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European Technical Assessment

ETA-15/0802
of 11.01.2016

General part

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik (OIB)
Austrian Institute of Construction Engineering

Trade name of the construction product

FLAMRO Variant N EC

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products:
Penetration Seals

Manufacturer

FLAMRO Brandschutz-Systeme GmbH
Am Sportplatz 2
56291 Leiningen
GERMANY

Manufacturing plant

FLAMRO Brandschutz-Systeme GmbH
Werk E

This European Technical Assessment contains

67 pages including Annexes A-1 to F-14 which form an integral part of this assessment

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

Guideline for European technical approval for "Fire Stopping and Fire Sealing Products", ETAG 026 Part 2: "Penetration Seals", edition August 2011, used as European Assessment Document (EAD)

Specific parts

1 Technical description of the product

“FLAMRO Variant N EC” is a pipe collar to be used as pipe penetration seal in combination with gap fillers and insulations (additional components).

Components of pipe collar “FLAMRO Variant N EC”	Characteristics
ROKU® Strip	Flexible intumescent strip (provided with a self-adhesive device) with a nominal thickness of 2,0 mm and a width of 40 mm
ROKU® Strip EM	Flexible intumescent strip (provided with a self-adhesive device) with a nominal thickness of 2,0 mm and a width of 40 mm
Metal Strap	Metal strap according to Annex B of the ETA made of sheet steel (alloy 1.4016 according to EN 10088-2) with a width of 42,5 mm for fixing of “ROKU® Strip” and “ROKU® Strip EM”
Metal Hook	Metal hook according to Annex B of the ETA made of sheet steel (alloy 1.4016 according to EN 10088-2) for fixing the Metal Straps to the separating element

Gap fillers (additional components)	Characteristics
FLAMRO BSS	Intumescent fire protection foam on the basis of polyurethane (2-component) – filled in cartridges – only to be used as gap filler in rigid floors for plastic pipes “Wavin SiTech®”, “Geberit Silent-PP”, “POLO-KAL NG” and “RAUPIANO PLUS”
Gap Filler	Non-combustible material with classification A1 or A2-s1,d0 according to EN 13501-1 which is dimensionally stable as e.g. mortar, cement or gypsum joint filler

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document

2.1 Intended use

“FLAMRO Variant N EC” is intended to be used to temporarily or permanently reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they have been provided with apertures which are penetrated by various metal pipes and plastic pipes.

“FLAMRO Variant N EC” can only be installed in the types of separating elements as specified in the following table.

Separating element	Construction
Flexible walls	<ul style="list-style-type: none">> Steel studs or timber studs lined on both faces with minimum 2 layer of boards (minimum thickness 12,5 mm) with classification A2-s1,d0 or A1 according to EN 13501-1> For timber stud walls there shall be a minimum distance of 100 mm of the penetration seal to any timber stud. The cavity between the penetration seal and the timber stud has to be closed with minimum 100 mm of insulation with classification A1 or A2 according to EN 13501-1> Minimum thickness 94 mm> Classification according to EN 13501-2: $\geq EI 90$> This European Technical Assessment does not cover sandwich panel constructions and flexible walls where the lining does not cover studs on both sides. Penetrations in such constructions shall be tested on a case by case basis
Rigid walls	<ul style="list-style-type: none">> Aerated concrete, concrete, masonry> Minimum thickness 100 mm> The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period
Rigid floors	<ul style="list-style-type: none">> Aerated concrete, concrete> Minimum density 550 kg/m³> Minimum thickness 150 mm> The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period

“FLAMRO Variant N EC” can only be configured as specified in the following tables. Other parts or service support constructions shall not penetrate the penetration seal.

Penetrating element	Construction characteristics for installation of the penetrating element in flexible walls and rigid walls
Plastic pipes	<ul style="list-style-type: none"> > PVC-U pipes according to EN ISO 1452-1 or EN ISO 15493 and DIN 8061 / DIN 8062 with diameters and wall thicknesses as defined in Annex D-1 and Annex D-2 of the ETA > PE-HD pipes according to EN 1519-1 or EN ISO 15494 and DIN 8074 / DIN 8075 with diameters and wall thicknesses as defined in Annex D-3 and Annex D-4 of the ETA > PP pipes according to EN ISO 15494 and DIN 8077 / DIN 8078 with diameters and wall thicknesses as defined in Annex D-5 of the ETA > “alpex F50 PROFI” and “alpex L” pipes from manufacturer “Fränkische Rohrwerke Gebr. Kirchner GmbH & Co. KG” with diameters and wall thicknesses as defined in Annex D-6 of the ETA > “BluePower®” pipes from manufacturer “COES – Compagnia Edil Sanitaria S.p.A.” with diameters and wall thicknesses as defined in Annex D-7 of the ETA > “Uponor Unipipe Mehrschichtverbundrohr MLC” pipes from manufacturer “Uponor GmbH” with diameters and wall thicknesses as defined in Annex D-8 of the ETA > “Wavin SiTech®” pipes from manufacturer “Wavin GmbH” with diameters and wall thicknesses as defined in Annex D-9 of the ETA > “Fusiotherm® Stabiverbundrohr” pipes from manufacturer “aquatherm GmbH” with diameters and wall thicknesses as defined in Annex D-10 of the ETA > “Geberit Silent-PP” pipes from manufacturer “Geberit Vertriebs GmbH & Co KG” with diameters and wall thicknesses as defined in Annex D-11 of the ETA > “POLO-KAL NG” pipes from manufacturer “POLOPLAST GmbH & Co KG” with diameters and wall thicknesses as defined in Annex D-12 of the ETA > “RAUPIANO PLUS” pipes from manufacturer “REHAU AG & Co” with diameters and wall thicknesses as defined in Annex D-13 of the ETA > “Triplus®” pipes from manufacturer “Valsir S.p.A. Sanitaria Idraulica Riscaldamento” with diameters and wall thicknesses as defined in Annex D-14 of the ETA

Penetrating element	Construction characteristics for installation of the penetrating element in rigid floors
Plastic pipes	<ul style="list-style-type: none"> > "POLO-KAL NG" pipes from manufacturer "POLOPLAST GmbH & Co KG" with diameters and wall thicknesses as defined in Annex F-11 of the ETA > "RAUPIANO PLUS" pipes from manufacturer "REHAU AG & Co" with diameters and wall thicknesses as defined in Annex F-12 of the ETA
Metal pipes	<ul style="list-style-type: none"> > Metal pipes of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater or equal than copper (1049 °C for EI 120) and a thermal conductivity smaller or equal than copper with diameters and wall thicknesses as defined in Annex F-13 and Annex F-14 of the ETA > Metal pipes of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater or equal than steel (1049 °C for EI 120) and a thermal conductivity smaller or equal than steel with diameters and wall thicknesses as defined in Annex F-13 and Annex F-14 of the ETA

2.2 Use category

"FLAMRO Variant N EC" is intended for use at temperatures below 0 °C and with exposure to UV, but with no exposure to rain, and can therefore – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Y₁. Since the requirements for Type Y₁ are met, also the requirements for Type Y₂, Z₁ and Z₂ are fulfilled.

Although a penetration seal is intended for indoor applications only, the construction process may result in it being subjected to more exposed conditions for a period before the building envelope is closed. For this case provisions shall be made to protect temporarily exposed penetration seals according to the ETA-holder's installation instructions.

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of "FLAMRO Variant N EC" of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

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

2.4 General assumptions

2.4.1 It is assumed that:

- > damages to the penetration seal are repaired accordingly,
- > the installation of the penetration seal does not effect the stability of the adjacent building element – even in case of fire,
- > the lintel or floor above the penetration seal is designed structurally and in terms of fire protection such that no additional mechanical load (other than its own weight) is imposed on the penetration seal,
- > the thermal movement in the pipe work will be accommodated in such way that it does not impose a load on the penetration seal,
- > the installations are fixed to the adjacent building element in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed to the penetration seal,
- > the support of the installations is maintained for the required period of fire resistance and
- > pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire.

2.4.2 This European Technical Assessment does not address any risks associated with the emission of dangerous liquids or gases caused by failure of the pipe(s) in case of fire nor does it prove the prevention of the transmission of fire through heat transfer via the medium in the pipes.

2.4.3 This European Technical Assessment does not verify the prevention of destruction of adjacent building elements with fire separating function or of the pipes themselves due to distortion forces caused by extreme temperatures. These risks shall be accounted for by taking appropriate measures when designing or installing the pipe work.

The mounting or hanging of the pipes or the layout of the pipe work shall be implemented in such a way that the pipes and the fire resistant building elements shall remain functional within a period of time which corresponds to the fire resistance period required.

2.4.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this European Technical Assessment (see EN 1366-3:2009, clause 1).

2.4.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through the pipe walls.

2.4.6 The assessment does not cover the avoidance of destruction of the penetration seal or of the adjacent building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

2.5 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with the Österreichisches Institut für Bautechnik, 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 the Österreichisches Institut für Bautechnik before the changes are introduced. The Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment and consequently the validity of the CE marking on the basis of the European Technical Assessment and if so whether further assessment or alterations to the European Technical Assessment, shall be necessary.

2.6 Installation

The product shall be installed and used as described in this European Technical Assessment.

Additional marking of the penetration seal shall be done in case of national requirements.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 2	Reaction to fire	EN 13501-1	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009	Clause 3.1.2 of the ETA and Annex D-1 to D-15 and Annex F-1 to F-14 of the ETA
BWR 3	Air permeability (material property)	No performance assessed	
	Water permeability (material property)	No performance assessed	
	Content and/or release of dangerous substances	European Council Directive 67/548/EEC and Regulation (EC) No 1272/2008 as well as EOTA TR 034, edition March 2012	Declaration of conformity by the manufacturer
BWR 4	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
BWR 5	Airborne sound insulation	No performance assessed	
BWR 6	Thermal properties	No performance assessed	
	Water vapour permeability	No performance assessed	
BWR 7	No performance assessed		

3.1 Safety in case of fire (BWR 2)

3.1.1. Reaction to fire

The components of “FLAMRO Variant N EC” were assessed according to ETAG 026-Part 2 clause 2.4.1 and classified according to EN 13501-1.

Component	Class according to EN 13501-1
ROKU® Strip	E
ROKU® Strip EM	E
Metal Strap	A1
Metal Hook	A1
FLAMRO BSS	E

The sheet steel of the “Metal Strap” and the “Metal Hook” is classified Class A1 according to Commission Decision 96/603/EC¹.

3.1.2. Resistance to fire

“FLAMRO Variant N EC” was tested according to ETAG 026-Part 2 clause 2.4.2 and EN 1366-3:2009 in conjunction with EN 1363-1:1999.

Based upon the gained test results and the field of application specified within EN 1366-3:2009 the pipe penetration seal “FLAMRO Variant N EC” has been classified according to EN 13501-2:2007+A1:2009.

The fire resistance classes of the pipe penetration seal “FLAMRO Variant N EC” in the relevant separating elements are listed in Annex D-1 to Annex D-15 and Annex F-1 to Annex F-14 of the ETA.

The resistance to fire classification listed in Annex D-1 to D-15 and Annex F-1 to F-14 of the ETA is only valid if “FLAMRO Variant N EC” is installed according to Annex A-1 to A-6 of the ETA.

3.2. Hygiene, health and environment (BWR 3)

3.2.1. Air permeability

No performance assessed.

3.2.2. Water permeability

No performance assessed.

3.2.3. Release of dangerous substances

According to the manufacturer’s declaration “ROKU® Strip” and “ROKU® Strip EM” and “FLAMRO BSS” do not contain dangerous substances detailed in Council Directive 67/548/EEC and Regulation (EC) no 1272/2008 as well as EOTA TR 034 (General ER 3 Checklist for ETAGs/CUAPs/ETAs- Content and/or release of dangerous substances in products/kits), edition March 2012 above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

¹ Official Journal of the European Communities no. L 267, 19.10.1996, p. 23

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 Product Regulation, these requirements need also to be complied with, when and where they apply.

3.3. Safety and accessibility in use (BWR 4)

3.3.1. Mechanical resistance and stability

No performance assessed.

3.3.2. Resistance to impact / movement

No performance assessed.

3.3.3. Adhesion

No performance assessed.

3.4. Protection against noise (BWR 5)

3.4.1. Airborne sound insulation

No performance assessed.

3.5. Energy economy and heat retention (BWR 6)

3.5.1. Thermal properties

No performance assessed.

3.5.2. Water vapour permeability

No performance assessed.

3.6. Sustainable use of natural resources (BWR 7)

No performance assessed.

3.7. General aspects relating to fitness for use

The components “Metal Strap” and “Metal Hook” are made of ferritic stainless steel, material number 1.4016 according to EN 10088-2.

According to ETAG 026-Part 2 clause 2.4.12.1.2.5 and Annex B of EN 10088-1 ferritic stainless steels have relatively low corrosion resistance and their use should normally be restricted to mild indoor or similarly protected environments. This type of stainless steel is therefore suitable for use in use category Y₁.

