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to Article 29 of the Regulation (EU)
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Parliament and of the Council of 9
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MEMBER OF EOTA



European Technical Assessment ETA-25/0963 of 2025/10/10

I General Part

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

**Trade name of the
construction product:**

PANNUS

**Product family to which the
above construction product
belongs:**

Fire Stopping, Fire Sealing & Fire Protective Products.
Fire Retardant Products

Manufacturer:

Rotho Blaas s.r.l
Via dell'Adige 2/1
IT-38040 Cortaccia (BZ)
Italy

Manufacturing plant:

Rotho Blaas s.r.l Manufacturing Plants: PS1

**This European Technical
Assessment contains:**

41 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, on the
basis of:**

EAD 350454-00-1104, Firestopping and Fire Sealing
Products, Penetration Seals

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

PANNUS is a glass wool mat quilted between two glass fabrics – the external fabric is covered by an aluminized layer, the internal fabric is coated with an ablative paint. In case of fire the product is designed to prevent the ignition on the cold side of the compartment by providing thermal insulation to the through-penetration.

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

PANNUS is a special mat used to restore the integrity and thermal insulation (EI) of walls and floors passed through by service installations such as metal pipes, cable trays and busbars. It is installed by wrapping it on the unexposed side of the through-services, in one or more layers depending on the type of through-service and supporting construction. In case of fire the physical and chemical properties of its mineral wool and ablative coating cool down the temperatures of the through-penetration on the side of the compartment not directly exposed to flames and hot smokes.

PANNUS may be used to provide a penetration seal in combination with the following supporting constructions:

Flexible walls:

The flexible walls comprise timber or steel studs lined on both faces with minimum two layers of 12,5 mm thick 'Type F' or 'Type DF' gypsum plasterboards according to EN 520 (or minimum 1 layer of 15 mm in the case of the 80 mm thick flexible wall). In timber stud walls, no part of the penetration shall be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud and minimum 100 mm of insulation of reaction to fire class A1 or A2 according to EN 13501-1, is provided within the cavity between the penetration seal and the stud.

The resistance to fire performance given in Annex A for flexible walls may be applied to rigid constructions of an overall thickness equal to or greater and a minimum density of 350 kg/m³.

- **Flexible walls of thickness 80 mm:**
Walls with a minimum thickness of 80 mm and resistance to fire EI 60.
When an opening in the wall is closed with PANEL, one layer is installed levelled to the surface at the fire exposed side of the wall. The maximum size of the opening is 550 mm x 600 mm.
When an opening in the wall is closed with MASS, these are installed in the center of the supporting construction. The maximum size of the opening is 550 mm x 200 mm, and the depth is specified in the proper section in Annex A.
When an opening in the wall is closed with GRAPHIT FOAM, the product is applied throughout the entire depth of the wall. The maximum size of the opening is 450 mm x 250 mm.
- **Flexible walls of thickness 100 mm:**
Walls with a minimum thickness of 100 mm and resistance to fire EI 120.
When an opening in the wall is closed with PANEL, two layers are installed levelled to the surface at both sides of the wall. The maximum size of the opening is 550 mm x 600 mm.
When an opening in the wall is closed with MASS, these are installed in the center of the supporting construction. The maximum size of the opening is 525 mm x 270 mm, and the depth is specified in the proper section in Annex A.
When an opening in the wall is closed with SACCUS, these installed in the center of the supporting construction. The maximum size of the opening is 525 mm x 250 mm, and the depth is specified in the proper section in Annex A.
- **Flexible walls of thickness 120 mm:**
Walls with a minimum thickness of 120 mm and resistance to fire EI 120.
When an opening in the wall is closed with PANEL, two layers are installed levelled to the surface at both sides of the wall. The maximum size of the opening is 1750 mm x 1000 mm.
When an opening in the wall is closed with MASS, these are installed in the centre of the supporting construction. The maximum size of the opening is 550 mm x 1050 mm and the depth is specified in the proper section in Annex A.
When an opening in the wall is closed with GRAPHIT FOAM, the product is applied throughout the entire depth of the wall. The maximum size of the opening is 450 mm x 250 mm.

Lining walls:

- **Lining wall of thickness 30 mm:**
One-sided flexible walls with a minimum thickness of 30 mm (boards only) and resistance to fire EI 60, which comprise a steel frame of a minimum thickness 50 mm (studs of 50 mm x 49 mm x 0,6 mm), lined at one side only with minimum two layers of 15 mm thick 'Type F' gypsum plasterboards according to EN 520.
When an opening in the wall is closed with PANEL, one layer is installed. A frame is installed around the opening, fixed to the wall plasterboards with self-tapping steel screws Ø 3,5 mm every 200 mm, made of strips (50 mm width and 15 mm thick) of 'Type F' gypsum plasterboards according to EN 520. The maximum size of the opening is 500 mm x 1060 mm.
- **Lining walls of thickness 50 mm:**
One-sided flexible walls with a minimum thickness of 50 mm (boards only) and resistance to fire EI 120, which comprise a steel frame of a minimum thickness 75 mm (studs of 75 mm x 50 mm x 0,6 mm), lined at one side only with minimum two layers of 25 mm thick 'Type GM-F' gypsum and vermiculite plasterboards, coated with fiberglass, according to EN 520.
When an opening in the wall is closed with PANEL, two layers are installed. A frame is installed around the opening, fixed to the wall plasterboards with self-tapping steel screws Ø 4 mm every 200 mm, made of strips (50 mm width and 25 mm thick, two layers for a total thickness of 50 mm) of 'Type GM-F' gypsum and vermiculite plasterboards, coated with fiberglass, according to EN 520. The maximum size of the opening is 550 mm x 1050 mm.

Self-supporting sandwich panels walls:

- Walls with a minimum thickness of 100 mm and resistance to fire EI 120, made of self-supporting sandwich panels with rock wool insulation core of density 100 kg/m³ faced at both sides with two corrugated galvanized steel sheets of thickness 0,5 mm. The sandwich panels have tongue and groove joints and are fixed to each other with steel rivets Ø3,5 mm x 14 mm, and to the rigid floors with steel L-profiles and steel anchors.
The opening in the sandwich panels wall is closed with two layers of PANEL. The maximum size of the opening is 600 mm x 1000 mm.

CLT walls:

- Walls with a minimum thickness of 137 mm and resistance to fire EI 120, made of cross laminated timber boards (X-LAM panels according to EAD 130005-00-0304 or equivalent in accordance with EN 1366-3).
When an opening in the wall is closed with PANEL, two layers are installed levelled to the surface at both sides of the wall. A frame is installed around the opening, fixed to the wall timber boards with self-tapping steel screws Ø6 mm every 200 mm, made of strips (100 mm width and 12,5 mm thick) of 'Type F' gypsum plasterboards according to EN 520. The maximum size of the opening is 600 mm x 600 mm.
When an opening in the wall is closed with MASS, these are installed in the center of the supporting construction. The maximum size of the opening is 700 mm x 300 mm and the depth is specified in the proper section in Annex A.

