm

Design variants in floors

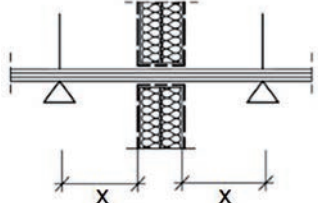


Dimensions in mm

FLAMRO® Multi Combi seal EN

6.1 Initial brackets (supports)

The brackets/supports of the installations in front of the wall seal must be largely non-combustible (building material class DIN 4102-A) and arranged at a distance on both sides according to the overview.

		Wall – X [mm]	Floor – X [mm]
	Cables, cable bundles, cable trays	≤ 250	≤ 500 mm above
	Electric installation conduits	≤ 250	
	Combustible pipes, uninsulated	≤ 300	
	Combustible pipes, insulated	≤ 400	
	Non-combustible pipes	≤ 400	

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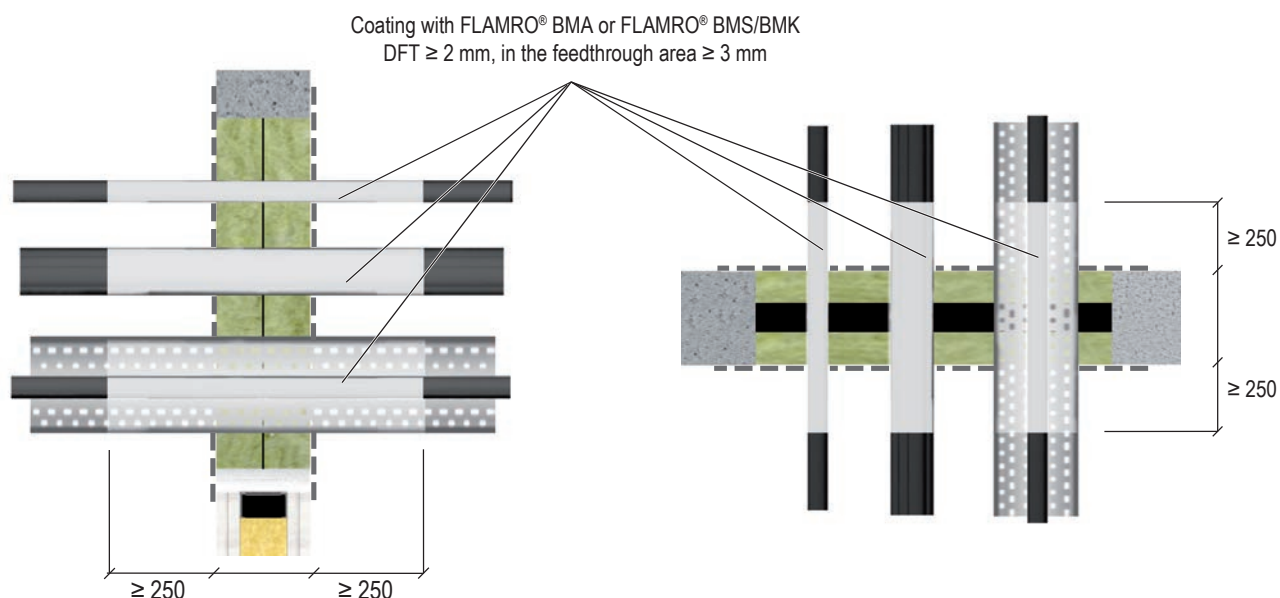
Multi Combi seal EN

7. Fire protection measures

7.1 Cables, cable bundles and cable support constructions

All cable trays/cable conductors (floor and sides) and cables must be on both sides of the penetration seal over a length of ≥ 250 mm (measured from the surface of the penetration seal) with FLAMRO® BMA or FLAMRO® BMS / FLAMRO® BMK with a thickness of ≥ 2 mm (total dry film thickness) and in the feedthrough area (area below and between the two mineral wool panels) with a thickness of ≥ 3 mm (total dry layer thickness).