The components “ROKU® Strip” and “ROKU® Strip EM” fulfil the requirements for use at conditions exposed to weathering and can – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type X. Since the requirements for Type X are met, also the requirements for Type Y₁, Y₂, Z₁ and Z₂ are fulfilled.

The additional component “FLAMRO BSS” fulfils the requirements for use at conditions exposed to weathering and can – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type X. Since the requirements for Type X are met, also the requirements for Type Y₁, Y₂, Z₁ and Z₂ are fulfilled.

All components of “FLAMRO Variant N EC” fulfil the requirements for the intended use category.

“FLAMRO Variant N EC” is therefore appropriate for use at temperatures below 0 °C and with exposure to UV, but with no exposure to rain, and can – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Y₁. Since the requirements for Type Y₁ are met, also the requirements for Type Y₂, Z₁ and Z₂ are fulfilled.

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

4.1. AVCP system

According to the Decision 1999/454/EC², amended by Decision 2001/596/EC³ of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

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

In addition, according to the Decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission the system(s) of assessment and verification of constancy of performance, with regard to reaction to fire, is given in the following table.

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	System of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	For uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		A1**, A2**, B**, C**, D, E	3
		(A1 to E)***, F	4
<p>* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)</p> <p>** Products/materials not covered by footnote (*)</p> <p>*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of class A1 according to Commission Decision 96/603/EC, as amended)</p>			

² Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

³ Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

5. Technical details necessary for the implementation of the AVCP system, as provided for the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

The notified product certification body shall visit the factory at least once a year for surveillance of the manufacturer.

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The original document is signed by:

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Managing Director

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1 General

- > “FLAMRO Variant N EC” can be used for metal pipes and plastic pipes according to clause 2.1 of the ETA in apertures in walls (vertical separating element) and floors (horizontal separating element) according to clause 2.1 of the ETA.
- > Each metal pipe or plastic pipe which is to be sealed off has to be equipped separately with “FLAMRO Variant N EC”; except for multiple penetrations of maximum three plastic pipes (clearance between pipes maximum 15 mm; linear arrangement, no clusters) according to clause 2.1 of the ETA made from PVC-U, PE-HD or PP with diameters and wall thicknesses as defined in Annex D-15 and Annex F-13 of the ETA – these pipes can be equipped with one concerted Pipe collar “FLAMRO Variant N EC”. For details see Annex C-5 and Annex E-8 of the ETA.
- > In some cases it is allowed to install “FLAMRO Variant N EC” on plastic pipes with bows on the bottom side of the floor and a connection sleeve within the floor. For details see Annex E-7, Annex F-8 and Annex F-10 to Annex F-12 of the ETA.
- > In some cases it is allowed for floor penetrations to install “FLAMRO Variant N EC” on vertical plastic pipes which are positioned directly in the corner of the wall (clearance between pipe and wall maximum 10 mm). The pipe collar “FLAMRO Variant N EC” covers the pipe only from wall to wall. For details see Annex E-4, Annex E-5, Annex F-3, Annex F-4, Annex F-8 and Annex F-10 to Annex F-12 of the ETA.

1.1 Pipe end configuration

- > For plastic pipes classified with pipe end configuration U/U the pipe end configuration can be U/U, C/U, U/C and C/C.
- > For plastic pipes classified with pipe end configuration U/C the pipe end configuration can be U/C and C/C.
- > For metal pipes classified with pipe end configuration C/U the pipe end configuration can be C/U and C/C.

1.2 Orientation of the penetrating elements

- > Metal pipes and plastic pipes (except for some plastic pipes according to Annex D-1, Annex D-3, Annex D-5, Annex F-1, Annex F-2 and Annex F-4 of the ETA) have to be installed perpendicular to the surface of the separating element.
- > Some plastic pipes according to Annex D-1, Annex D-3, Annex D-5, Annex F-1, Annex F-2 and Annex F-4 of the ETA can be installed in all angles between 90° and 45°.
- > In case of multiple penetrations of maximum three plastic pipes (linear arrangement, no clusters) according to clause 2.1 of the ETA made from PVC-U, PE-HD or PP with diameters and wall thicknesses as defined in Annex D-15 and Annex F-13 of the ETA equipped with one concerted pipe collar “FLAMRO Variant N EC” which are installed in vertical separating elements the plastic pipes shall only be positioned in horizontal direction. For details see Annex C-5 and Annex E-8 of the ETA.

FLAMRO Variant N EC
- Details for installation -

ANNEX A-1

1.3 Service support constructions

- > All metal pipes and plastic pipes – in flexible walls and rigid walls – have to be supported on both sides of the separating element by service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 945 °C for EI 60, 1006 °C for EI 90 or 1049 °C for EI 120 (e.g. stainless steel or galvanized steel) according to the ETA-holder’s installation instructions.
- > All metal pipes and plastic pipes – in rigid floors – have to be supported at least on the top side of the separating element by service support constructions (e.g. pipe hangers) made of metal with a decomposition point greater or equal than 945 °C for EI 60, 1006 °C for EI 90, 1049 °C for EI 120, 1110 °C for EI 180 or 1153 °C for EI 240 (e.g. stainless steel or galvanized steel) according to the ETA-holder’s installation instructions.
- > The first support (service support construction) for metal pipes and plastic pipes in flexible walls and rigid walls has to be at maximum 650 mm (measured from the surface of the separating element).
- > The first support (service support construction) for metal pipes in rigid floors has to be at maximum 550 mm (measured from the surface of the separating element).
- > The first support (service support construction) for plastic pipes in rigid floors has to be at maximum 400 mm (measured from the surface of the separating element).
- > All metal pipes and plastic pipes have to be fixed according to the ETA-holder’s installation instructions to the service support construction.

2 Details for installation of “FLAMRO Variant N EC” (see Annex B to F-14 of the ETA)

- > “FLAMRO Variant N EC” has to be installed according to the ETA-holder’s installation instructions.

2.1 Plastic pipes and metal pipes in vertical separating elements

- > For plastic pipes in vertical separating elements the pipe collar “FLAMRO Variant N EC” has to be installed on both sides of the separating element (see Annex C-1 to Annex C-5 of the ETA).
- > For metal pipes in vertical separating elements “ROKU® Strip” or “ROKU® Strip EM” has to be installed on both sides flushed within the separating element (without “Metal Strap”) (see Annex C-6, Annex C-7 and Annex D-15 of the ETA).

FLAMRO Variant N EC
- Details for installation -

ANNEX A-2

2.2 Plastic pipes and metal pipes in horizontal separating elements

- > For plastic pipes in horizontal separating elements the pipe collar “FLAMRO Variant N EC” has to be installed at the bottom side of the separating element (see Annex E-1 to Annex E-8 of the ETA).
- > For metal pipes in horizontal separating elements two “ROKU® Strip” or “ROKU® Strip EM” which have to be arranged one behind the other have to be installed at the bottom side flushed within the separating element (without “Metal Strap”) (see Annex E-9, Annex F-13 and Annex F-14 of the ETA).
- > For steel pipes and stainless steel pipes a pipe collar “FLAMRO Variant N EC” can alternatively be installed at the bottom side of the separating element (see Annex E-10 and Annex F-14 of the ETA).

2.3 Installation of “ROKU® Strip” and “ROKU® Strip EM”

- > The metal pipes and plastic pipes to be sealed off have to be wrapped with “ROKU® Strip” or “ROKU® Strip EM” with the corresponding number of layers as specified in Annex D-1 to Annex D-15 and Annex F-1 to Annex F-14 of the ETA.
- > It is not allowed to combine “ROKU® Strip” and “ROKU® Strip EM” in one penetration seal.
- > If metal pipes or plastic pipes are insulated with “AF/Armaflex”, “SH/Armaflex” or Polyethylene sound insulation (e.g. “THERMACOMPACT TF™”) according to clause 1 of the ETA “ROKU® Strip” or “ROKU® Strip EM” has to be wrapped around the insulation.

2.4 Installation of “Metal Strap”

- > If metal pipes or plastic pipes have to be equipped with pipe collar “FLAMRO Variant N EC”, the intumescent inlay “ROKU® Strip” or “ROKU® Strip EM” has to be fixed by one layer of “Metal Strap” (see Annex C-1 to Annex C-5, Annex E-1 to Annex E-8, Annex E-10 and Annex F-14 of the ETA). The “Metal Strap” has to be fixed with at least the corresponding number of “Metal Hooks” and the corresponding means of fixation (e.g. threaded steel bolts) to the separating element as specified below.

Separating element	Orientation	Pipe outer diameter (mm)	Minimum number of Metal Hooks
Flexible wall	perpendicular	≤ 50	2
	perpendicular	> 50 to ≤ 110	3
	perpendicular	> 110 to ≤ 160	4
	angle between 90° and 45°	≤ 50	3
	angle between 90° and 45°	> 50 to ≤ 110	4
	angle between 90° and 45°	> 110 to ≤ 160	6
Rigid wall or Rigid floor	perpendicular	≤ 50	2
	perpendicular	> 50 to ≤ 110	3
	perpendicular	> 110	4
	angle between 90° and 45°	≤ 50	3
	angle between 90° and 45°	> 50 to ≤ 110	4
	angle between 90° and 45°	> 110 to ≤ 160	6

FLAMRO Variant N EC
- Details for installation -

ANNEX A-3

2.4.1 Installation of "Metal Strap" in case of flexible walls acc. to cl. 2.1 of the ETA

- > The "Metal Straps" have to be installed on both sides of the flexible wall.
- > The minimum number of "Metal Hooks" has to be taken from the table above.
- > The "Metal Hooks" shall be distributed equally around the pipe to be sealed off.
- > In case of multiple penetrations of maximum three plastic pipes (clearance between pipes maximum 15 mm; linear arrangement, no clusters) according to clause 2.1 of the ETA made from PVC-U, PE-HD or PP through one concerted pipe collar "FLAMRO Variant N EC" between each pipe one "Metal Hook" on the top side and the bottom side of the "Metal Strap" has to be installed.
- > The "Metal Straps" have to be fixed by threaded steel bolts (outer diameter 6 mm to 8 mm – for pipes with outer diameter \leq 50 mm or 8 mm – for pipes with outer diameter $>$ 50 mm; length \geq thickness of the separating element) and on both sides of the separating element with washers and nuts (corresponding to the outer diameter of the threaded steel bolts).

2.4.2 Installation of „Metal Strap“ in case of rigid walls and rigid floors acc. to cl. 2.1 of the ETA

- > The "Metal Straps" have to be installed on both sides of the rigid wall.
- > The "Metal Strap" has to be installed on the bottom side of the rigid floor.
- > The minimum number of "Metal Hooks" has to be taken from the table above.
- > The "Metal Hooks" shall be distributed equally around the pipe to be sealed off.
- > In case the "Metal Strap" is installed on a vertical plastic pipe which is positioned directly in the corner of the wall (clearance between pipe and wall maximum 10 mm) three "Metal Hooks" have to be used (one "Metal Hook" in each corner and one in the middle of the "Metal Strap").
- > In case of multiple penetrations of maximum three plastic pipes (clearance between pipes maximum 15 mm; linear arrangement, no clusters) according to clause 2.1 of the ETA made from PVC-U, PE-HD or PP through one concerted pipe collar "FLAMRO Variant N EC" between each pipe one "Metal Hook" on the top side and the bottom side of the "Metal Strap" has to be installed.
- > The "Metal Strap" has to be fixed by appropriate steel dowels resp. steel screw anchors (outer diameter \geq 6 mm) and washers (corresponding to the outer diameter of the steel dowels resp. steel screw anchors). In case of aerated concrete the "Metal Strap" can alternatively be fixed by steel dry-wall screws (outer diameter \geq 5 mm; length \geq 50 mm) and washers (corresponding to the outer diameter of the steel dry-wall screws).

FLAMRO Variant N EC
- Details for installation -

ANNEX A-4

2.5 Insulation

- > Metal pipes according to Annex D-15, Annex F-13 and Annex F-14 of the ETA have to be insulated with “AF/Armaflex”.
- > Plastic pipes can be insulated with “AF/Armaflex”, “SH/Armaflex” or Polyethylene sound insulation (e.g. “THERMACOMPACT TF™”) according to clause 1 of the ETA. In some cases it is mandatory to insulate the plastic pipes. For details see Annex D-1 to Annex D-15 and Annex F-1 to Annex F-13 of the ETA.

