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



European Technical Assessment ETA-21/0461 of 2021/05/21

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 66 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

FLAMRO® NBR-plus

Product family to which the above construction product belongs:

Fire stopping product – penetration seals.

Manufacturer:

FLAMRO Brandschutz System GmbH
Glüsinger Straße 86
D – 21217 Seevetal
Internet www.flamro.de

Manufacturing plant:

FLAMRO Brandschutz System GmbH
Manufacturing Plant II

This European Technical Assessment contains:

16 pages including 1 annex which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, based on:

European Assessment Document (EAD) No. 350454-00-110 Fire Stopping and fire sealing products – Penetration seals

This version replaces:

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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 product FLAMRO® NBR-plus is a factory made flexible intumescent fabric mat, which reacts in case of fire by expanding and generating foam. The fabric mat is made of a glass filament fabric which consists of a glass filament mechanically covered with the intumescent coating FLAMRO® DSB on one side, and on the other side covered with a Polyurethane pigment optionally in the colour grades: Grey, red, black or white.

The construction product FLAMRO® NBR-plus is produced in rolls, cut at factory. It may also be delivered as intumescent strips, mats, cuts, and stamps (bands, blocks, pads) of dimension of request.

Detailed specifications for identification and performance criteria for fire safety regarding the construction product are given in the annexes of this ETA.

2 Specification of the intended use in accordance with the applicable EAD

The construction product FLAMRO® NBR-plus is assessed on the basis of EAD 350454-00-1104, September 2017 as a fire stopping product, penetration seal.

The construction product FLAMRO® NBR-plus is intended for use as a component with a fire protection effect in building elements, assembled systems or constructions that are subject to requirements related to fire protection. Their reactive effect prevents heat transmission and fire spreading in the event of fire.

Within the scope of this ETA, the fire resistance was demonstrated for pipes made of non-combustible materials (copper or steel pipes and “Tubolit DuoSplit” pipes). Pipe penetrations seals are used to seal off openings in fire resistant walls or floors, which are penetrated by pipes, and serves to preserve the walls or

floors fire resistance in the area of the penetrations.

More information in table 3: “Performance of the product and references to the methods used for its assessment”.

The intumescent fire sealing products are to be installed according to the manufacturer’s installation manual.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the FLAMRO® NBR-plus of 10 years, provided the manufacturers conditions for the packaging, transport, storage, installation, use, maintenance and repair are met.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic
3.1 Safety in case of fire (BWR2)	
Reaction to fire	The product is classified as B-s1,d0 in accordance with EN13501-1, and the EC Delegated regulation 2016/364/EU.
Resistance to fire	Classification according to EN 13501-2: See Annex A for further information of fire-resistant designs.
3.2 Hygiene, health, and the environment (BWR3)	
Content, emission and/or release of dangerous substances	No dangerous substances
Air permeability (material property)	No performance assessed
Water Permeability (material property)	No performance assessed
3.3 Safety and accessibility in use (BWR4)	
Mechanical resistance and stability	No performance assessed
Resistance to impact/movement	No performance assessed
Adhesion	No performance assessed
Durability	The product fulfils the provisions related to durability in EAD 350454-00-1104 for use condition X.
3.4 Protection against noise (BWR5)	
Airborne sound insulation	No performance assessed
3.5 Energy Economy and heat retention (BWR6)	
Thermal properties	No performance assessed
Water vapour permeability	No performance assessed

*) See additional information in section 3.9 – 3.10.

3.9 Methods of verification

The characteristic values of the joint sealing system are based on the EAD 350454-00-1104.

3.10 General aspects related to the fitness for use of the product

The European Technical Assessment is issued for the product based on agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide if such changes affect the ETA and consequently the validity of the CE marking based on the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

FLAMRO® NBR-plus is manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

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

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 2021-05-21 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex A
Resistance to fire classification of FLAMRO® NBR-plus
mounted as single penetration seals

A.1 General information:

A. 1.1. Wall/floor constructions

a. Flexible wall

The wall must have a minimum thickness of 100 mm and a metal profile frame lined on both faces with minimum 2 layers of 12,5 mm thick gypsum boards according to EN 520/gypsum plaster boards according to EN 18180.

b. Aerated concrete wall

The wall must have a minimum thickness of 150 mm and comprise aerated concrete with a minimum density of 600-650 kg/m³

c. Aerated concrete floor

The floor must have a minimum thickness of 150 mm and comprise aerated concrete with a minimum density of 500-550 kg/m³

A.2 Flexible wall, according to Annex A.1.1.a

Wall installation, 100 mm wall as metal stud construction Annex A 1.1.a	General view
	<p style="text-align: right;">Dimensions in mm</p>

Construction details

Penetration seal:

FLAMRO® NBR-plus intumescent fire protection wraps

Numbers/width: 1x ≥ 125 mm, or 2x ≥ 62,5 mm

Thickness: 1,5 mm

Layers: According to table

Protective insulation:

With or without protective insulation made of Rockwool “Klimarock” or FEF-Insulation.