Version with wall and floor seal



Component, seal thickness and variants page 18

Dimensions in mm

Wall and floor					
Service	FLAMRO® BMA / BMS / BMK				Fire resistance class
	Length [mm]	Inside seal [mm]	Outside seal [mm]	Dry film thickness [mm]	
Cables $\varnothing \leq 80$ mm	≥ 630	≥ 130	≥ 250	≥ 2.0	E 120, EI 90
Cable bundles $\varnothing \leq 100$ mm with single cables $\varnothing \leq 21$ mm				in the feedthrough area ≥ 3.0	EI 120

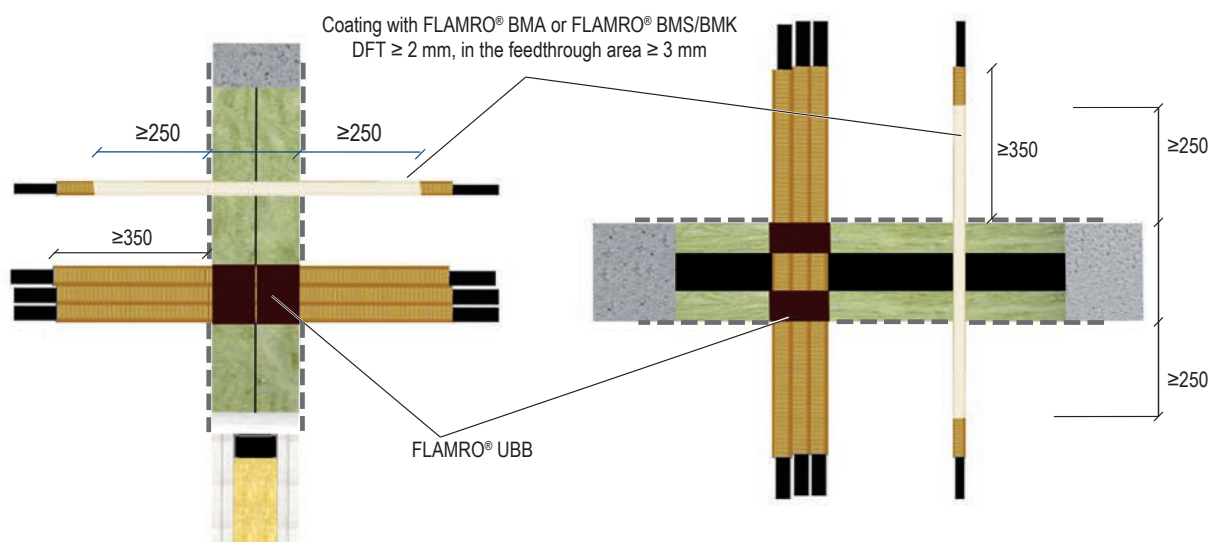
FLAMRO® Multi Combi seal EN

7.2 Electrical installation conduits (EIC)

All electrical installation pipes must be on both sides of the penetration seal over a length of ≥ 250 mm (measured from the surface of the penetration seal) with FLAMRO® BMA or FLAMRO® BMS / FLAMRO® BMK with a thickness of ≥ 2 mm (total dry layer thickness) and in the feedthrough area (area below and between the two mineral wool plates) with a thickness of ≥ 3 mm (total dry layer thickness).

Bundles of electrical installation pipes made from plastic must be provided with FLAMRO® UBB, which are installed on the inside and flush with the penetration seal. If necessary, they must also be fixed with plastic cable ties or steel wire.

Version with wall and floor seal



Component, seal thickness and variants page 18

Dimensions in mm

Wall and floor											
Service	FLAMRO® BMA / BMS / BMK				FLAMRO® UBB						Fire resistance class
	Length [mm]	In penetration seal [mm]	In front of the penetration seal [mm]	Dry film thickness [mm]	Wrap width [mm]	Qty. wraps [n]	In penetration seal [mm]	In front of the penetration seal [mm]	Qty. layers [n]		
									Wall	Floor	
EIC made from plastic or steel Ø ≤ 16 mm	≥ 630	≥ 130	≥ 250	≥ 2.0 in the feed-through area ≥ 3.0	—	—	—	—	—	—	EI 120 C/C
Bundle of up to 3 EIC made from steel Ø ≤ 25 mm	≥ 630	≥ 130	≥ 250	≥ 2.0 in the feed-through area ≥ 3.0	—	—	—	—	—	—	
Bundle of up to 3 EIC made from plastic Ø ≤ 25 mm	—	—	—	—	≥ 60	2	≥ 60	0	1	2	