Rigid walls:

- **Rigid wall of thickness 150 mm:**
Concrete or masonry walls with a minimum thickness of 150 mm, minimum density of 550 kg/m³ and resistance to fire EI 180.
When an opening in the wall is closed with PANEL, two layers are installed levelled to the surface at both sides of the wall. The maximum size of the opening is 1800 mm x 650 mm.
When an opening in the wall is closed with MASS, these are installed in the center of the supporting construction. The maximum size of the opening is 450 mm x 150 mm and the depth is specified in the proper section in Annex A.
When an opening in the wall is closed with GRAPHIT FOAM, the product is applied throughout the entire depth of the wall. The maximum size of the opening is 520 mm x 250 mm.
- **Rigid wall of thickness 200 mm:**
Concrete or masonry walls with a minimum thickness of 200 mm, minimum density of 550 kg/m³ and resistance to fire EI 240.
When an opening in the wall is closed with PANEL, three layers are installed with the external panels levelled to the surface at both sides of the wall. The maximum size of the opening is 600 mm x 250 mm.
When an opening in the wall is closed with MASS, these are installed in the center of the supporting construction. The maximum size of the opening is 450 mm x 200 mm, and the depth is specified in the proper section in Annex A.

Rigid floors:

- **Rigid floors of thickness 150 mm:**
Concrete or other type of rigid floors with a minimum thickness of 150 mm, minimum density of 1600 kg/m³ and resistance to fire EI 180.
When an opening in the floor is closed with PANEL, two layers are installed levelled to the surface at both sides of the floor. The maximum size of the opening is 1000 mm x 500 mm. The maximum size can be enlarged up to 2000 mm x 1000 mm when supporting profiles are installed beneath the panels. Steel slotted profiles (30 mm width and 1 mm thick) placed under the panel's splices at maximum 500 mm, fixed to the floor at both profile's ends with expansion anchors Ø60 mm x 8 mm. When an opening in the floor is closed with MASS, these are installed flush with the exposed surface of the floor. The maximum size of the opening is 1000 mm x 600 mm, and the sealing depth is specified in the proper section in Annex A.
When an opening in the wall is closed with GRAPHIT FOAM, the product is applied throughout the entire depth of the wall. The maximum size of the opening is 480 mm x 230 mm.
When an opening in the floor is closed with SACCUS, these are installed flush with the exposed surface of the floor. The maximum size of the opening is 700 mm x 280 mm, and the depth is specified in the proper section in Annex A.
- **Rigid floors of thickness 200 mm:**
Concrete or other type of rigid floors (such as reinforced aerated concrete) with a minimum thickness of 200 mm, minimum density of 650 kg/m³ and resistance to fire EI 240.
When an opening in the floor is closed with PANEL, three layers are installed with the external panels levelled to the surface at both sides of the floor. The maximum size of the opening is 1360 mm x 200 mm. When an opening in the floor is closed with MASS, these are installed flush with the exposed surface of the floor. The maximum size of the opening is 450 mm x 200 mm, and the depth is specified in the proper section in Annex A.

CLT floors:

- Floors with a minimum thickness of 158 mm and resistance to fire EI 120, made of cross laminated timber boards (X-LAM panels according to EAD 130005-00-0304 or

equivalent in accordance with EN 1366-3).
When an opening in the floor is closed with PANEL, two layers of PANEL are installed levelled to the surface at both sides of the floor. A frame is installed around the opening, fixed to the floor timber boards with self-tapping steel screws Ø 5 mm approximately every 175 mm, made of strips (110 mm width and 12,5 mm thick) of 'Type F' gypsum plasterboards according to EN 520. The maximum size of the opening is 700 mm x 500 mm. When an opening in the floor is closed with MASS, these are installed flush with the exposed surface of the floor. The maximum size of the opening is 700 mm x 300 mm, and the depth is specified in the proper section in Annex A.

False ceilings:

- False ceilings with a minimum thickness of 50 mm (boards only) and resistance to fire EI 120 (a ← b), which comprise a steel frame lined at the bottom side with minimum two layers of 25 mm thick 'Type F' gypsum plasterboards according to EN 520.
A double layer frame made of 25mm 'Type GM-F' gypsum plasterboards (150x150 mm), according to EN 15283-1, is installed around the opening in the false ceiling, fixed to the gypsum plasterboards with self-tapping steel screws approximately every 100 mm.

Installation PANNUS

PANNUS will be installed in accordance with the manufacturer's instructions, which shall conform to the assessment carried out, and the provisions established in this section and in Annex A. The sequence of installation is described:

- 1- Wrap the PANNUS mat around the penetration system, adhering to the unexposed side of the supporting construction, by the number of windings and protection length required for the specific installation (see Annex A).
- 2- Secure the PANNUS in place by mean of 1mm thick iron wire, wrapped around the mat and tied on itself.
- 3- In walls, when it is not possible to identify an unexposed side, the PANNUS should be installed on both sides.
- 4- In floors, PANNUS is always installed on the unexposed (upper) side.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the sealant system of 25 years, provided that the conditions laid down in the product data sheet for the packaging/transport/storage/installation/use/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 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												
3.2 Safety in case of fire (BWR 2)													
Reaction to fire	No performance assessed												
Resistance to fire	See Annex A												
3.3 Hygiene, Health and the Environment (BWR 3)													
Air permeability	No performance assessed												
Water permeability	No performance assessed												
Content, emission and/or release of dangerous Substances*)	<table><tr><th>Release scenario</th><th colspan="2">IA1: Product with direct contact to indoor air.</th></tr><tr><td></td><td>3 days [mg/m³]</td><td>28 days [mg/m³]</td></tr><tr><td>SVOC</td><td>0,015</td><td>0,012</td></tr><tr><td>VOC</td><td>0,063</td><td>0,046</td></tr></table>	Release scenario	IA1: Product with direct contact to indoor air.			3 days [mg/m³]	28 days [mg/m³]	SVOC	0,015	0,012	VOC	0,063	0,046
Release scenario	IA1: Product with direct contact to indoor air.												
	3 days [mg/m³]	28 days [mg/m³]											
SVOC	0,015	0,012											
VOC	0,063	0,046											
3.4 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	Use category: Type Y ₂												
3.5 Protection against noise (BWR5)													
Airborne sound insulation	No performance assessed												
3.6 Energy economy and heat retention (BWR6)													
Thermal properties	No performance assessed												
Water vapour permeability	No performance assessed												

See additional information in section 3.7-3.8

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

3.7 Methods of verification

The assessment of PANNUS for the declared intended use has been made in accordance with EAD 350454-00-1104 Firestopping and fire sealing products, Penetration Seals, assessed as a sealant according to table 1.1 of the EAD.

3.8 General aspects related to the fitness for use of the product.

The verification of durability is part of testing the essential characteristics. PANNUS may be used in end-use applications according to the provisions for use category Y₂ (intended for use at temperatures below 0°C, but with no exposure to rain or UV radiation) without expecting significant changes of the characteristics relevant for fire protection. Products that meet the requirements for type Y₂ also meet the requirements for type Z₁ and Z₂.