Length and width: According to table.

Annular gap filling material:

Ablative or intumescent filler or non-combustible material (class A1 or A2-s1, d0 according to EN 13501-1) as e.g. concrete, cementitious or gypsum mortar. “

Back-up filling material:

Loose stone wool.

Working Space:

Working space between services ≥ 100 mm, gap – except for services marked “zero distance”.

FLAMRO® NBR-plus
Resistance to fire classification, 100 mm flexible wall installations

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]	
Copper, steel, stainless steel, cast iron	≤ 28,0	1,0 - 14,2	XG/Armaflex	9,0	1	-	E 90 C/U	EI 90 C/U	
				> 9,0 - ≤ 25,0	2	-	E 90 C/U	EI 90 C/U	
	> 28,0 - ≤ 42,0	1,2 - 14,2		13,0	1	-	E 90 C/U	EI 90 C/U	
				> 13,0 - ≤ 25,0	2	-	E 90 C/U	EI 90 C/U	
	≤ 54,0	1,5 - 14,2		19,0 - ≤ 40,0	2	-	E 90 C/U	EI 90 C/U	
				> 19,0 - ≤ 40,0	2	-	E 90 C/U	EI 90 C/U	
	≤ 88,9	2,0 - 14,2		> 19,0 - ≤ 40,0	2	≥ 30 x 500	E 120 C/U	EI 120 C/U	
				50,0	3	≥ 19 x 500	E 120 C/U	EI 120 C/U	
	Steel, stainless steel, cast iron	> 88,9 - ≤ 108,0		3,2 - 14,2	19,0	2	≥ 30 x 250	E 90 C/U	EI 90 C/U
					> 19,0 - ≤ 50,0	2	≥ 30 x 250	E 90 C/U	EI 60 C/U
> 88,9 - ≤ 114,3		4,0 - 14,2	19,0	2	≥ 30 x 500	E 90 C/U	EI 90 C/U		
			19,0 - 50,0	3	≥ 30 x 500	E 120 C/U	EI 120 C/U		
> 108,0 - ≤ 168,3		4,0 - 14,2	25,0 - 50,0	2	≥ 30 x 250	E 90 C/U	EI 60 C/U		
> 168,3 - ≤ 219,1		4,5 - 14,2	25,0	2	≥ 30 x 250	E 90 C/U	EI 60 C/U		

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	SH/Armaflex	20,0	2	-	E 90 C/U	EI 90 C/U
				> 20,0 - ≤ 40,0			E 120 C/U	EI 120 C/U

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	AF/Armaflex	17,0	2	-	E 90 C/U	EI 90 C/U
				> 17,0 - ≤ 38,0			E 120 C/U	EI 120 C/U

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	NH/Armaflex	19,0	2	-	E 90 C/U	EI 60 C/U
				> 19,0 - < 38,0			E 90 C/U	EI 90 C/U
				38,0			E 120 C/U	EI 120 C/U

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	Kaiflex Kkplus s2	16,5	2	-	E 90 C/U	EI 60 C/U
				> 16,5 - ≤ 35,5	2	-	E 90 C/U	EI 90 C/U

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	Kaiflex Htplus	10,0 - 34,0	2	-	E 90 C/U	EI 90 C/U

Zerodistance

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 42,0	1,2 - 14,2	XG/Armaflex	13,0	1	-	E 90 C/U	EI 90 C/U
	≤ 42,0	1,2 - 14,2		13,0	1	-	E 90 C/U	EI 90 C/U
	≤ 54,0	1,5 - 14,2		19,0	2	≥ 20 x 250	E 90 C/U	EI 90 C/U
	≤ 88,9	2,0 - 14,2		19,0	2	≥ 20 x 250	E 90 C/U	EI 60 C/U
	≤ 88,9	2,0 - 14,2		19,0	2	≥ 20 x 250	E 90 C/U	EI 90 C/U
Steel	≤ 219,1	4,5 - 14,2		25,0	2	≥ 30 x 250	E 90 C/U	EI 60 C/U

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Tubolit Duosplit	6,0 / 10,0	-	PEF	9,0	1	≥ 30 x 500	E 120 C/U	EI 120 C/U