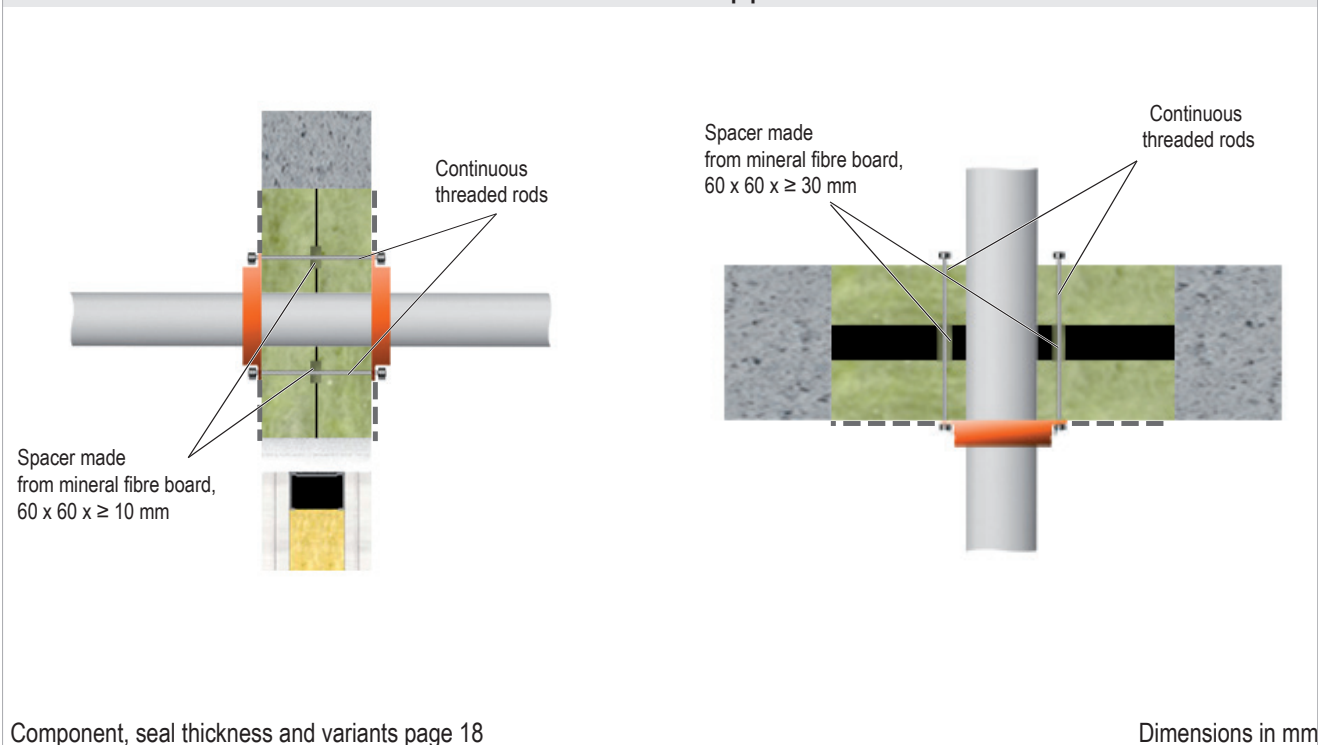
FLAMRO® Multi Combi seal EN

7.3 Combustible pipes

7.3.1 Combustible pipes without insulation

The penetration seal may only be used on pneumatic conveyor systems, compressed air lines, etc. if the pipeline system is switched off in the event of a fire.