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.

The PANNUS for firestopping and fire sealing purposes are 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 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/EC of the European Commission, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is: **1.**

5 Technical details necessary for the implementation of the AVCP system, as provided for 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 2025-10-10 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex A

Resistance to Fire Classification

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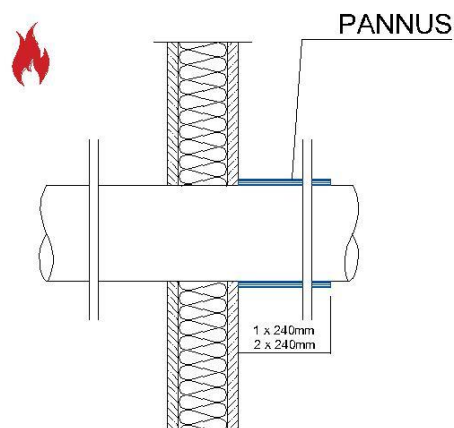
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A.1 Stainless steel pipes

A.1.1 Stainless steel pipes through the constructive element

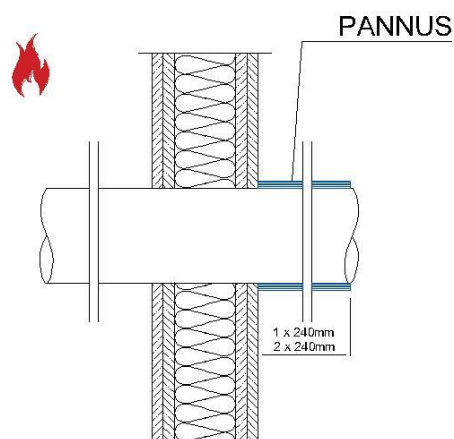
A.1.1.1 Flexible wall

A.1.1.1.1 80 mm thick flexible wall



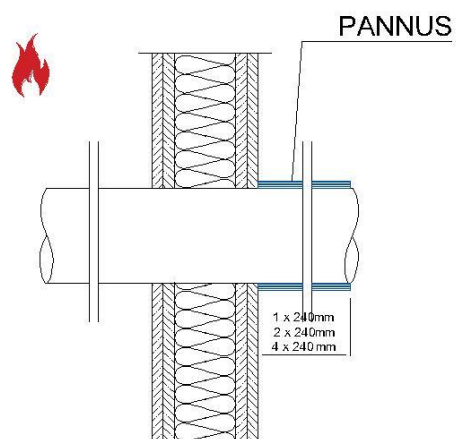
Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 60 C/C
≤ 108	1,0	2 x 240mm	EI 60 C/C

A.1.1.1.2 100 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 120 C/C
≤ 108	1,0	2 x 240mm	EI 60 C/C

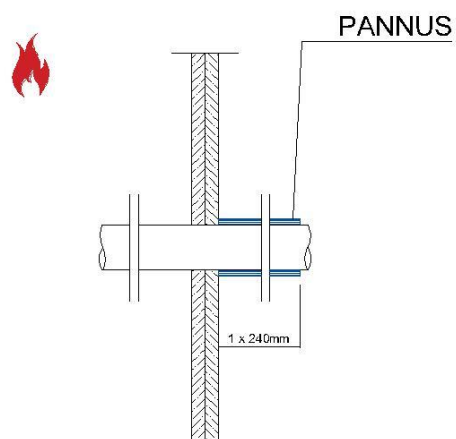
A.1.1.1.3 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0-4,0	1 x 240mm	EI 120 U/C
≤ 108	2,0-5,0	2 x 240mm	EI 120 U/C
≤ 300	1,0-8,0	4 x 240mm	EI 120 C/C

A.1.1.2 Lining wall

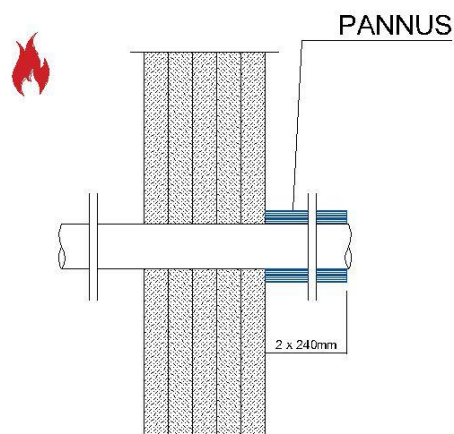
A.1.1.2.1 30 mm thick lining wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 60 U/C

A.1.1.3 CLT wall

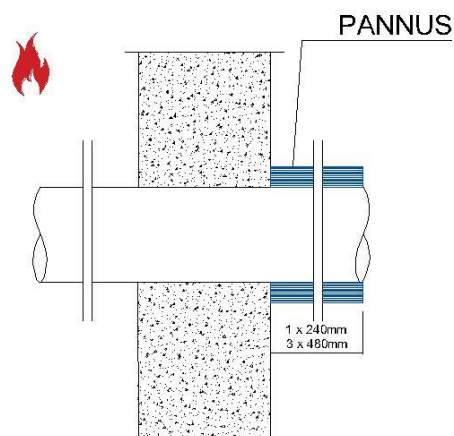
A.1.1.3.1 137 mm thick CLT wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	2,0	2 x 240mm	EI 120 C/U

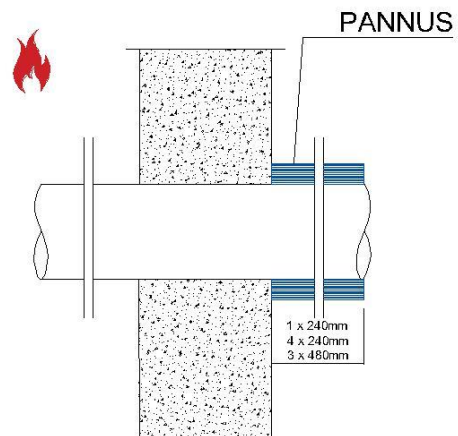
A.1.1.4 Rigid wall

A.1.1.4.1 150 mm thick rigid wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 200	4,5	1 x 240mm	EI 120 C/U
≤ 300	5,0	3 x 480mm	EI 180 C/C