FLAMRO® NBR-plus
Resistance to fire classification, 150 mm concrete wall installations

FLAMRO® NBR-plus - 2 x 62,5 mm placed on both sides

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 88,9	2,0 - 14,2	XG/Armaflex	38,0	2	-	E 120 C/U	EI 120 C/U
				19,0 - 38,0	2	≥ 19 x 500	E 90 C/U	EI 90 C/U
Steel, stainless steel, cast iron	≤ 114,3	3,2 - 14,2		19,0	2	-	E 120 C/U	EI 90 C/U
				19,0 - 38,0	2	-	E 120 C/U	EI 60 C/U
	≤ 219,1	4,5 - 14,2		50,0	3	≥ 30 x 500	E 120 C/U	EI 90 C/U
				25,0	2	≥ 60 x 500	E 120 C/U	EI 120 C/U
				50,0	3	≥ 60 x 500	E 120 C/U	EI 90 C/U
				25,0	2	≥ 60 x 750	E 120 C/U	EI 120 C/U
≤ 323,9	5,6 - 14,2	25,0		2	≥ 60 x 750	E 120 C/U	EI 120 C/U	
		50,0		3	≥ 60 x 750	E 120 C/U	EI 120 C/U	

FLAMRO® NBR-plus - 2 x 62,5 mm placed on both sides

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Steel, stainless steel, cast iron	≤ 168,3	4,0 - 14,2	AF/Armaflex	25,0	2	-	E 120 C/U	EI 60 C/U
				50,0	3	-	E 120 C/U	EI 60 C/U
				25,0	2	≥ 30 x 500	E 120 C/U	EI 60 C/U
				50,0	3	≥ 30 x 500	E 120 C/U	EI 60 C/U

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides

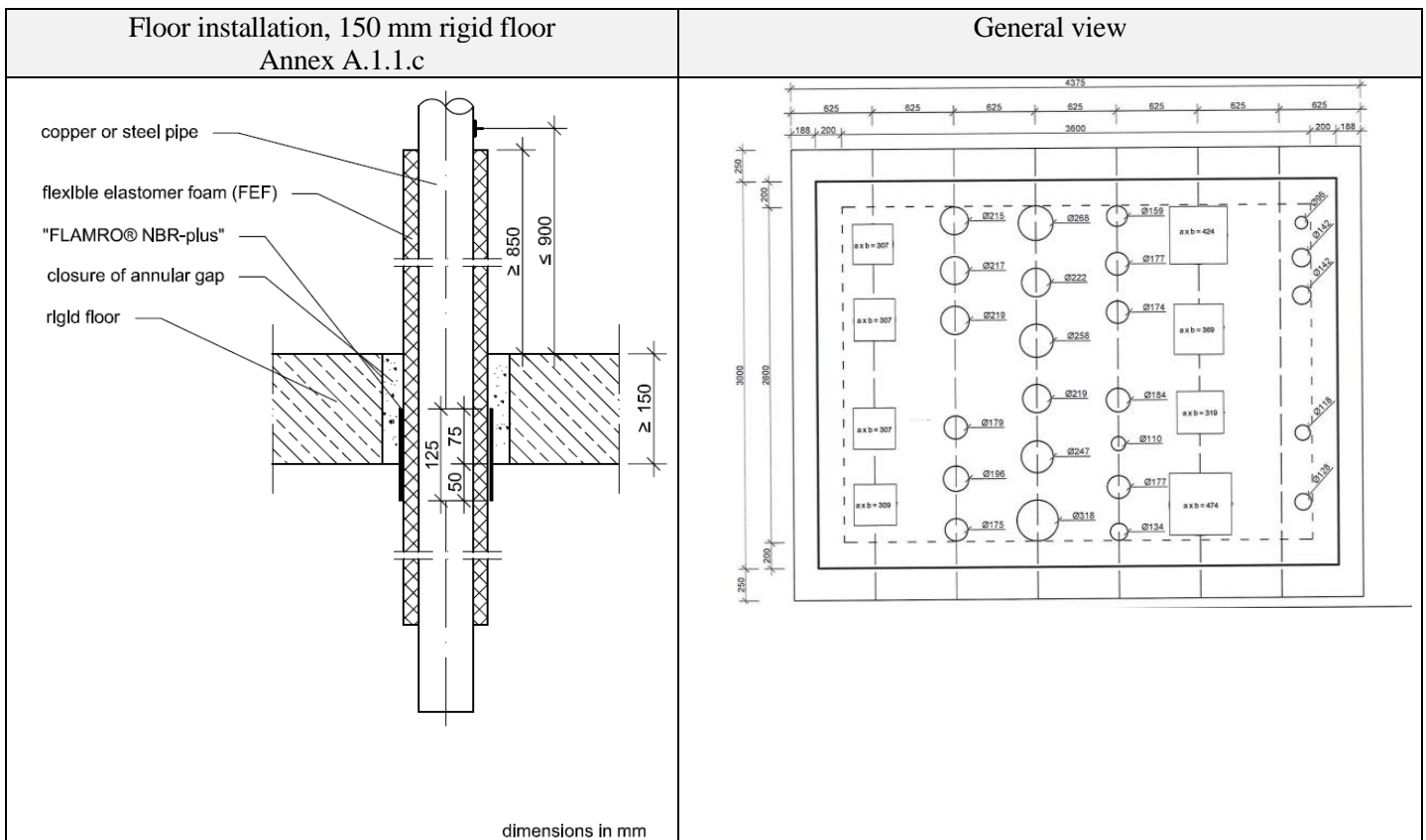
Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 28,0	1,0 - 14,2	NH/Armaflex	9,0 - 25,0	2	-	E 120 C/U	EI 120 C/U
	≤ 42,0	1,2 - 14,2		10,0 - 44,0		-		EI 120 C/U
	≤ 54,0	1,5 - 14,2		13,0 - 50,0		-		EI 120 C/U
	≤ 88,9			19,0 - 38,0		≥ 30 x 500		EI 120 C/U
	≤ 108,0			25,0 - 50,0		≥ 40 x 750		EI 120 C/U
Steel, stainless steel, cast iron	≤ 168,3	4,0 - 14,2		19,0 - 50,0	2	≥ 40 x 500	EI 120 C/U	
	≤ 219,1	4,5 - 14,2		19,0		≥ 60 x 500	EI 120 C/U	