Version with wall and floor seal - variant with FLAMRO® Variant N II A pipe collar



Wall			
Pipe material	Outer Ø [mm]	Measure	Fire resistance class
PVC-U pipes	≤ 160	FLAMRO® Variant N II A collar, double-sided	EI 120 U/U
PE-HD pipes	≤ 160	FLAMRO® Variant N II A collar, double-sided	EI 120 U/U

Floor			
Pipe material	Outer Ø [mm]	Measure	Fire resistance class
PVC-U pipes	≤ 160	FLAMRO® Variant N II A collar, underside of floor	EI 120 U/U
PE-HD pipes	≤ 160	FLAMRO® Variant N II A collar, underside of floor	EI 120 U/U

FLAMRO® Multi Combi seal EN

7.3.2 Insulation with FEF "Armaflex Protect"

When installing "Armaflex Protect", all butt seams and longitudinal seams must be glued with "Armaflex Kleber 520" (application quantity $\leq 300 \text{ g / m}^2$) and covered "Armaflex self-adhesive tape" (dimensions 50 mm x 3 mm).

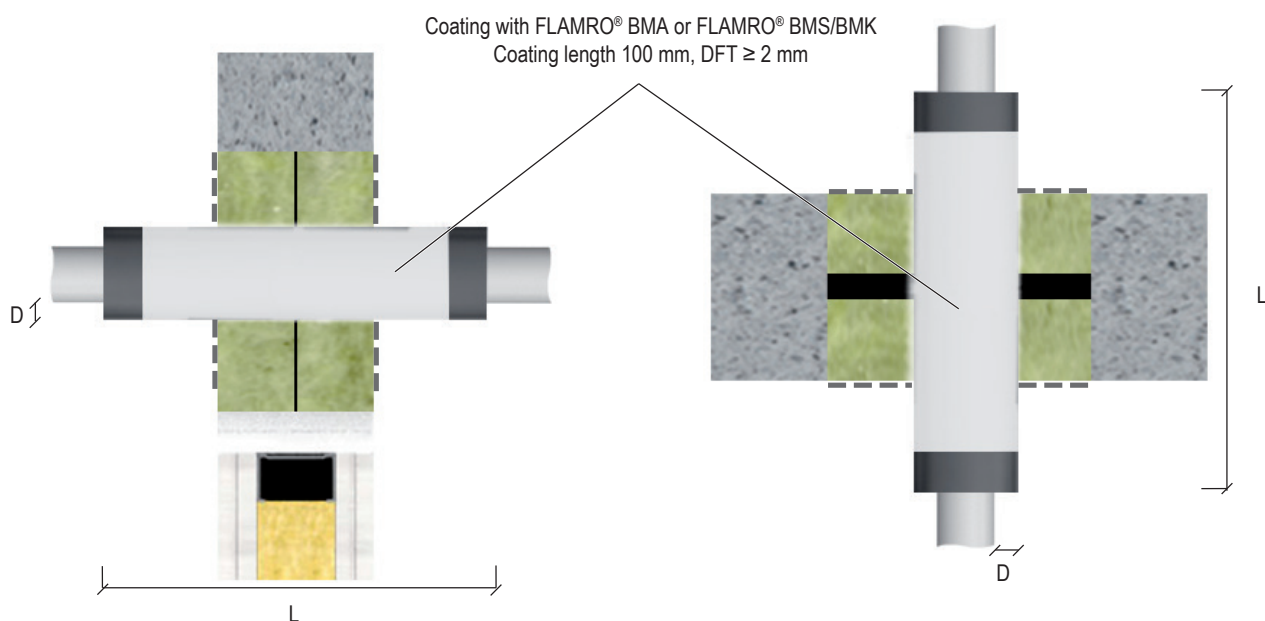
The hose or plate of "Armaflex Protect" can generally be glued along the required minimum insulation length ($\geq 2000 \text{ mm}$) or in the middle of the penetration seal, whereby the length of each of the two hoses or plates must be $\geq 1000 \text{ mm}$.

"Armaflex Protect" in the form of a hose must be used for pipes with a diameter of $\leq 89 \text{ mm}$. The "Armaflex Protect" hose can either be pushed onto the pipe or slit and placed around the pipe and glued at the longitudinal seam.