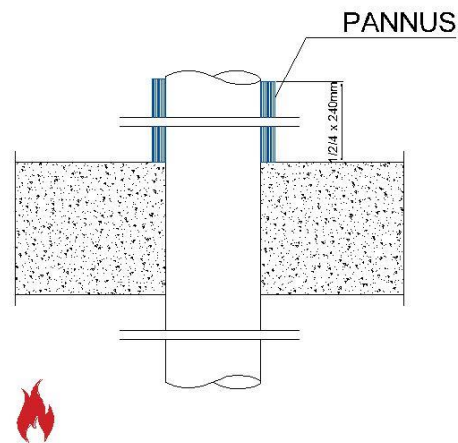
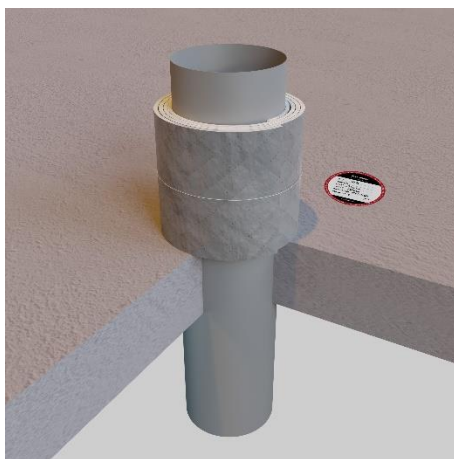
A.1.1.4.2 200 mm thick rigid wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	4 x 240mm	EI 240 U/C
≤ 200	4,5	1 x 240mm	EI 120 C/U
≤ 300	5,0	3 x 480mm	EI 180 C/C

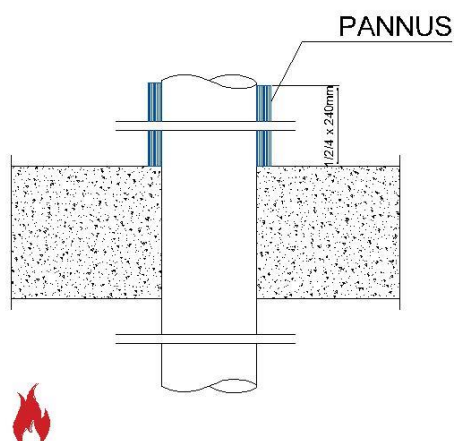
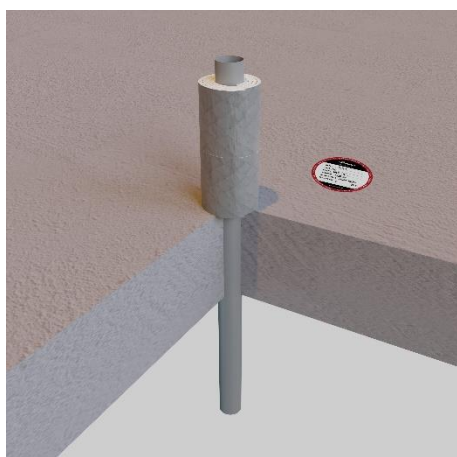
A.1.1.5 Rigid floor

A.1.1.5.1 150 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 180 C/U
≤ 108	1,0	2 x 240mm	EI 180 C/C
≤ 300	1,0-5,0	4 x 240mm	EI 180 C/C
	5,0	4 x 240mm	EI 180 U/C

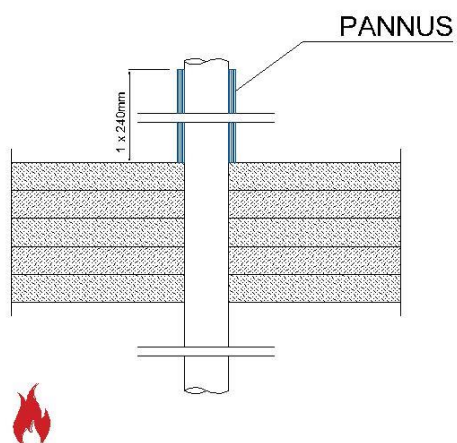
A.1.1.5.2 200 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	4 x 240mm	EI 240 U/C
≤ 108	1,0	2 x 240mm	EI 180 C/C
≤ 300	1,0-5,0	4 x 240mm	EI 180 C/C
	5,0	4 x 240mm	EI 180 U/C

A.1.1.6 CLT floor

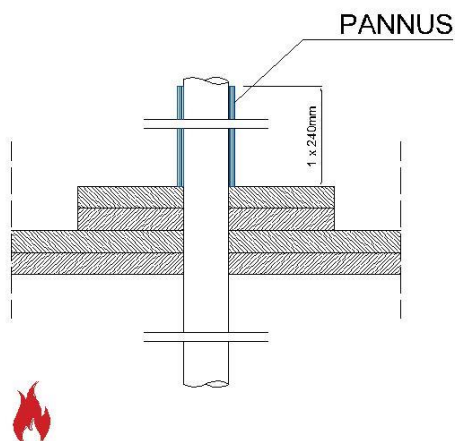
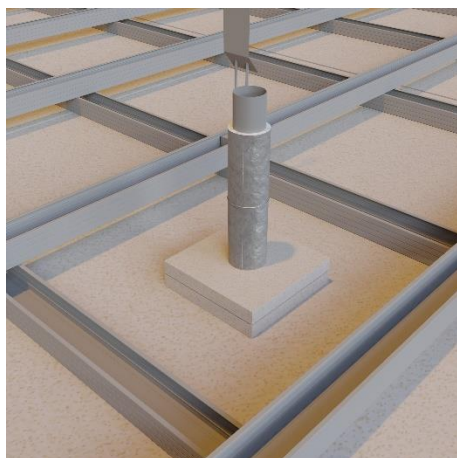
A.1.1.6.1 158 mm thick CLT floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,25	1 x 240mm	EI 120 U/C

A.1.1.7 False ceiling

A.1.1.7.1 50 mm thick false ceiling

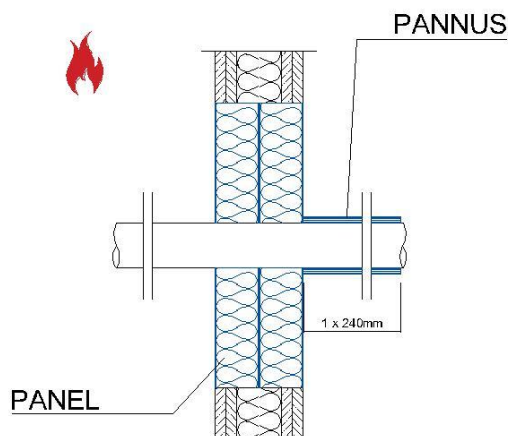
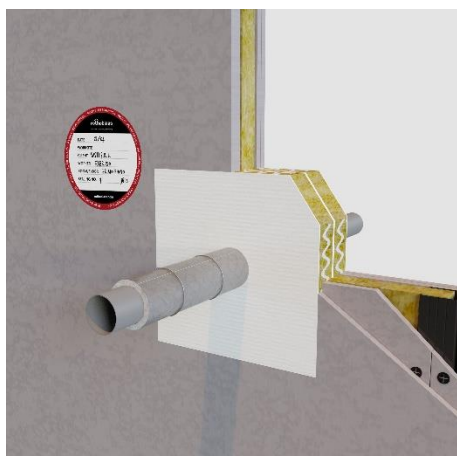


Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	2,0	1 x 240mm	EI 120 C/C

A.1.2 Stainless steel pipes through PANEL

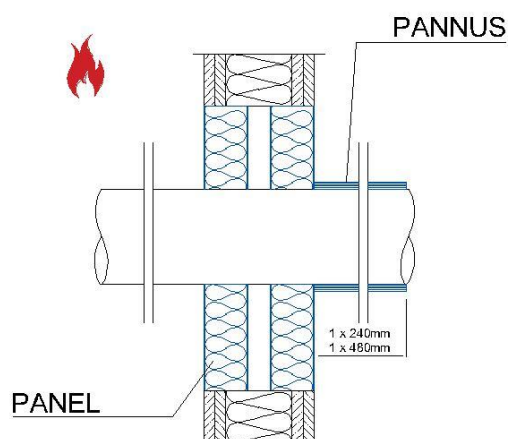
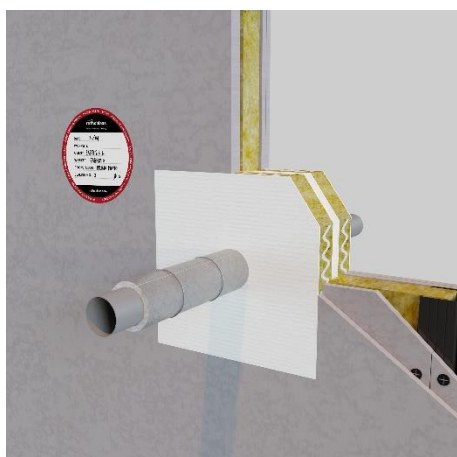
A.1.2.1 Flexible wall

A.1.2.1.1 100 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,0	1 x 240mm	2	EI 120 C/C

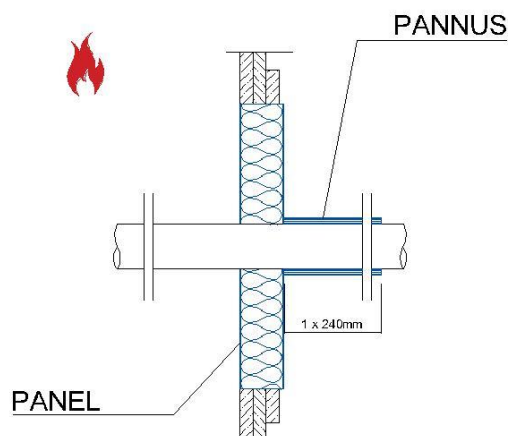
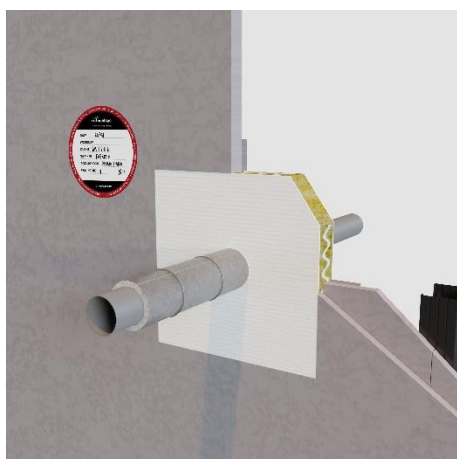
A.1.2.1.2 125 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,0	1 x 240mm	2	EI 120 C/C
≤ 200	4,5	1 x 480mm	2	EI 120 C/U

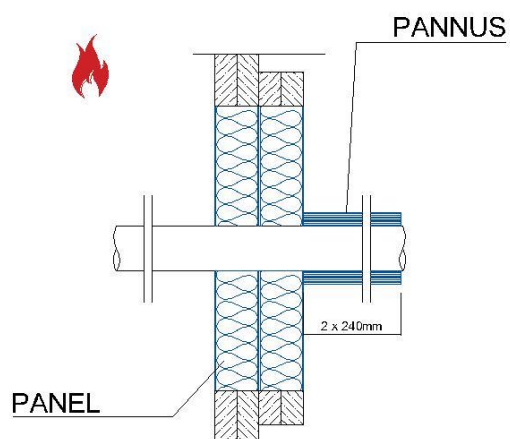
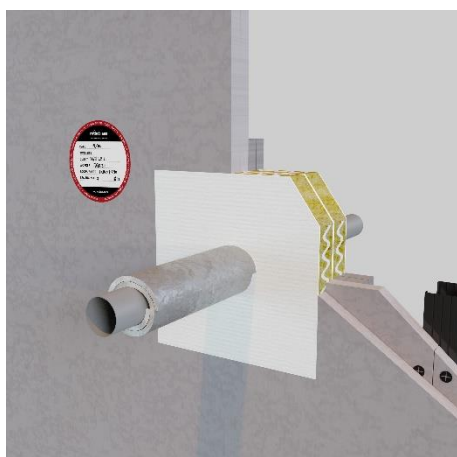
A.1.2.2 Lining wall

A.1.2.2.1 30 mm thick lining wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,0	1 x 240mm	1	EI 60 U/C

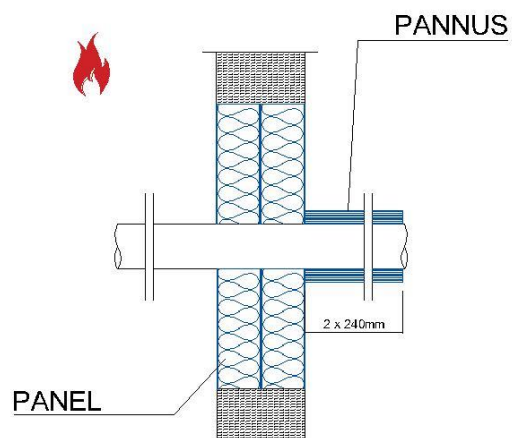
A.1.2.2.2 50 mm thick lining wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	2	2 x 240mm	2	EI 120 C/C

A.1.2.3 Sandwich wall

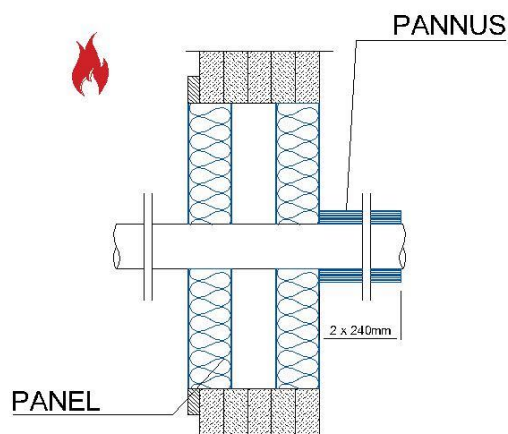
A.1.2.3.1 100 mm thick sandwich wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	2	2 x 240mm	2	EI 120 C/C

A.1.2.4 CLT wall

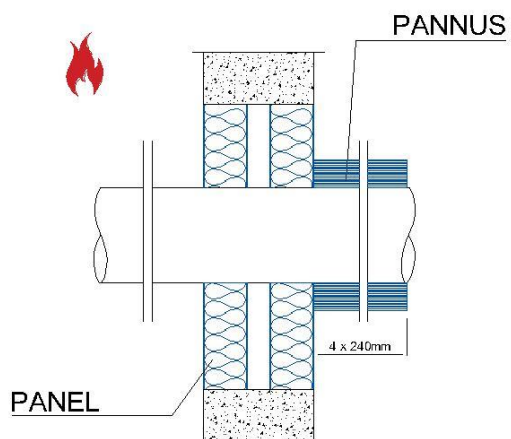
A.1.2.4.1 137 mm thick CLT wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,5	2 x 240mm	2	EI 120 C/U