2.5.1 Installation of “AF/Armaflex” or “SH/Armaflex”

- > The thickness of the tube has to correspond with the provisions given in Annex D-1 to Annex D-15 and Annex F-1 to Annex F-14 of the ETA.
- > The length of the tube of has to be ≥ 500 mm (local-sustained LS or continued-sustained CS) on both sides of the separating element (measured from the surface of the separating element).
- > The tube has to be continuous along the required minimum insulation length.
- > When installing the tubes all butt joints and longitudinal joints (except for tubes with self-adhesive device) have to be glued with “Armaflex Kleber 520” (Armaflex Adhesive 520) and can be covered with “AF/Armaflex Band selbstklebend” (AF/Armaflex self-adhesive tape) or “SH/Armaflex Band selbstklebend” (SH/Armaflex self-adhesive tape).
- > The amount of “Armaflex Kleber 520” (Armaflex Adhesive 520) shall not be more than given in the technical literature of the manufacturer.
- > The strip of “AF/Armaflex Band selbstklebend” (AF/Armaflex self-adhesive tape) or “SH/Armaflex Band selbstklebend” (SH/Armaflex self-adhesive tape) have to be 50 mm x 3 mm (width x thickness).
- > Branches or elbows also have to be equipped with tubes along the required minimum insulation length (≥ 500 mm – measured from the surface of the separating element) on both sides of the separating element.
- > For further details see technical literature of the manufacturer.

2.5.2 Installation of Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA

- > The tubes can either be pushed onto the pipe or slotted and wrapped around the pipe.
- > The pipes can be insulated in the penetration area exclusively (flushed within the penetration seal) as well as at their complete length.
- > As the dimensions of the tubes are given, the excess insulation material can be partially (on width between 20 mm to 40 mm) folded over the other at one point so that the thickness becomes 12 mm.
- > For further details see technical literature of the manufacturer.

FLAMRO Variant N EC
- Details for installation -

ANNEX A-5

2.6 Annular gap

- > The annular gap (maximum width 30 mm) between the penetrating elements (metal pipes and plastic pipes – including insulation) and the vertical separating element has to be completely filled with “Gap Filler” according to clause 1 of the ETA on both sides of the separating element.
- > The annular gap (maximum width 50 mm) between the penetrating elements (metal pipes and plastic pipes – including insulation) and the horizontal separating element has to be completely filled with “Gap Filler” according to clause 1 of the ETA on both sides of the separating element.
- > The annular gap (maximum width 50 mm) between plastic pipes (including insulation) “Wavin SiTech®”, “Geberit Silent-PP”, “POLO-KAL NG” or “RAUPIANO PLUS” and the horizontal separating element can alternatively be completely filled with “FLAMRO BSS” according to clause 1 of the ETA on both sides of the separating element.

3 Minimum working clearances

- > The minimum clearance between two non-insulated pipes (linear arrangement, no clusters) is 100 mm (measured from the surface of the pipe).
- > The minimum clearance between two pipes (linear arrangement, no clusters) insulated with “AF/Armaflex”, “SH/Armaflex” or Polyethylene sound insulation (e.g. “THERMACOMPACT TF™”) according to clause 1 of the ETA is 100 mm (measured from the surface of the insulation).
- > For multiple penetrations the minimum clearance between maximum three plastic pipes (linear arrangement, no clusters) according to clause 2.1 of the ETA made from PVC-U, PE-HD or PP with diameters and wall thicknesses as defined in Annex D-15 and Annex F-13 of the ETA equipped with one concerted pipe collar “FLAMRO Variant N EC” is 0 mm (measured from the surface of the pipe).

4 Transport and storage

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

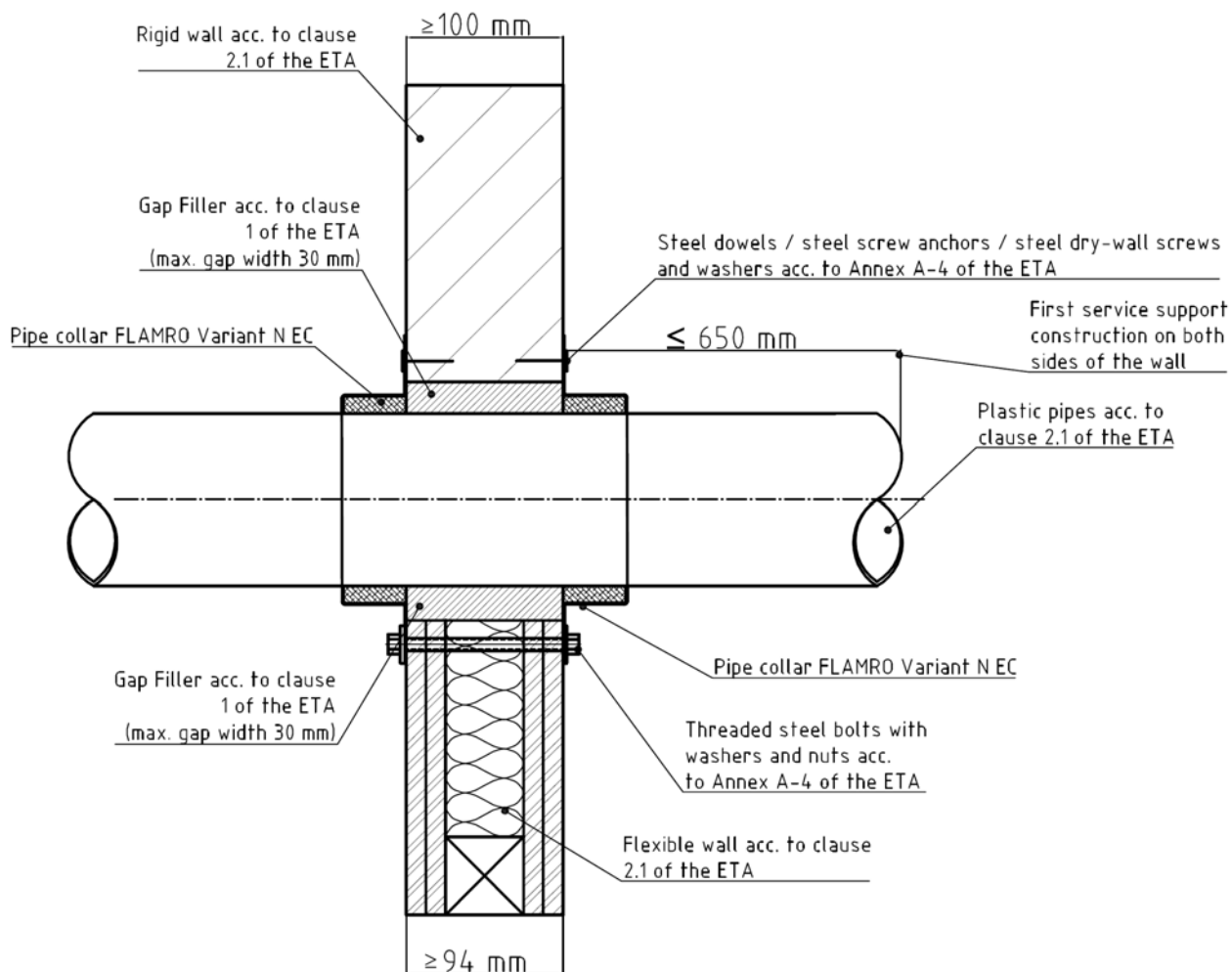
5 Use, maintenance and repair

- > The fire resistance of the penetration seal shall not be negatively affected by future changes to buildings or building elements.
- > The assessment of the fitness for use is based on the assumption that necessary maintenance and repair if required is carried out in accordance with the manufacturer’s instructions during the assumed intended working life.

FLAMRO Variant N EC
- Details for installation -

ANNEX A-6

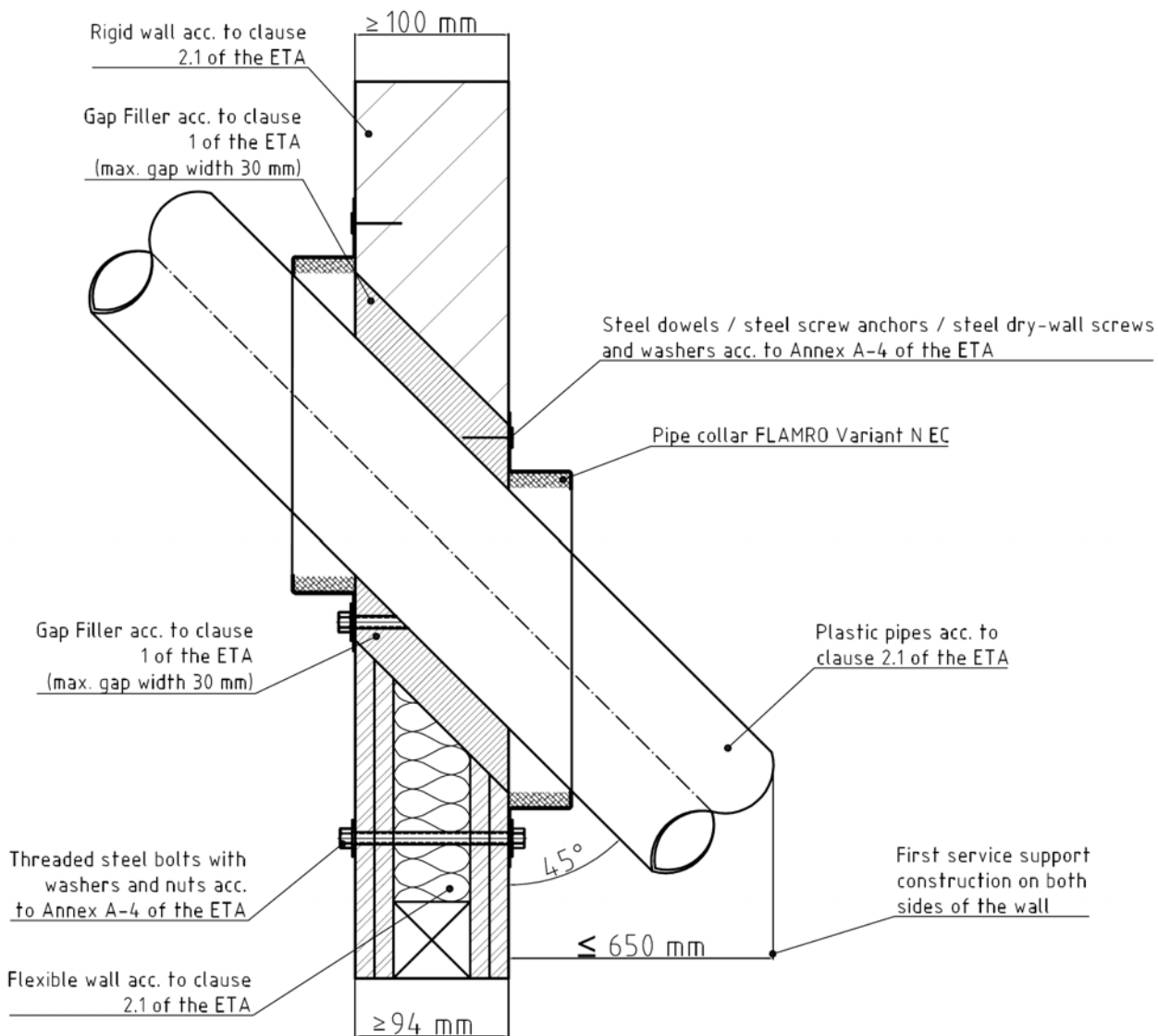
FLAMRO Variant N EC – flexible walls and rigid walls according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, non-insulated – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in flexible wall and rigid wall -