Junctions and pipe bends must also be equipped with "Armaflex Protect" along the required minimum insulation length.

Butt seams between "Armaflex Protect" and other attached insulation can be glued according to the manufacturer's instructions.

Version for wall and floor insulation - variant with "Armaflex protect"



Component, seal thickness and variants page 18

Wall and floor

Pipe material	Outer Ø [mm]	Type of insulation	Length of insulation L [mm]	Thickness of insulation D [mm]	FLAMRO® BMA / BMS / BMK coating		Fire resistance class
					Length [mm]	Dry film thickness [mm]	
PVC-U pipes	25	Armaflex Protect	≥ 2000	20	100 in front of penetration seal, continuous in the penetration seal	2	EI 120 U/C
	32-75			25			
PE-HD pipes	20-25			20			EI 120 U/C
	32-75			25			
PP pipes	25			20			EI 120 U/C

FLAMRO®

Multi Combi seal EN

7.4 Measures for non-combustible pipes

7.4.1 Insulation with FEF "Armaflex Protect"

When installing "Armaflex Protect", all butt seams and longitudinal seams must be glued with "Armaflex Kleber 520" (application quantity $\leq 300 \text{ g / m}^2$) and covered "Armaflex self-adhesive tape" (dimensions 50 mm x 3 mm).

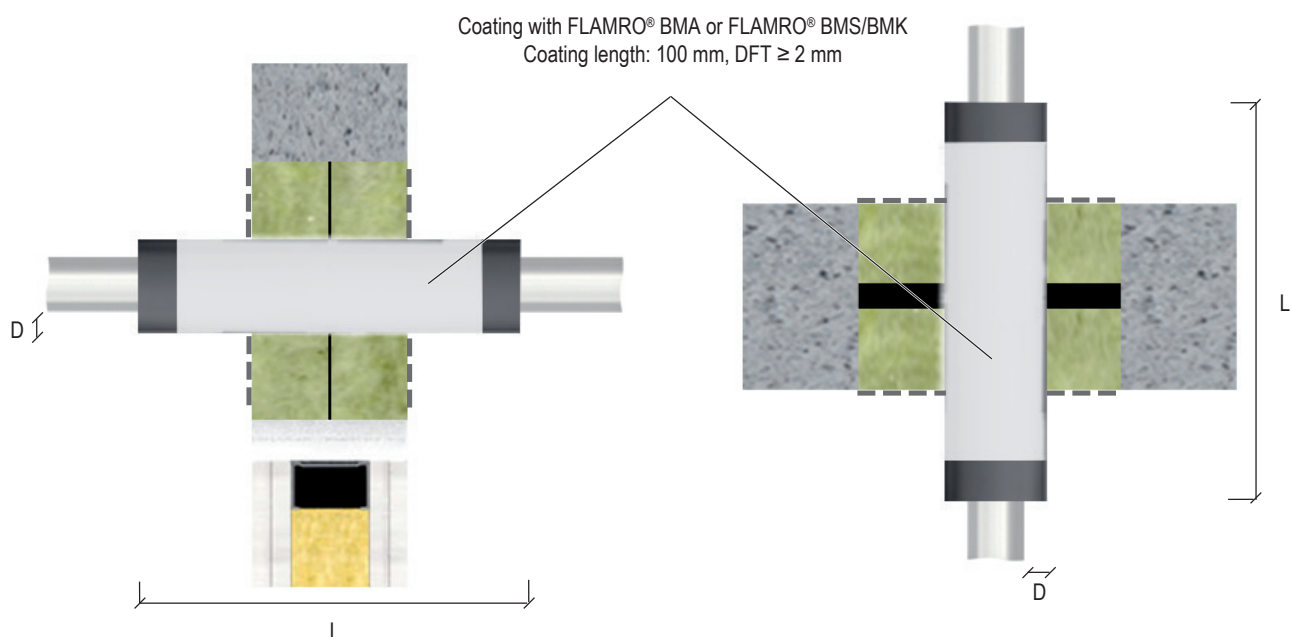
The hose or plate of "Armaflex Protect" can generally be glued along the required minimum insulation length ($\geq 2000 \text{ mm}$) or in the middle of the penetration seal, whereby the length of each of the two hoses or plates must be $\geq 1000 \text{ mm}$.