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Tubolit Duosplit copper	10,0 / 18,0	-	PEF	9,0	2	-	E 120 C/U	EI 120 C/U

including 1 x PE-pipe Ø 25 mm and 2 x cable Ø 14 mm

A.3 Aerated concrete floor, according to Annex A.1.1.c



Construction details

Penetration seal:

FLAMRO® NBR-plus intumescent fire protection wraps

Numbers/width: 1 or $2x \geq 125$ mm

Thickness: 1,5 mm

Layers: According to table

Protective insulation:

With or without protective insulation made of Rockwool "Klimarock" or FEF-Insulation

Length and width: According to table.

Annular gap filling material:

Ablative or intumescent filler or non-combustible material (class A1 or A2-sl, d0 according to EN 13501-1) as e.g. concrete, cementitious or gypsum mortar. "

Back-up filling material:

Loose stone wool.

Working Space:

Working space between services ≥ 0 mm.

FLAMRO® NBR-plus
Resistance to fire classification, 150 mm concrete floor installations

FLAMRO® NBR-plus - 1 x 125 mm placed at floor bottom

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 28,0	1,0 - 14,2	XG/Armaflex	9,0	1	-	E 120 C/U	EI 120 C/U
				> 9,0 - ≤ 25,0	2	-		EI 120 C/U
	> 28,0 - ≤ 42,0	1,2 - 14,2		13,0	1	-		EI 120 C/U
				> 13,0 - ≤ 25,0	2	-		EI 120 C/U
	> 42,0 - ≤ 54,0	1,5 - 14,2		19,0 - 40,0	2	-		EI 120 C/U
	> 54,0 - ≤ 88,9	2,0 - 14,2		19,0 - 40,0	2	≥ 30 x 500		EI 120 C/U

FLAMRO® NBR-plus 1 x 125 mm placed at floor bottom

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	AF/Armaflex	19,0	2	Isover ML 3 + 0,6 mm steel sheet casing	E 120 C/U	EI 120 C/U
				19,0	2	Rockwool Klimarock + 0,6 mm steel sheet casing		EI 120 C/U
				14,5	2	-		EI 120 C/U
	≤ 88,9	2,0 - 14,2		19,0	2	-		EI 120 C/U
				41,5	2	-		EI 60 C/U
				18,0 - 41,5	2	≥ 30 x 500		EI 120 C/U
Steel, stainless steel, cast iron	≤ 108,0	2,0 - 14,2	19,0	2	-	EI 120 C/U		
	≤ 168,3	4,0 - 14,2	> 19,0 - ≤ 50,0	3	-	EI 60 C/U		
			25,0	2	-	EI 60 C/U		
	≤ 219,1	4,5 - 14,2	> 25,0 - ≤ 50,0	3	-	EI 60 C/U		
			> 19,0 - ≤ 25,0	2	≥ 60 x 500	EI 120 C/U		
	≤ 323,9	5,6 - 14,2	> 25,0 - ≤ 50,0	3	≥ 60 x 500	EI 90 C/U		
25,0			2	≥ 60 x 750	EI 120 C/U			
> 25,0 - ≤ 50,0	3	≥ 60 x 750	EI 120 C/U					