ANNEX C-1

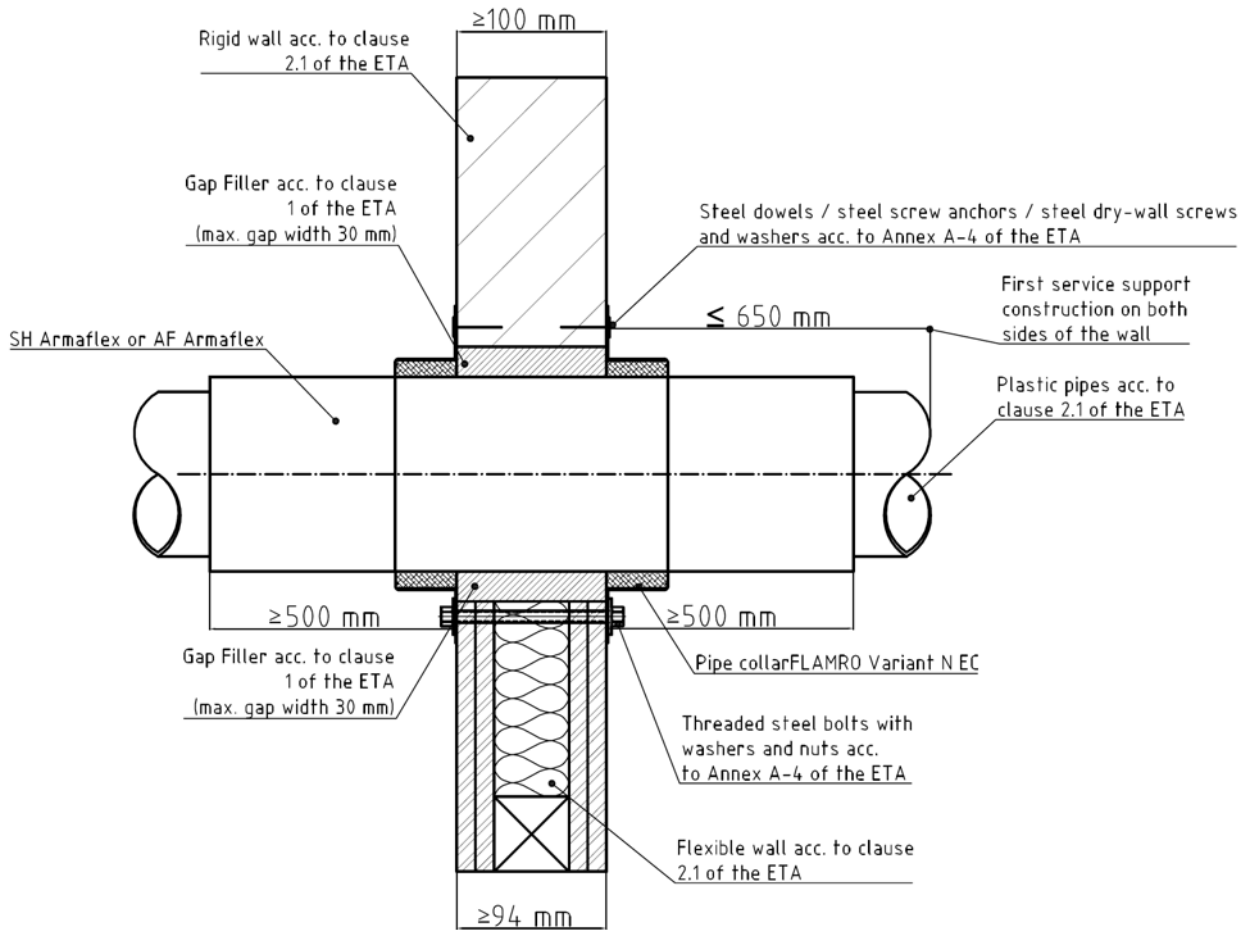
FLAMRO Variant N EC – flexible walls and rigid walls according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in flexible wall and rigid wall -

ANNEX C-2

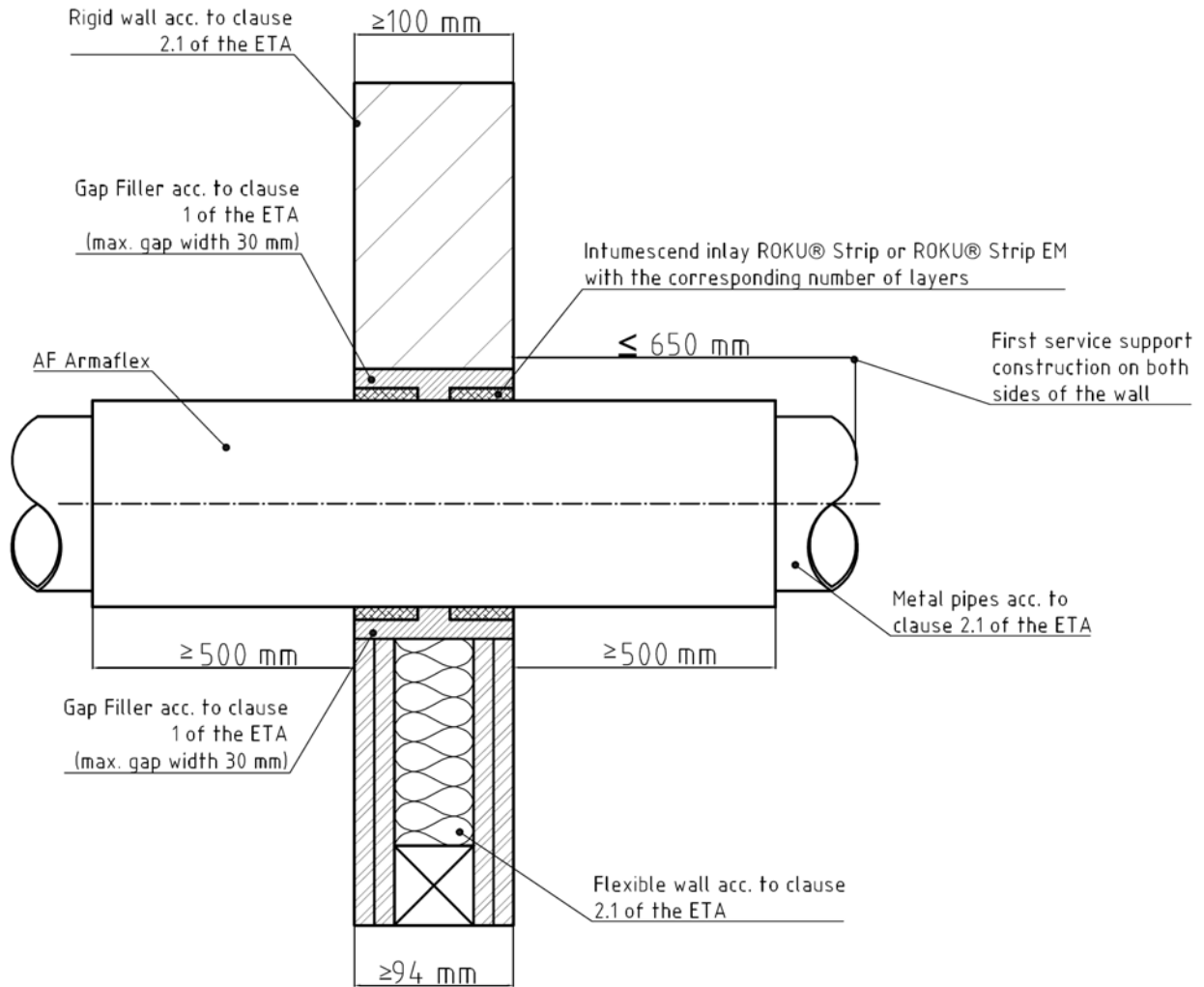
FLAMRO Variant N EC – flexible walls and rigid walls according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, insulated with SH/Armaflex or AF/Armaflex – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in flexible wall and rigid wall -

ANNEX C-4

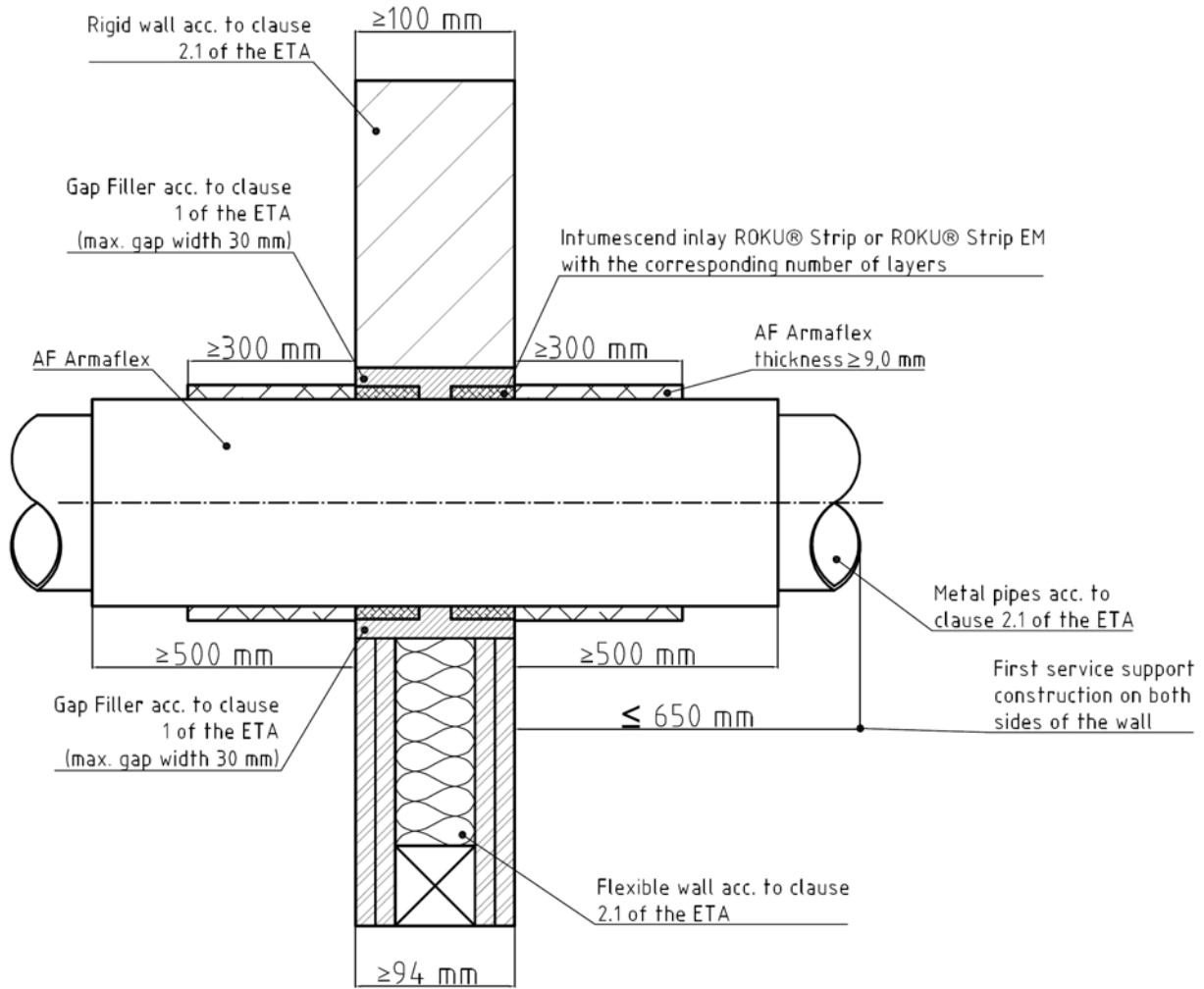
FLAMRO Variant N EC – flexible walls and rigid walls according to clause 2.1 of the ETA – metal pipes according to clause 2.1 of the ETA, insulated with AF/Armaflex – intumescent inlays on both sides flushed within the separating element (without Metal Strap) – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in flexible wall and rigid wall -

ANNEX C-6

FLAMRO Variant N EC – flexible walls and rigid walls according to clause 2.1 of the ETA – metal pipes according to clause 2.1 of the ETA insulated with AF/Armaflex and an additional layer of AF/Armaflex – intumescent inlays on both sides flushed within the separating element (without Metal Strap) – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in flexible wall and rigid wall -

ANNEX C-7

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PVC-U pipes acc. to cl. 2.1 of the ETA, non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 5,6	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	1,8 to 12,3	---	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 125	2,2 to 12,2	---	X	X	5	EI 120-U/C E 120-U/C
> 125 to ≤ 160	3,2 to 11,9	---	X	X	6	EI 120-U/C E 120-U/C

PVC-U pipes acc. to cl. 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 5,6	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	1,8 to 12,3	---	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 125	2,2 to 12,2	---	X	X	6	EI 120-U/C E 120-U/C
> 125 to ≤ 160	3,2 to 11,9	---	X	X	8	EI 90-U/C E 90-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-1

PVC-U pipes acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	≤ 4	X	X	4	EI 90-U/C E 120-U/C
> 50 to ≤ 75	1,8	≤ 4	X	X	5	EI 90-U/C E 120-U/C
> 75 to ≤ 110	1,8	≤ 4	X	X	4	EI 90-U/C E 120-U/C
> 110 to ≤ 125	1,8 to 2,2	≤ 4	X	X	6	EI 90-U/C E 120-U/C
≤ 50	1,8 to 5,6	≤ 4	---	X	2	EI 120-U/U E 120-U/U
> 50 to ≤ 75	1,8 to 8,4	≤ 4	---	X	3	EI 90-U/U E 120-U/U
> 75 to ≤ 110	1,8 to 11,9	≤ 4	---	X	4	EI 90-U/U E 120-U/U
> 110 to ≤ 125	3,2 to 11,9	≤ 4	---	X	5	EI 90-U/U E 120-U/U
> 125 to ≤ 160	3,2 to 11,9	≤ 4	---	X	6	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-2

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PE-HD pipes acc. to cl. 2.1 of the ETA, non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 4,6	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	2,7 to 10,0	---	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 160	4,0	---	X	X	8	EI 120-U/C E 120-U/C
> 110 to ≤ 160	> 4,0 to 14,6	---	X	X	8	EI 60-U/C E 60-U/C