"Armaflex Protect" in the form of a hose must be used for pipes with a diameter of $\leq 89 \text{ mm}$. The "Armaflex Protect" hose can either be pushed onto the pipe or slit and placed around the pipe and glued at the longitudinal seam.

Junctions and pipe bends must also be equipped with "Armaflex Protect" along the required minimum insulation length.

Butt seams between "Armaflex Protect" and other attached insulation can be glued according to the manufacturer's instructions.

Version for wall and floor insulation - variant with "Armaflex protect"



Component, seal thickness and variants page 18

Dimensions in mm

Wall and floor							
Pipe material	Outer Ø [mm]	Type of insulation	Length of insulation L [mm]	Thickness of insulation D [mm]	FLAMRO® BMA/BMS/BMK coating		Fire resistance class
					Length [mm]	Dry film thickness [mm]	
Copper, steel, stainless steel, cast iron	8	Armaflex Protect	≥ 2000	16	100 in front of penetration seal, continuous in the penetration seal	2	EI 120 C/U
	> 8–15			19			
	> 15–25			20			
	> 25–88.9			25			
Steel, stainless steel, cast iron	> 88.9–168.3			26 (2x 13)			E 120, EI 90 C/U

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Multi Combi seal EN

7.4.2 Insulation with mineral wool / pipe sections (e.g. "ProRox PS 960")

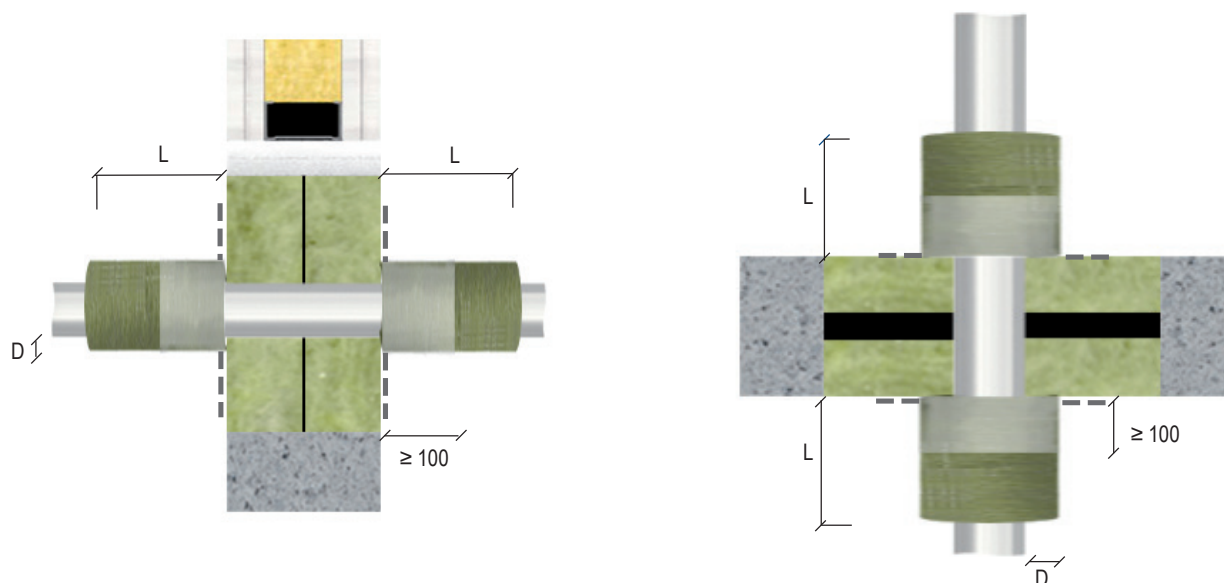
The longitudinal seams of the prefabricated pipe sections must be fully glued with FLAMRO® BMA or FLAMRO® BMS / FLAMRO® BMK with a thickness of at least 1 mm (wet layer thickness).