A.1.2.5 Rigid wall

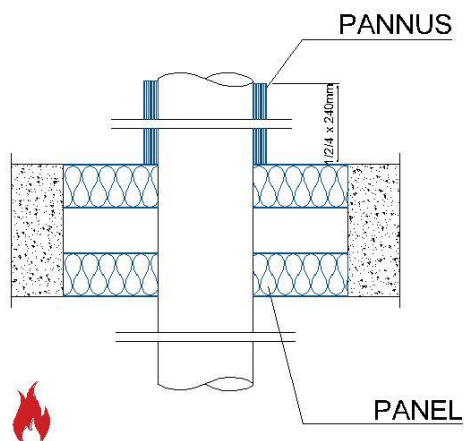
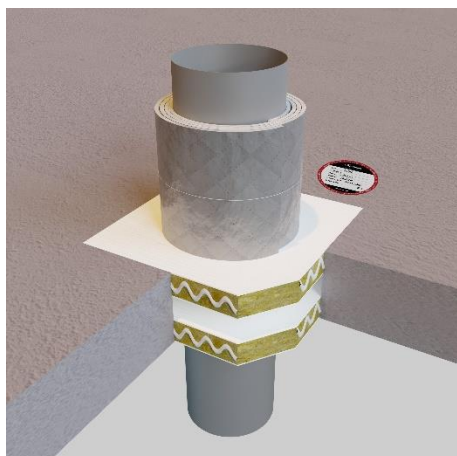
A.1.2.5.1 150 mm thick rigid wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 108	1,0	4 x 240mm	2	EI 180 C/C

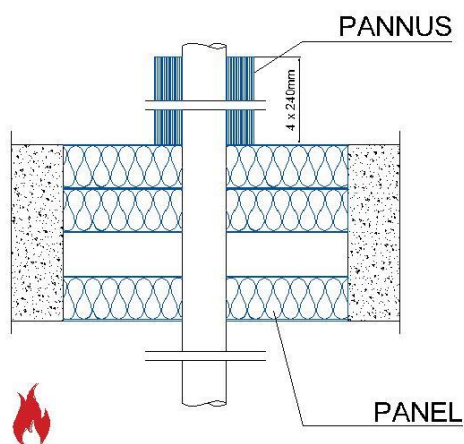
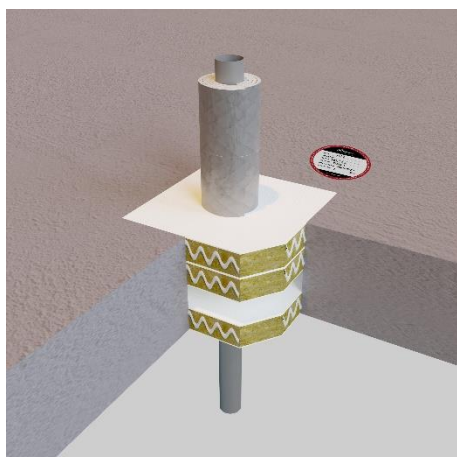
A.1.2.6 Rigid floor

A.1.2.6.1 150 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,0	1 x 240mm	2	EI 180 U/C
≤ 108	1,0	2 x 240mm	2	EI 180 U/C
≤ 300	1,0	4 x 240mm	2	EI 180 U/C

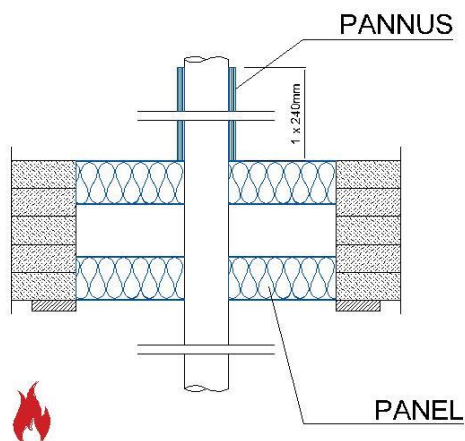
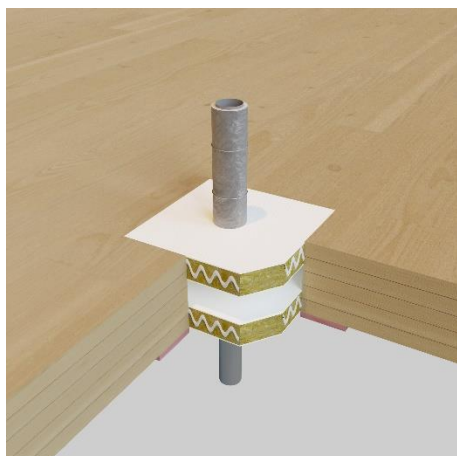
A.1.2.6.2 200 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,0	4 x 240mm	3	EI 240 U/C

A.1.2.7 CLT floor

A.1.2.7.1 158 mm thick CLT floor

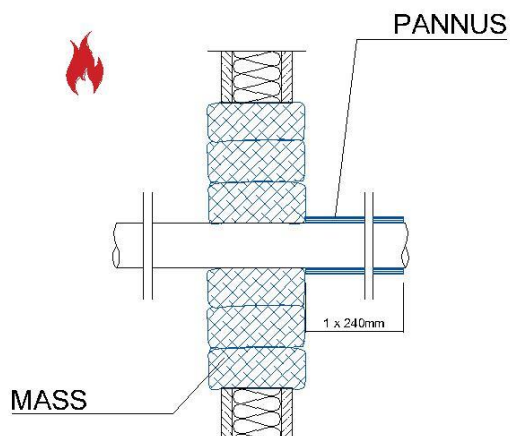
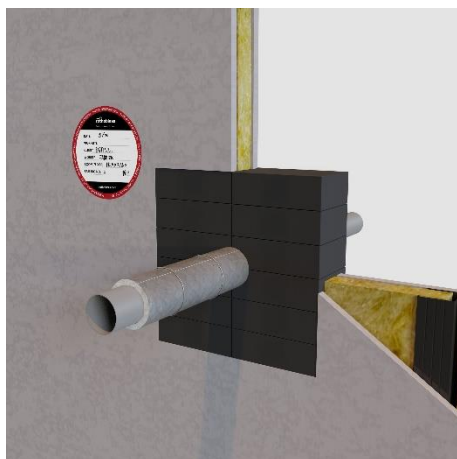


Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 50	1,25	1 x 240mm	2	EI 120

A.1.3 Stainless steel pipes through MASS

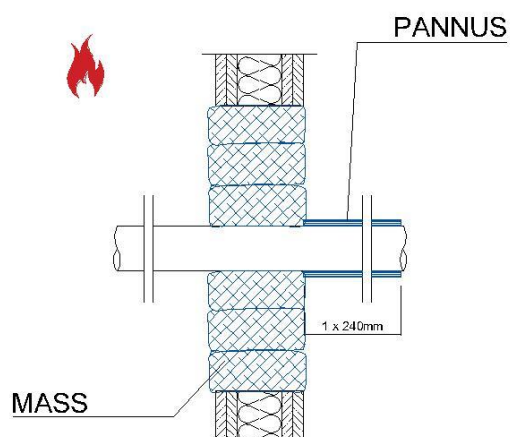
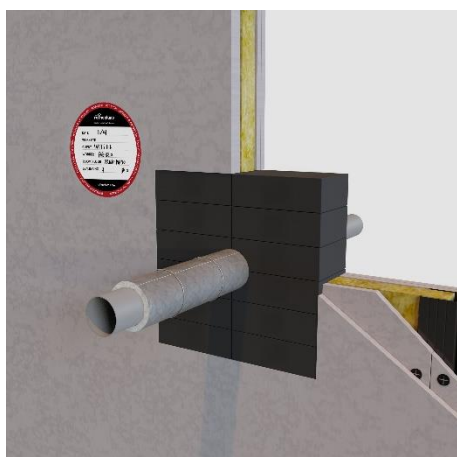
A.1.3.1 Flexible wall

A.1.3.1.1 80 mm thick flexible wall



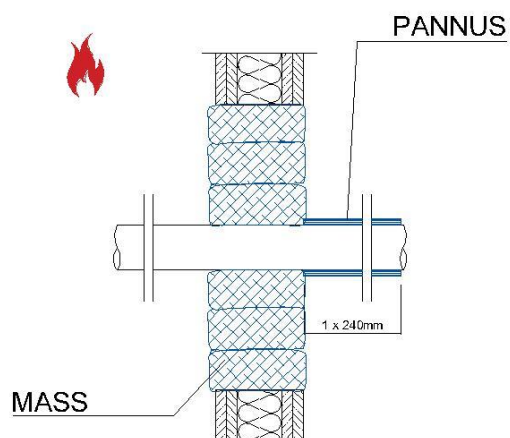
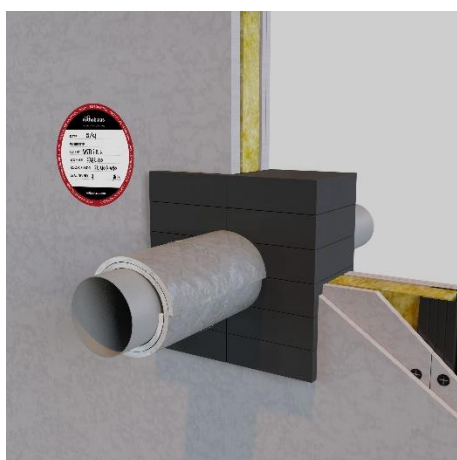
Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,0	1 x 240mm	100mm	EI 60 C/C

A.1.3.1.2 100 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,0	1 x 240mm	100mm	EI 120 C/C

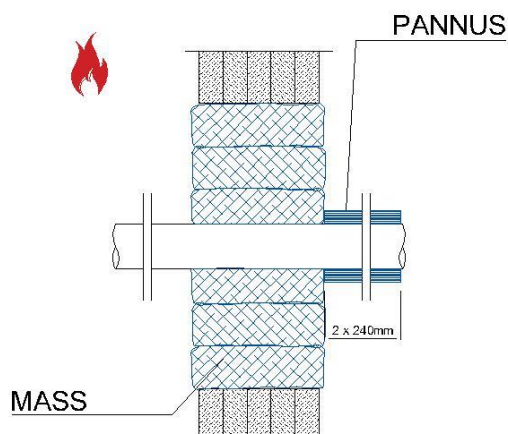
A.1.3.1.3 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,0	1 x 240mm	100mm	EI 120 C/C
≤ 108	4,0	2 x 240mm	150mm	EI 120 C/C

A.1.3.2 CLT wall

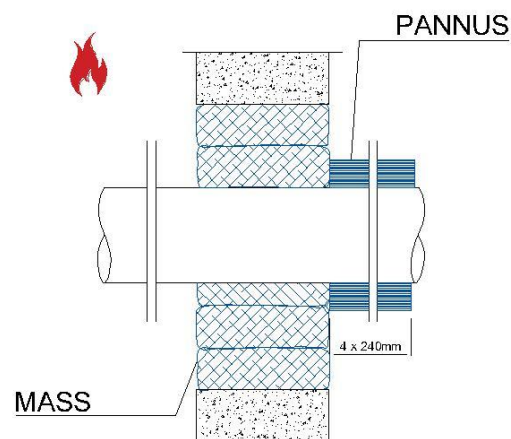
A.1.3.2.1 137 mm thick CLT wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,5	2 x 240mm	150mm	EI 120 C/U

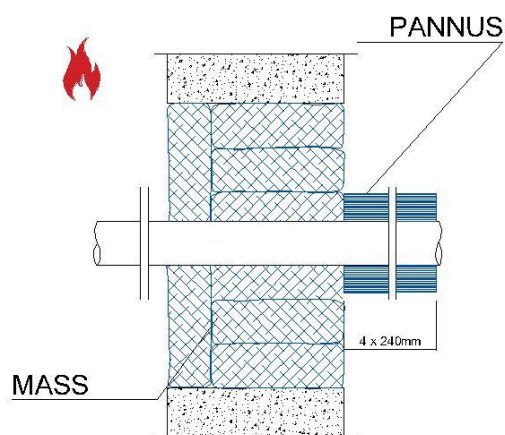
A.1.3.3 Rigid wall

A.1.3.3.1 150 mm thick rigid wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,0	4 x 240mm	150mm	EI 180 C/C

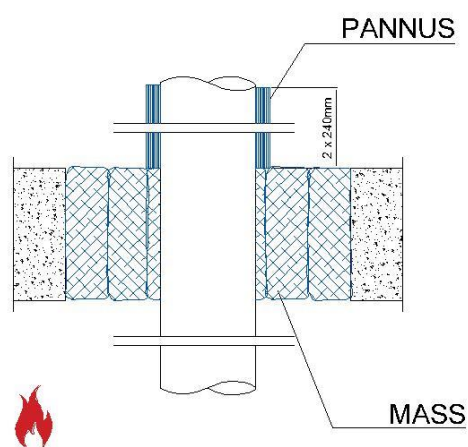
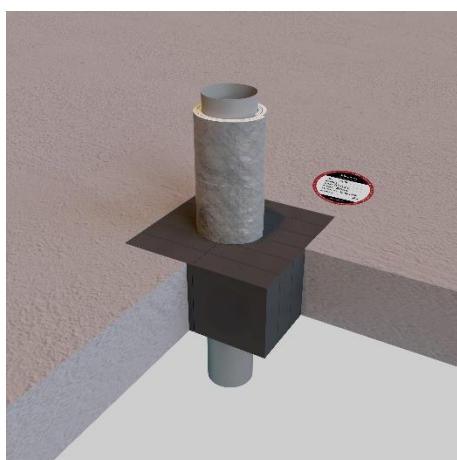
A.1.3.3.2 200 mm thick rigid wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,0	4 x 240mm	200mm	EI 240 U/C