PE-HD pipes acc. to cl. 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8	---	X	X	4	EI 90-U/C E 90-U/C
> 75 to ≤ 110	2,7	---	X	X	5	EI 90-U/C E 90-U/C
> 110 to ≤ 125	3,2	---	X	X	7	EI 90-U/C E 90-U/C
> 125 to ≤ 160	4,0	---	X	X	8	EI 90-U/C E 90-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX D-3
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PE-HD pipes acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TFF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 4,6	≤ 4	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8 to 6,8	≤ 4	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	1,8 to 10,0	≤ 4	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 160	4,0	≤ 4	X	X	6	EI 120-U/C E 120-U/C
> 110 to ≤ 160	> 4,0 to 14,6	≤ 4	X	X	6	EI 90-U/C E 120-U/C
≤ 50	1,8 to 4,6	≤ 4	---	X	2	EI 120-U/U E 120-U/U
> 50 to ≤ 75	2,7	≤ 4	---	X	3	EI 120-U/U E 120-U/U
> 75 to ≤ 110	2,7	≤ 4	---	X	4	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-4

PP pipes acc. to cl. 2.1 of the ETA, non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 4,6	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	2,7 to 10,0	---	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 160	4,0	---	X	X	8	EI 90-U/C E 120-U/C
> 110 to ≤ 160	> 4,0 to 14,6	---	X	X	6	EI 90-U/C E 90-U/C

PP pipes acc. to cl. 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 75	1,8	---	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	2,7	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

PP pipes acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 4,6	≤ 4	---	X	2	EI 120-U/U E 120-U/U
> 50 to ≤ 75	1,8 to 2,7	≤ 4	---	X	3	EI 120-U/U E 120-U/U
> 75 to ≤ 110	2,7	≤ 4	---	X	4	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-5

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Plastic pipes alpex F50 PROFI acc. to cl. 2.1 of the ETA, non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,0	---	X	X	2	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Plastic pipes alpex F50 PROFI and alpex L acc. to cl. 2.1 of the ETA, insulated with SH/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued- sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,0	9,0	X	X	2	EI 120-U/C E 120-U/C
≤ 50	4,0	10,0	X	X	3	EI 60-U/C E 120-U/C
≤ 75	5,0	9,0	X	X	4	EI 90-U/C E 120-U/C
≤ 75	5,0	> 9,0 to 20,0	X	X	5	EI 90-U/C E 90-U/C
≤ 75	5,0	> 20,0 to 30,0	X	X	6	EI 90-U/C E 90-U/C
≤ 75	5,0	> 30,0 to 44,0	X	X	6	EI 90-U/C E 120-U/C

Plastic pipes alpex F50 PROFI and alpex L acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued- sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 75	5,0	9,5	X	X	4	EI 120-U/C E 120-U/C
≤ 75	5,0	> 9,5 to 20,0	X	X	5	EI 120-U/C E 120-U/C
≤ 75	5,0	> 20,0 to 30,0	X	X	6	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX D-6
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Plastic pipes BluePower® acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,5	≤ 4	X	X	3	EI 120-U/C E 120-U/C
≤ 110	3,4	≤ 4	X	X	4	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-7

Plastic pipes Uponor Unipipe Mehrschichtverbundrohr MLC acc. to cl. 2.1 of the ETA, non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,0	---	X	X	2	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Plastic pipes Uponor Unipipe Mehrschichtverbundrohr MLC acc. to cl. 2.1 of the ETA, insulated with SH/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,0	9,0	X	X	2	EI 120-U/C E 120-U/C
≤ 50	4,5	10,0	X	X	3	EI 60-U/C E 120-U/C
≤ 110	10,0	9,0	X	X	6	EI 120-U/C E 120-U/C
≤ 110	10,0	> 9,0 to 20,0	X	X	6	EI 90-U/C E 120-U/C

Plastic pipes Uponor Unipipe Mehrschichtverbundrohr MLC acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	4,5	27,5	X	X	4	EI 120-U/C E 120-U/C
≤ 110	10,0	9,5	X	X	6	EI 120-U/C E 120-U/C
≤ 110	10,0	19,0	X	X	6	EI 90-U/C E 120-U/C
≤ 110	10,0	30,0	X	X	6	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX D-8
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Plastic pipes Fusiotherm® Stabiverbundrohr acc. to cl. 2.1 of the ETA, non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,2	---	X	X	2	EI 120-U/C E 120-U/C
≤ 50	6,9	---	X	X	2	EI 120-U/C E 120-U/C
≤ 75	6,9	---	X	X	3	EI 120-U/C E 120-U/C
≤ 110	15,2	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Plastic pipes Fusiotherm® Stabiverbundrohr acc. to cl. 2.1 of the ETA, insulated with SH/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,2	9,0	X	X	3	EI 120-U/C E 120-U/C
≤ 50	6,9	10,0	X	X	3	EI 120-U/C E 120-U/C

Plastic pipes Fusiotherm® Stabiverbundrohr acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	15,2	31,0	X	X	6	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-10

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Plastic pipes Geberit Silent-PP acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,6	≤ 4	X	X	3	EI 90-U/C E 120-U/C
≤ 75	2,6	≤ 4	X	X	4	EI 120-U/C E 120-U/C
≤ 110	3,6	≤ 4	X	X	4	EI 90-U/C E 120-U/C
≤ 110	3,6	≤ 4	X	X	5	EI 120-U/C E 120-U/C
≤ 125	4,2	≤ 4	X	X	6	EI 120-U/C E 120-U/C
≤ 160	5,2	≤ 4	X	X	8	EI 120-U/C E 120-U/C
≤ 50	2,0	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	3,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 125	4,2	≤ 4	---	X	5	EI 120-U/U E 120-U/U
≤ 160	5,2	≤ 4	---	X	6	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-11

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Plastic pipes POLO-KAL NG acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,6	≤ 4	X	X	3	EI 90-U/C E 120-U/C
≤ 110	3,4	≤ 4	X	X	4	EI 90-U/C E 120-U/C
≤ 110	3,4	≤ 4	X	X	5	EI 120-U/C E 120-U/C
≤ 125	3,9	≤ 4	X	X	5	EI 120-U/C E 120-U/C
≤ 160	4,9	≤ 4	X	X	6	EI 120-U/C E 120-U/C
≤ 50	2,0	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	3,4	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 125	3,9	≤ 4	---	X	5	EI 120-U/U E 120-U/U
≤ 160	4,9	≤ 4	---	X	6	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX D-12
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Plastic pipes RAUPIANO PLUS acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TFM™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	1,9	≤ 4	X	X	3	EI 120-U/C E 120-U/C
≤ 110	2,7	≤ 4	X	X	4	EI 120-U/C E 120-U/C
≤ 125	3,1	≤ 4	X	X	5	EI 120-U/C E 120-U/C
≤ 160	3,6	≤ 4	X	X	6	EI 120-U/C E 120-U/C
≤ 50	1,8	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	1,9	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	2,7	≤ 4	---	X	4	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX D-13
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Plastic pipes Triplus® acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 40	1,8	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,5	≤ 4	X	X	3	EI 120-U/C E 120-U/C
≤ 90	3,1	≤ 4	X	X	4	EI 120-U/C E 120-U/C
≤ 110	3,4	≤ 4	X	X	5	EI 120-U/C E 120-U/C
≤ 125	3,9	≤ 4	X	X	6	EI 120-U/C E 120-U/C
≤ 160	4,9	≤ 4	X	X	8	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

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Multiple penetration of maximum three plastic pipes acc. to cl. 2.1 of the ETA made from PVC-U, PE-HD or PP through one concerted pipe collar FLAMRO Variant N EC (clearance between pipes maximum 15 mm; linear arrangement, no clusters), non-insulated – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter of each pipe	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 75	1,8 to 8,4	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Metal pipes (copper pipes, steel pipes, stainless steel pipes) acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA – the intumescent inlay has to be installed on both sides flushed within the separating element (without Metal Strap)

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 28	1,0 to 14,2	6,0 to 35,0	X	X	2	EI 120-C/U E 120-C/U
≤ 54	1,5 to 14,2	9,0 to < 35,0	X	X	2	EI 60-C/U E 120-C/U
≤ 54	1,5 to 14,2	35,0	X	X	2	EI 120-C/U E 120-C/U

Metal pipes (copper pipes, steel pipes, stainless steel pipes) acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) and an additional layer of AF/Armaflex (length 300 mm, thickness ≥ 9,0 mm – on both sides of the separating element, local-interrupted LI) – in flexible walls and rigid walls acc. to cl. 2.1 of the ETA – the intumescent inlay has to be installed on both sides flushed within the separating element (without Metal Strap)

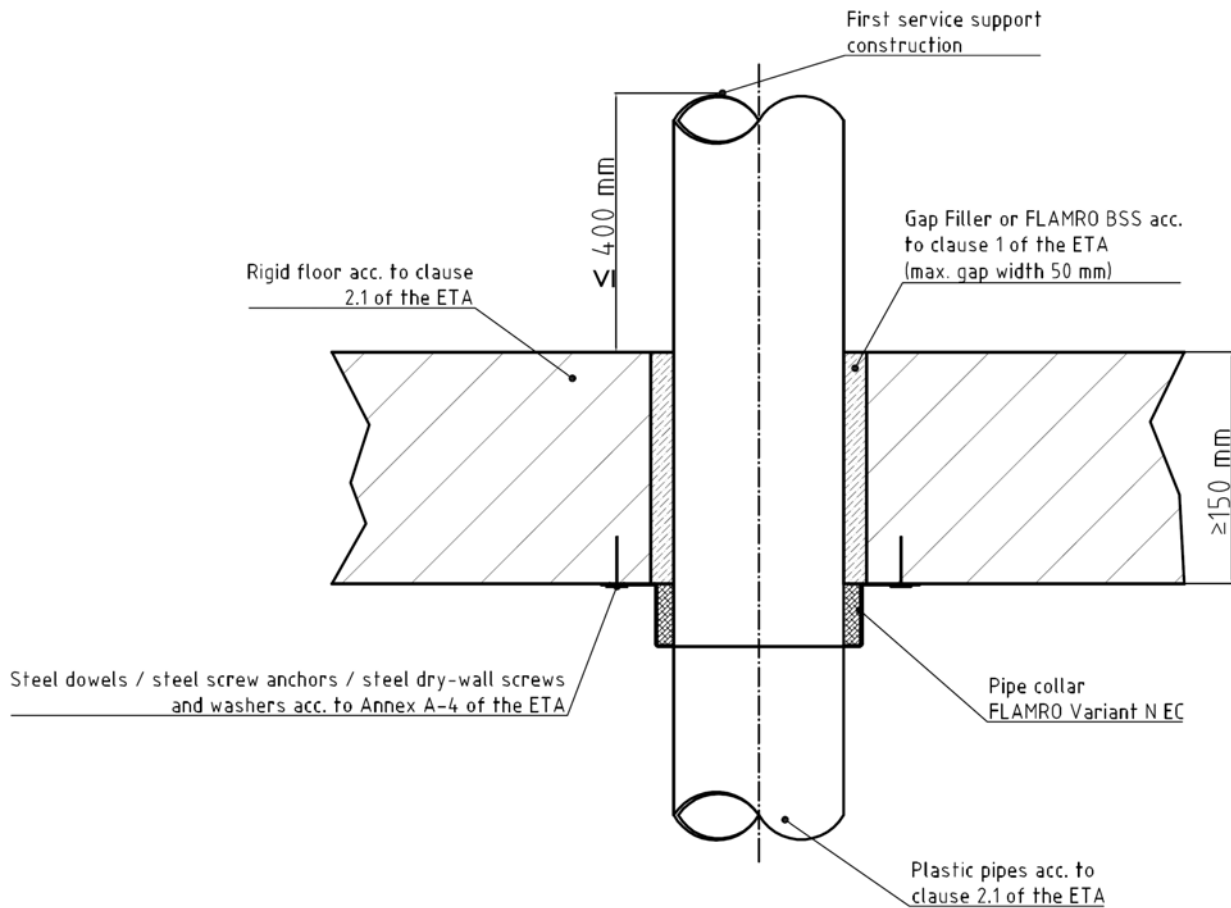
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 54	1,5 to 14,2	9,0 to < 35,0	X	X	2	EI 90-C/U E 120-C/U