All longitudinal and butt seams must be fully glued with FLAMRO® BMA/BMS/BMK with a thickness of min. 1 mm (wet layer thickness).

The prefabricated pipe sections must be fixed in position with winding wire (steel wire with a diameter ≥ 2 mm; 3 windings per metre; e.g. with spacing of 200 mm, 550 mm and 900 mm - measured from the surface of the penetration seal).

Joints and pipe bends must also be equipped with prefabricated pipe sections over the required minimum insulation length (≥ 1000 mm - measured from the surface of the penetration seal) on both sides of the penetration seal. The joint between the insulation of the pipe and the joint or pipe bend must be fully glued with FLAMRO® BMA or FLAMRO® BMS / FLAMRO® BMK with a thickness of at least 1 mm (wet layer thickness).

Version for wall and floor insulation - variant with "Armaflex protect"



Component, seal thickness and variants page 18

Dimensions in mm

Wall and floor								
Pipe material	Outer Ø [mm]	Type of insulation	Length of insulation L [mm]	Thickness of insulation D [mm]	FLAMRO® BMA/BMS/BMK coating		Fire resistance class	
					Length [mm]	Dry film thickness [mm]		
Copper, steel, stainless steel, cast iron	≤ 25	Prefabricated pipe sections (e.g. "ProRox PS 960")	1000	30	100 in front of penetration seal	2	EI 120 C/U	
	> 25 – 88.9			40				
Steel, stainless steel, cast iron	> 88.9 – 168.3			30				
				40				

FLAMRO® **Multi Combi seal EN**

8. Installation steps

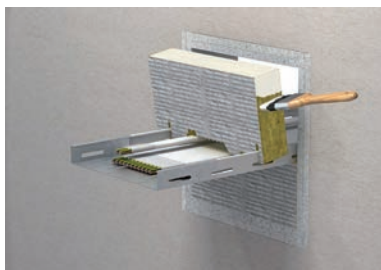
1. Clean the opening of the component and installations.



2. Coat the cable and opening with FLAMRO® BMA.



3. Cut the mineral fibre boards to size, coat the surrounding edge areas with FLAMRO® BMA. Seal the openings in two layers.



4. Pack the remaining openings with mineral wool or fill with FLAMRO® BMA.



5. Coat the seal surface with FLAMRO® BMA (DFT ≥ approx. 2 mm).



6. Attach the label if necessary.



Declaration of performance

KA-15-0237-FLAMRO® BMA

Date: 18/02/2020

Rev.: 01

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Unique product type identification code

FLAMRO® BMA

Intended use

Fire protection product for penetration seals

Manufacturer

Flamro Brandschutz-Systeme GmbH,
 Gluesinger Strasse 86, 21217 Seevetal, Germany

System for evaluating and checking performance consistency

System 1

European evaluation document

EAD 350454-00-1104

European technical evaluation

ETA-15/0237 from 05/10/2018

Performance consistency certificate

0761-CPR-0462

Technical assessment authority

ETA-Danmark A/S, Nordhavn

The notified authority

Material testing institute for the building trade, Brunswick, identification number 0761

Performance declaration

Important features	Performance	Harmonised technical specification
Fire behaviour	E	EN 13501-1
Fire resistance	Maximum class EI 120 - For details see ETA-15/0237	EN 13501-2
Release of hazardous substances	No hazardous substances	ETA-15/0237
Durability and usability	Usage category, type Y ₂	EOTA TR 024

The performance of the product for which the declaration of performance was issued corresponds to the declared performance. The above-mentioned manufacturer is solely responsible for the creation of the declaration of performance in accordance with regulation (EU) no. 305/2011. This declaration of performance is available online at www.flamro.de.

Signed for and on behalf of the manufacturer by:



p.p. Christian Meyer-Korte
 Product Management Construction



p.p. Daniel Bernhardt
 Technical Documentation Construction

Global fire protection



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