FLAMRO® NBR-plus 1 x 125 mm placed at floor bottom

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 88,9	2,0 - 14,2	SH/Armaflex	20,0 - 40,0	2	≥ 30 x 500	E 120 C/U	EI 120 C/U
Steel, stainless steel, cast iron	≤ 219,1	4,5 - 14,2		20,0	2	≥ 60 x 500		EI 120 C/U

FLAMRO® NBR-plus 1 x 125 mm placed at floor bottom

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 88,9	2,0 - 14,2	NH/Armaflex	19,0 - 38,0	2	≥ 30 x 500	E 120 C/U	EI 120 C/U
Steel, stainless steel, cast iron	≤ 219,1	4,5 - 14,2		19,0	2	≥ 60 x 500		EI 120 C/U

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides of the floor

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 28,0	1,0 - 14,2	NH/Armaflex	9,0 - 25,0	2	-	E 120 C/U	EI 120 C/U
	≤ 42,0	1,2 - 14,2		10,0 - 44,0		-		EI 120 C/U
	≤ 54,0	1,5 - 14,2		13,0 - 50,0		-		EI 120 C/U
	≤ 76,0	2,0 - 14,2		13,0		-		EI 120 C/U
	≤ 88,9			14,0 - 50,0		-		EI 90 C/U
	≤ 108,0			19,0 - 38,0		≥ 30 x 500		EI 120 C/U
	≤ 168,3			25,0 - 50,0		≥ 40 x 750		EI 120 C/U
Steel, stainless steel, cast iron	≤ 168,3	4,0 - 14,2	19,0 - 50,0	2	≥ 40 x 500	EI 120 C/U		
	≤ 219,1	4,5 - 14,2	19,0		≥ 60 x 500	EI 120 C/U		

FLAMRO® NBR-plus 1 x 125 mm placed at floor bottom

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 88,9	2,0 - 14,2	Kaiflex KK+ s2	17,5 - 39,0	2	≥ 30 x 500	E 120 C/U	EI 120 C/U
Steel, stainless steel, cast iron	≤ 219,1	4,5 - 14,2		19,0	2	≥ 60 x 500		EI 120 C/U

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides of the floor

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Tubolit Duosplit copper	6,0 / 10,0	-	PEF	9,0	1	≥ 30 x 500	E 120 C/U	EI 120 C/U
	10,0 / 18,0	-	PEF	9,0	2	-	E 120 C/U	EI 120 C/U

including 1 x PE-pipe Ø 25 mm and 2 x cable Ø 14 mm

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides of the floor

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 54,0	1,5 - 14,2	Isover ML 3	50,0	2	0,6 mm aluminum sheet casing	E 120 C/U	EI 120 C/U
				50,0	2	-		EI 120 C/U
	80,0	3		-	EI 120 C/U			
≤ 88,9	2,0 - 14,2	100,0		4	-	EI 120 C/U		
Steel, stainless steel, cast iron	≤ 219,1	4,5 - 14,2						EI 120 C/U

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides of the floor

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 88,9	2,0 - 14,2	Isover U Protect	80,0	1	Okapak PVC foil	E 120 C/U	EI 120 C/U

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides of the floor

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 15,0	1,0 - 14,2	Armacell Armalok	20,0	2	-	E 120 C/U	EI 120 C/U
	≤ 35,0			30,0	2	-		EI 120 C/U
	≤ 54,0	1,5 - 14,2		30,0	2	-		EI 120 C/U
				50,0	3	-		EI 120 C/U

FLAMRO® NBR-plus - 2 x 125 mm placed on both sides of the floor

Material	Pipe outer- Ø [mm]	Pipe wall thickness [mm]	Insulation type	Insulation thickness [mm]	FLAMRO® NBR-plus [No. of layers]	Protective insulation [mm]	Integrity [E]	Fire resistance classification [EI]
Copper, steel, stainless steel, cast iron	≤ 15,0	1,0 - 14,2	Armaflex Ultima	9,0 - 19,0	2	-	E 120 C/U	EI 120 C/U
	≤ 54,0	1,5 - 14,2		13,0 - 32,0	2	-		EI 120 C/U
	≤ 88,9	2,0 - 14,2		19,0	2	-		EI 120 C/U