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX D-15

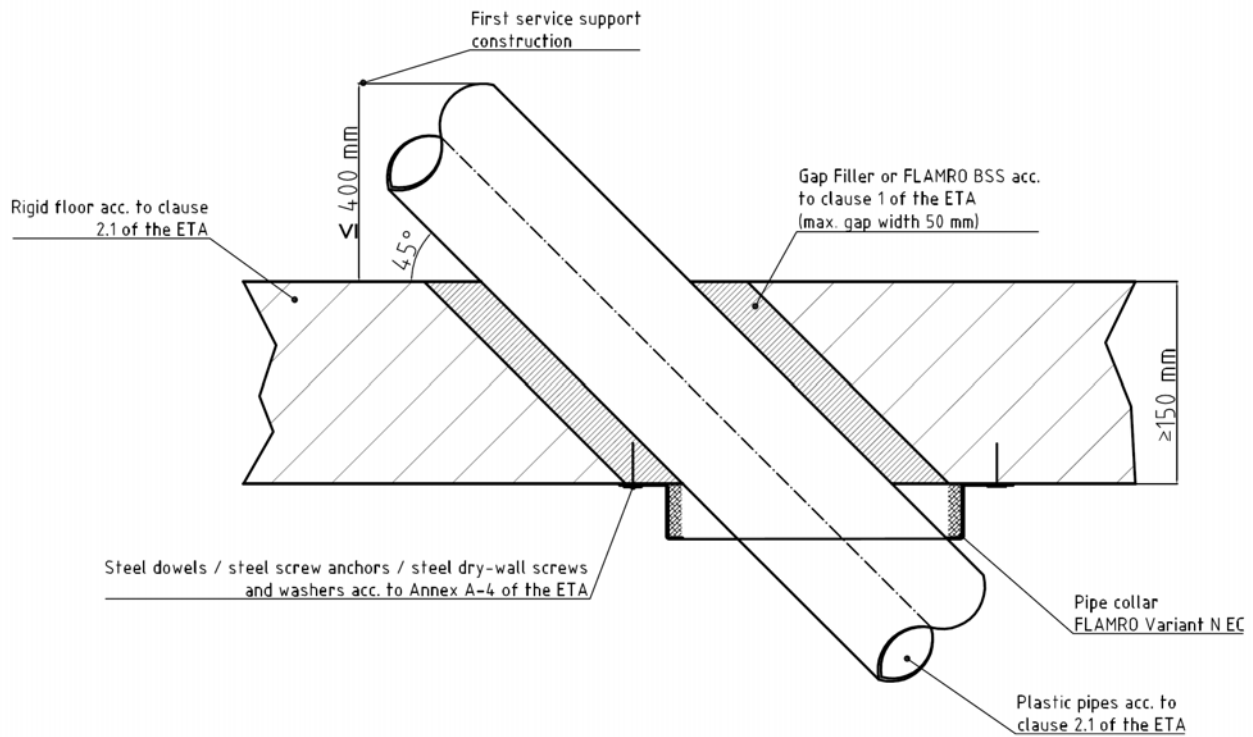
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, non-insulated – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-1

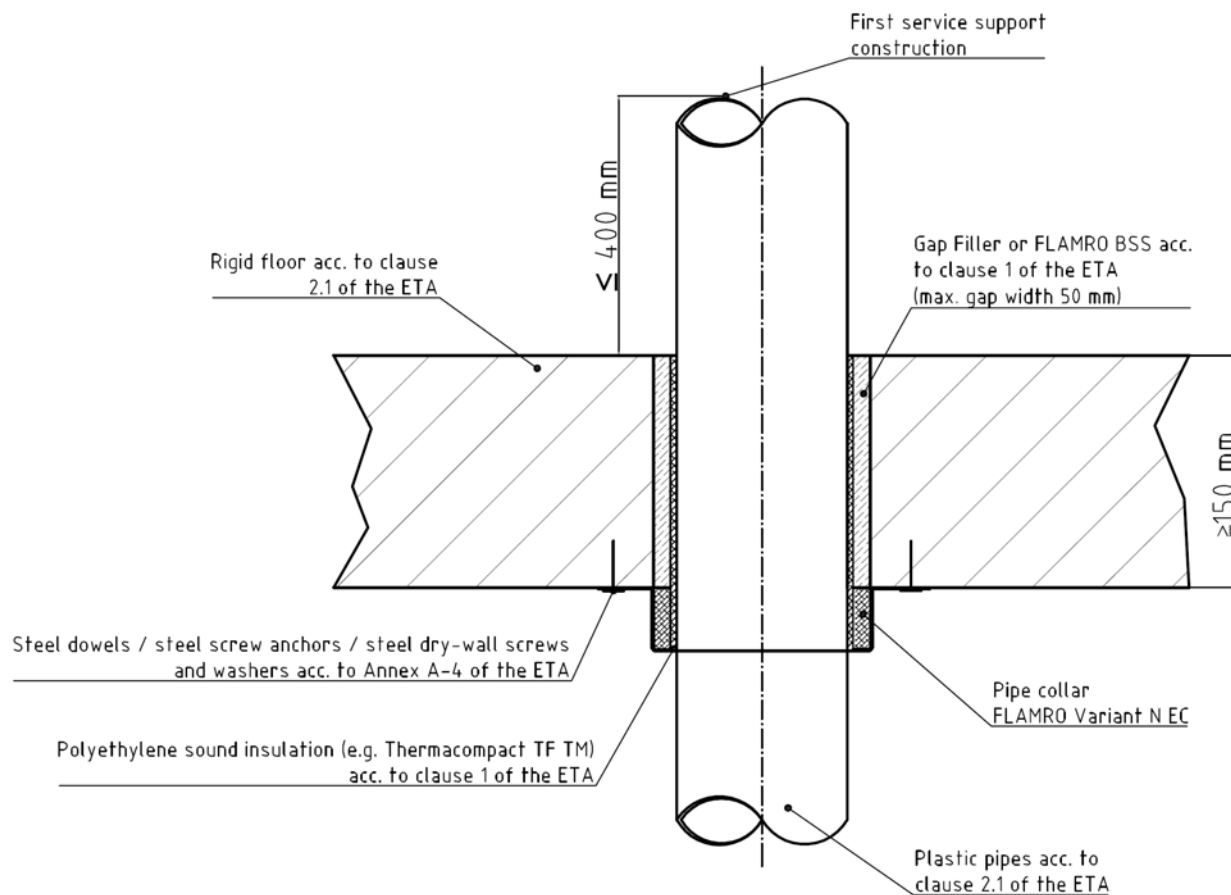
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-2

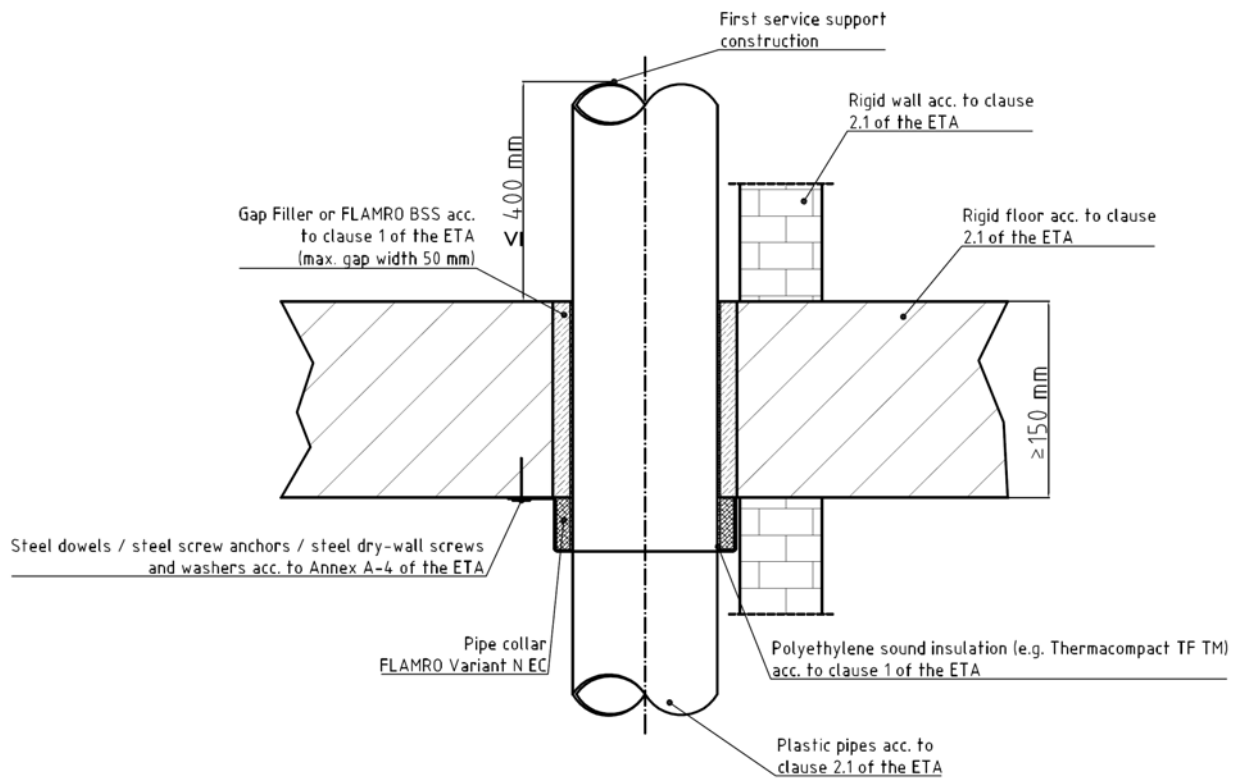
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-3

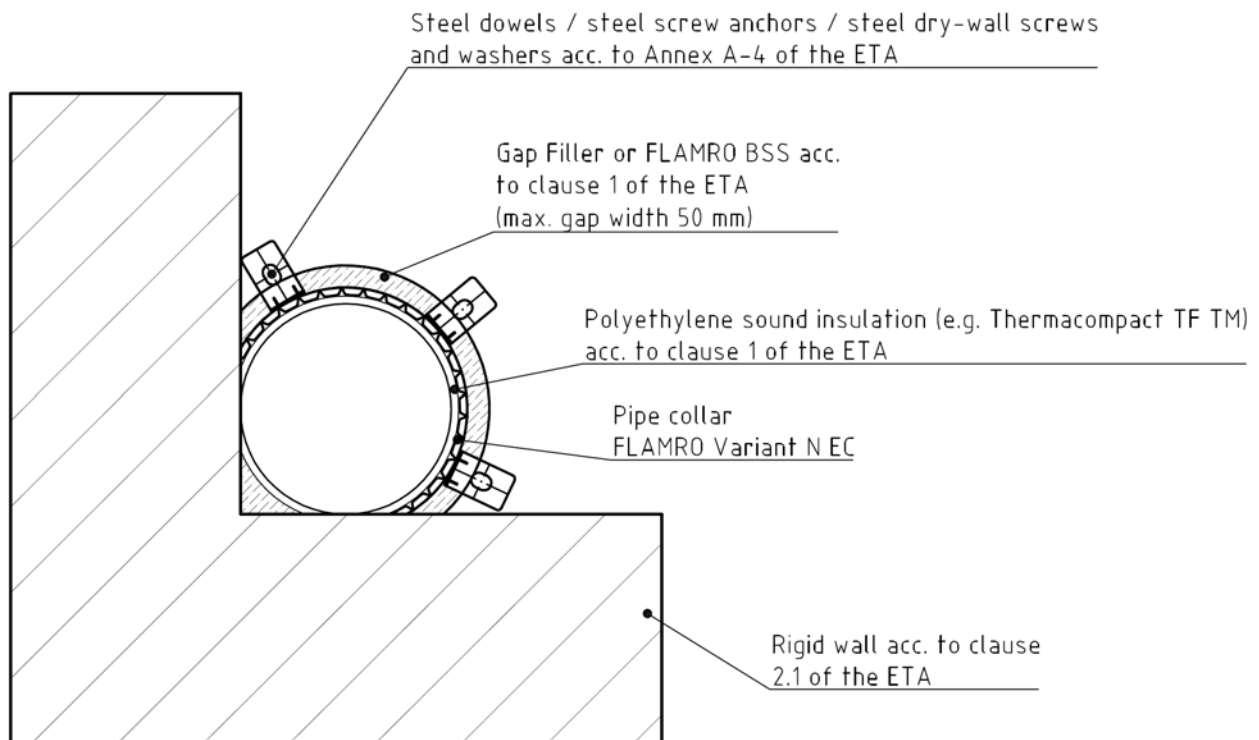
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – vertical plastic pipes according to clause 2.1 of the ETA which are positioned directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – Installation drawing – sectional view



**FLAMRO Variant N EC
- Installation in rigid floor -**

ANNEX E-4

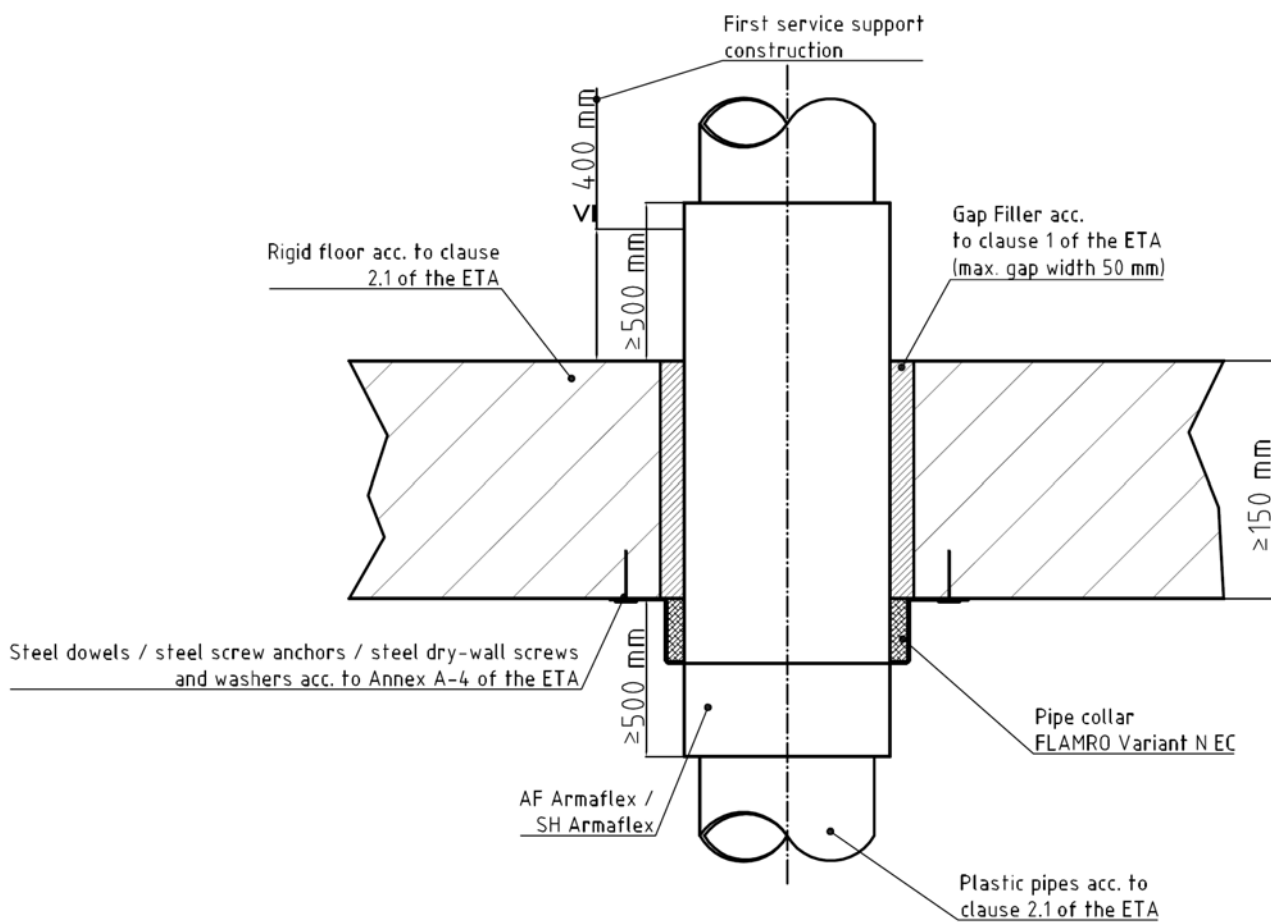
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – vertical plastic pipes according to clause 2.1 of the ETA which are positioned directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – Installation drawing – top view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-5

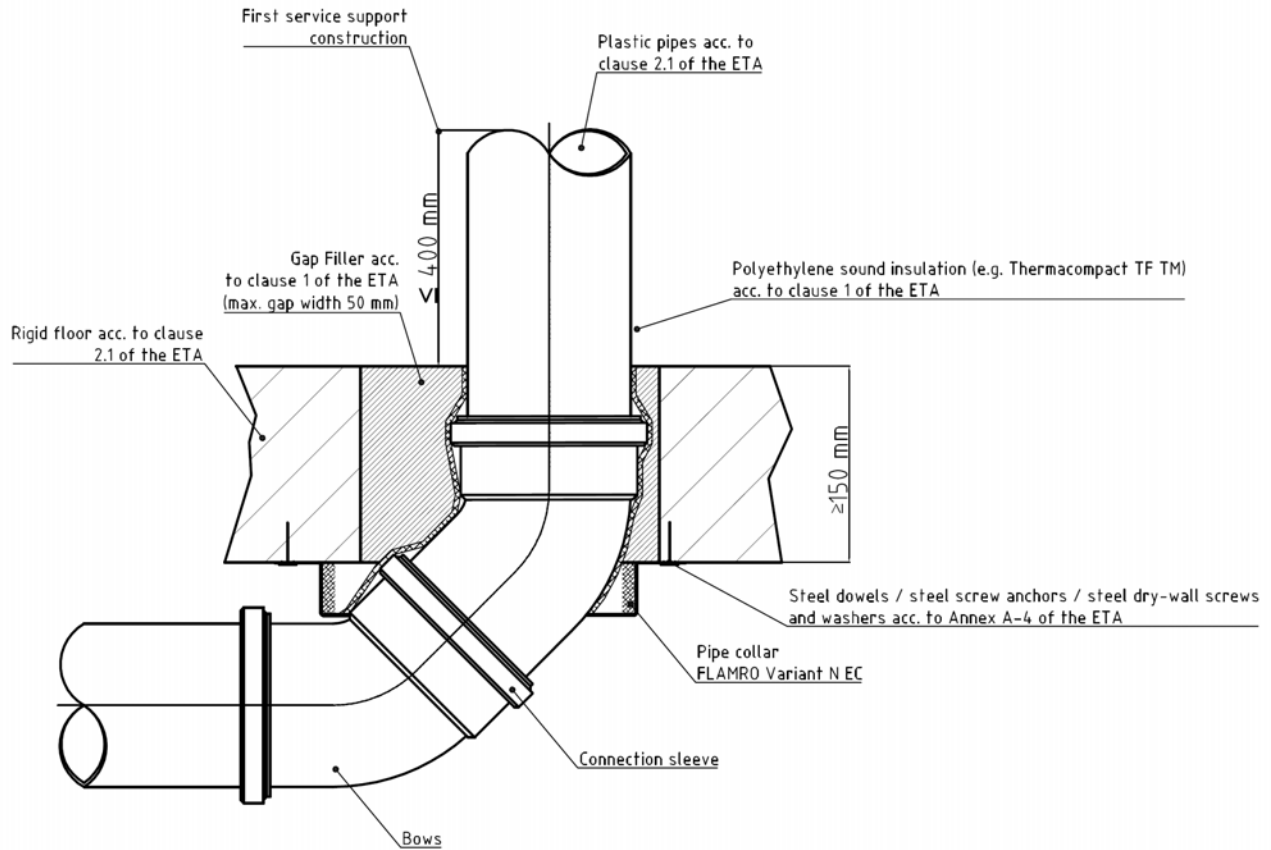
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA, insulated with SH/Armaflex or AF/Armaflex – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-6

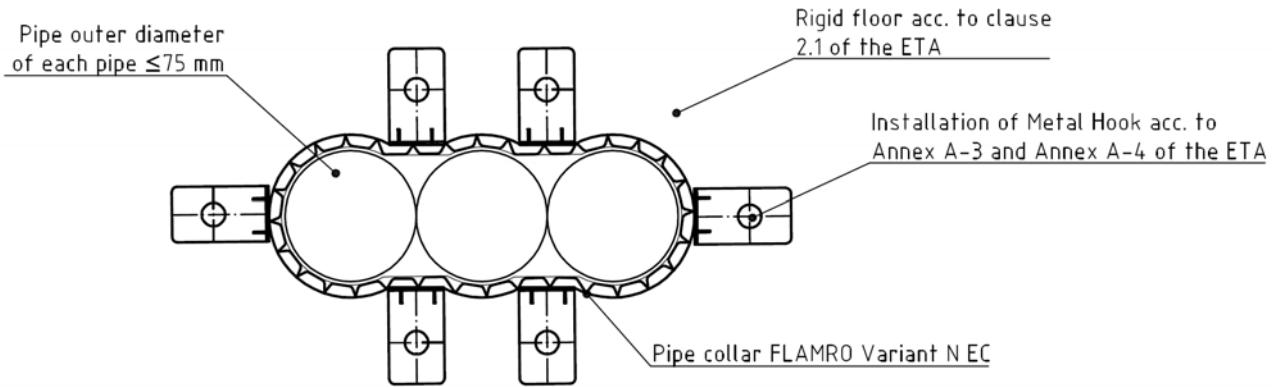
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – plastic pipes according to clause 2.1 of the ETA with bows on the bottom side of the floor and a connection sleeve within the floor, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – Installation drawing – sectional view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-7

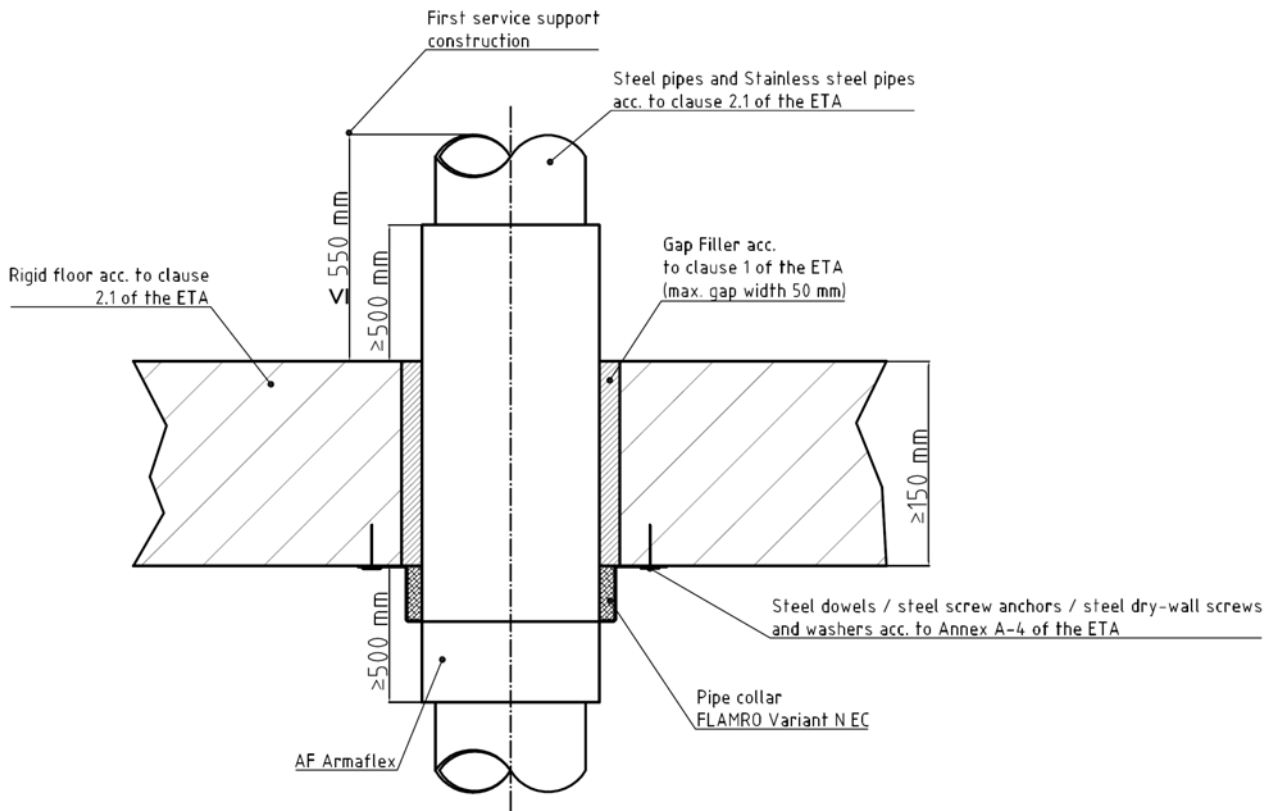
FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – Multiple penetration of maximum three plastic pipes acc. to cl. 2.1 of the ETA made from PVC-U, PE-HD or PP through one concerted pipe collar FLAMRO Variant N EC (clearance between pipes maximum 15 mm; linear arrangement, no clusters), non-insulated – Installation drawing – top view



FLAMRO Variant N EC
- Installation in rigid floor -

ANNEX E-8

FLAMRO Variant N EC – rigid floors according to clause 2.1 of the ETA – steel pipes and stainless steel pipes according to clause 2.1 of the ETA, insulated with AF/Armaflex – Pipe collar FLAMRO Variant N EC at the bottom side of the separating element – Installation drawing – sectional view



**FLAMRO Variant N EC
- Installation in rigid floor -**

ANNEX E-10

PVC-U pipes acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 5,6	---	X	X	2	EI 240-U/C E 240-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 240-U/C E 240-U/C
> 75 to ≤ 110	1,8 to 12,3	---	X	X	4	EI 240-U/C E 240-U/C
> 110 to ≤ 125	2,2 to 12,1	---	X	X	5	EI 120-U/C E 120-U/C
> 125 to ≤ 160	3,2 to 11,9	---	X	X	6	EI 120-U/C E 120-U/C

PVC-U pipes acc. to cl. 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	---	X	X	2	EI 120-U/C E 120-U/C
> 75 to ≤ 110	12,3	---	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 125	12,1	---	X	X	5	EI 120-U/C E 120-U/C
> 125 to ≤ 160	11,9	---	X	X	6	EI 120-U/C E 120-U/C
> 125 to ≤ 160	3,2	---	X	X	8	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-1

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PE-HD pipes acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 4,6	---	X	X	2	EI 240-U/C E 240-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 240-U/C E 240-U/C
> 75 to ≤ 110	> 2,7 to 10,0	---	X	X	4	EI 180-U/C E 240-U/C
> 110 to ≤ 160	> 4,0 to 14,6	---	X	X	6	EI 120-U/C E 240-U/C

PE-HD pipes acc. to cl. 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	4,6	---	X	X	2	EI 120-U/C E 120-U/C
> 50 to ≤ 110	2,7 to 10,0	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-2

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PE-HD pipes acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	≤ 4	X	X	2	EI 120-U/C E 120-U/C
>50 to ≤ 75	2,2	≤ 4	X	X	3	EI 120-U/C E 120-U/C
> 75 to ≤ 110	2,7 to 10,0	≤ 4	X	X	4	EI 120-U/C E 120-U/C

PE-HD pipes acc. to cl. 2.1 of the ETA, positioned vertically directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	10,0	≤ 4	X	X	4	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-3
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PP pipes acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8 to 4,6	---	X	X	2	EI 240-U/C E 240-U/C
> 50 to ≤ 75	1,8 to 8,4	---	X	X	3	EI 240-U/C E 240-U/C
> 75 to ≤ 110	> 2,7 to 10,0	---	X	X	4	EI 180-U/C E 180-U/C
> 110 to ≤ 125	> 3,1 to 11,4	---	X	X	6	EI 120-U/C E 120-U/C
> 125 to ≤ 160	> 4,0 to 14,6	---	X	X	8	EI 120-U/C E 120-U/C

PP pipes acc. to cl. 2.1 of the ETA, non-insulated, installed in an angle between 90° and 45° – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	2,7 to 10,0	---	X	X	4	EI 120-U/C E 120-U/C
> 110 to ≤ 125	3,2 to 12,0	---	X	X	6	EI 120-U/C E 120-U/C
> 125 to ≤ 160	4,0 to 14,6	---	X	X	8	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

PP pipes acc. to cl. 2.1 of the ETA, positioned vertically directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	2,7	≤ 4	X	X	4	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-4

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Plastic pipes alpex F50 PROFI and alpex L acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,0	---	X	X	2	EI 120-U/C E 120-U/C
≤ 50	4,0	---	X	X	2	EI 120-U/C E 120-U/C
≤ 75	5,0	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Plastic pipes alpex F50 PROFI and alpex L acc. to cl. 2.1 of the ETA, insulated with SH/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,0	9,0	X	X	2	EI 120-U/C E 120-U/C
≤ 75	5,0	9,0	X	X	4	EI 120-U/C E 120-U/C
≤ 75	5,0	> 9,0 to 20,0	X	X	5	EI 120-U/C E 120-U/C
≤ 75	5,0	> 20,0 to 30,0	X	X	6	EI 120-U/C E 120-U/C

Plastic pipes alpex F50 PROFI and alpex L acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 75	5,0	9,5	X	X	4	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-5
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Plastic pipes BluePower® acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,5	≤ 4	X	X	4	EI 90-U/C E 90-U/C
≤ 110	3,4	≤ 4	X	X	5	EI 90-U/C E 90-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-6

Plastic pipes Uponor Unipipe Mehrschichtverbundrohr MLC acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	4,5	---	X	X	2	EI 120-U/C E 120-U/C
≤ 75	7,5	---	X	X	3	EI 90-U/C E 90-U/C
≤ 110	10,0	---	X	X	4	EI 90-U/C E 90-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Plastic pipes Uponor Unipipe Mehrschichtverbundrohr MLC acc. to cl. 2.1 of the ETA, insulated with SH/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	4,5	10,0	X	X	3	EI 120-U/C E 120-U/C
≤ 63	6,0	9,0	X	X	4	EI 120-U/C E 120-U/C
≤ 90	8,5	9,0	X	X	5	EI 120-U/C E 120-U/C
≤ 110	10,0	> 9,0 to 20,0	X	X	6	EI 120-U/C E 120-U/C

Plastic pipes Uponor Unipipe Mehrschichtverbundrohr MLC acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	4,5	27,5	X	X	4	EI 120-U/C E 120-U/C
≤ 75	7,5	30,0	X	X	5	EI 120-U/C E 120-U/C
≤ 110	10,0	9,5 to 31,0	X	X	6	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-7
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Plastic pipes Wavin SiTech® acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,6	≤ 4	X	X	3	EI 120-U/C E 120-U/C
≤ 110	3,6	≤ 4	X	X	4	EI 120-U/C E 120-U/C
≤ 125	4,2	≤ 4	X	X	5	EI 60-U/C E 60-U/C
≤ 160	5,3	≤ 4	X	X	6	EI 60-U/C E 60-U/C
≤ 50	2,0	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	3,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 125	4,2	≤ 4	---	X	5	EI 120-U/U E 120-U/U
≤ 160	5,3	≤ 4	---	X	6	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay X ... valid intumescent inlay

Plastic pipes Wavin SiTech® acc. to cl. 2.1 of the ETA, positioned vertically directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	3,6	≤ 4	---	X	5	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay X ... valid intumescent inlay

Plastic pipes Wavin SiTech® acc. to cl. 2.1 of the ETA, with bows on the bottom side of the floor and a connection sleeve within the floor, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 110	3,6	≤ 4	---	X	5	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-8

Plastic pipes Fusiotherm® Stabverbundrohr acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 16	2,2	---	X	X	2	EI 120-U/C E 120-U/C
≤ 50	7,9	---	X	X	2	EI 120-U/C E 120-U/C
≤ 75	11,8	---	X	X	3	EI 120-U/C E 120-U/C
≤ 110	17,2	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Plastic pipes Fusiotherm® Stabverbundrohr acc. to cl. 2.1 of the ETA, insulated with SH/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	6,9	10,0	X	X	3	EI 120-U/C E 120-U/C

Plastic pipes Fusiotherm® Stabverbundrohr acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	15,2	31,0	X	X	6	EI 120-U/C E 120-U/C

X ... valid intumescent inlay

Plastic pipes Fusiotherm® SDR 11 acc. to cl. 2.1 of the ETA, non-insulated – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 315	28,6	---	X	X	20	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-9
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Plastic pipes Geberit Silent-PP acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	X	X	2	EI 120-U/C E 120-U/C
≤ 75	2,6	≤ 4	X	X	3	EI 120-U/C E 120-U/C
≤ 110	3,6	≤ 4	X	X	4	EI 120-U/C E 120-U/C
≤ 50	2,0	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	3,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 125	4,2	≤ 4	---	X	5	EI 120-U/U E 120-U/U
≤ 160	5,2	≤ 4	---	X	6	EI 120-U/U E 120-U/U

Plastic pipes Geberit Silent-PP acc. to cl. 2.1 of the ETA, positioned vertically directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	3,6	≤ 4	---	X	5	EI 120-U/U E 120-U/U

Plastic pipes Geberit Silent-PP acc. to cl. 2.1 of the ETA, with bows on the bottom side of the floor and a connection sleeve within the floor, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 110	3,6	≤ 4	---	X	5	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-10

Plastic pipes POLO-KAL NG acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	X	X	2	EI 90-U/C E 120-U/C
≤ 75	2,6	≤ 4	X	X	3	EI 90-U/C E 120-U/C
≤ 110	3,4	≤ 4	X	X	4	EI 120-U/C E 120-U/C
≤ 50	2,0	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	3,4	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 125	3,9	≤ 4	---	X	5	EI 120-U/U E 120-U/U
≤ 160	4,9	≤ 4	---	X	6	EI 120-U/U E 120-U/U

Plastic pipes POLO-KAL NG acc. to cl. 2.1 of the ETA, positioned vertically directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	3,4	≤ 4	---	X	5	EI 120-U/U E 120-U/U

Plastic pipes POLO-KAL NG acc. to cl. 2.1 of the ETA, with bows on the bottom side of the floor and a connection sleeve within the floor, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 110	3,4	≤ 4	---	X	5	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-11
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Plastic pipes RAUPIANO PLUS acc. to cl. 2.1 of the ETA, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	1,8	≤ 4	---	X	2	EI 120-U/U E 120-U/U
≤ 75	1,9	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 110	2,7	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 125	3,1	≤ 4	---	X	5	EI 120-U/U E 120-U/U
≤ 160	3,6	≤ 4	---	X	6	EI 120-U/U E 120-U/U

Plastic pipes RAUPIANO PLUS acc. to cl. 2.1 of the ETA, positioned vertically directly in the corner of the wall (clearance between pipe and wall maximum 10 mm), insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 110	2,7	≤ 4	---	X	5	EI 120-U/U E 120-U/U

Plastic pipes RAUPIANO PLUS acc. to cl. 2.1 of the ETA, with bows on the bottom side of the floor and a connection sleeve within the floor, insulated with Polyethylene sound insulation (e.g. THERMACOMPACT TF™) acc. to cl. 1 of the ETA – in rigid floors acc. to cl. 2.1 of the ETA						
Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 50	2,0	≤ 4	---	X	3	EI 120-U/U E 120-U/U
≤ 75	2,6	≤ 4	---	X	4	EI 120-U/U E 120-U/U
≤ 110	2,7	≤ 4	---	X	5	EI 120-U/U E 120-U/U

--- ... invalid intumescent inlay
X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-12
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Multiple penetration of maximum three plastic pipes acc. to cl. 2.1 of the ETA made from PVC-U, PE-HD or PP through one concerted pipe collar FLAMRO Variant N EC (clearance between pipes maximum 15 mm; linear arrangement, no clusters), non-insulated – in rigid floors acc. to cl. 2.1 of the ETA

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter of each pipe	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 75	1,8 to 8,4	---	X	X	4	EI 120-U/C E 120-U/C

--- ... no insulation allowed
X ... valid intumescent inlay

Metal pipes (copper pipes, steel pipes, stainless steel pipes) acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA – the intumescent inlays which have to be arranged one behind the other have to be installed at the bottom side flushed within the separating element (without Metal Strap)

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 28	1,0 to 14,2	6,0	X	X	2	EI 120-C/U E 120-C/U
≤ 28	1,0 to 14,2	6,0 to < 20,0	X	X	3	EI 120-C/U E 120-C/U
≤ 28	1,0 to 14,2	> 20,0 to 35,0	X	X	4	EI 120-C/U E 120-C/U

X ... valid intumescent inlay

FLAMRO Variant N EC
- Fire resistance classification -

ANNEX F-13

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Metal pipes (copper pipes, steel pipes, stainless steel pipes) acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA – the intumescent inlays which have to be arranged one behind the other have to be installed at the bottom side flushed within the separating element (without Metal Strap)

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 54	1,5 to 14,2	9,0	X	X	2	EI 120-C/U E 120-C/U
≤ 54	1,5 to 14,2	> 9,0 to 22,0	X	X	3	EI 120-C/U E 120-C/U
≤ 54	1,5 to 14,2	> 22,0 to 35,0	X	X	4	EI 120-C/U E 120-C/U
≤ 89	2,0 to 14,2	13,0	X	X	2	EI 120-C/U E 120-C/U
≤ 108	2,5 to 14,2	13,0	X	X	2	EI 120-C/U E 120-C/U

Metal pipes (only steel pipes and stainless steel pipes) acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA – the intumescent inlays which have to be arranged one behind the other have to be installed at the bottom side flushed within the separating element (without Metal Strap)

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 108	2,0 to 14,2	13,0 to 30,0	X	X	2	EI 120-C/U E 120-C/U

Metal pipes (only steel pipes and stainless steel pipes) acc. to cl. 2.1 of the ETA, insulated with AF/Armaflex (length ≥ 500 mm – on both sides of the separating element, local-sustained LS or continued-sustained CS) – in rigid floors acc. to cl. 2.1 of the ETA – the pipe collar “FLAMRO Variant N EC” has to be installed at the bottom side of the separating element

Pipe dimensions (mm)		Insulation thickness (mm)	Intumescent inlay			Fire resistance classification
Outer diameter	Wall thickness		ROKU® Strip EM	ROKU® Strip	Nr. of layers	
≤ 108	2,0 to 14,2	13,0 to 30,0	X	X	2	EI 120-C/U E 120-C/U

X ... valid intumescent inlay

FLAMRO Variant N EC - Fire resistance classification -	ANNEX F-14
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