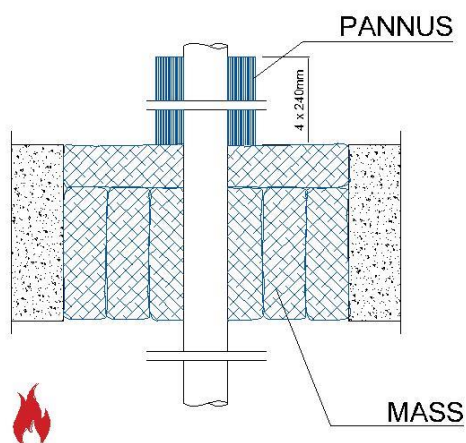
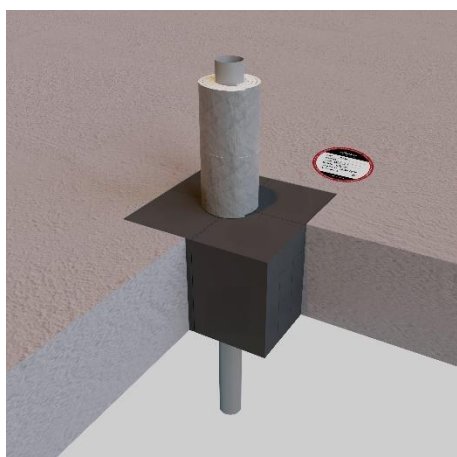
A.1.3.4 Rigid floor

A.1.3.4.1 150 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 108	4,0	2 x 240mm	150mm	EI 180 C/C

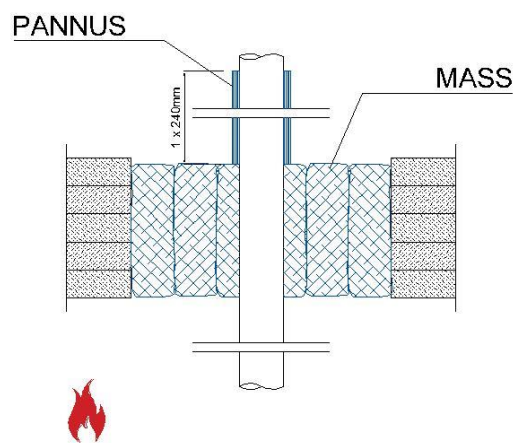
A.1.3.4.2 200 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,0	4 x 240mm	200mm	EI 240 U/C
≤ 108	4,0	2 x 240mm	150mm	EI 180 C/C

A.1.3.5 CLT floor

A.1.3.5.1 158 mm thick CLT floor

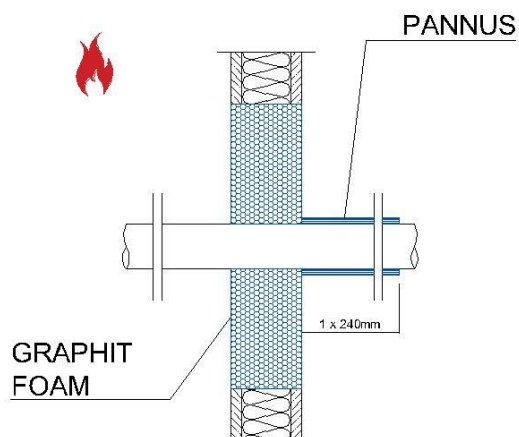
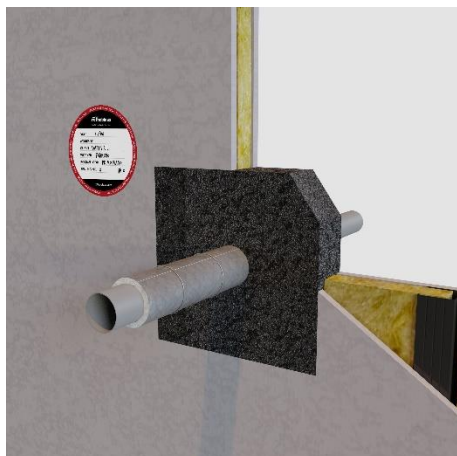


Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Depth MASS	Classification
≤ 50	1,25	1 x 240mm	150mm	EI 60

A.1.4 Stainless steel pipes through GRAPHIT FOAM

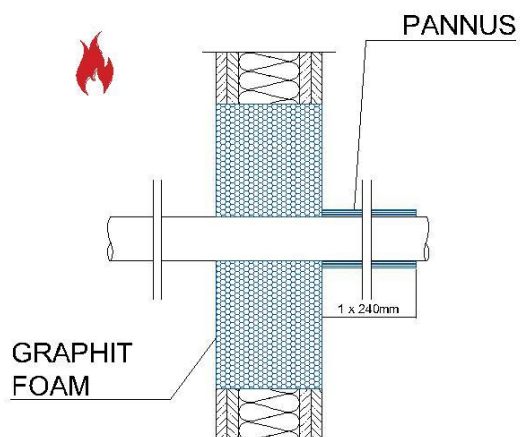
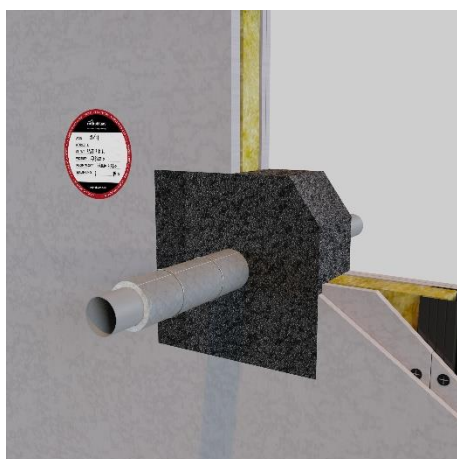
A.1.4.1 Flexible wall

A.1.4.1.1 80 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 60 C/C

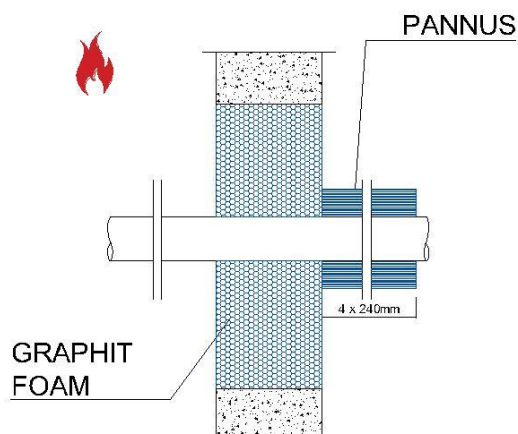
A.1.4.1.2 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 120 C/C

A.1.4.2 Rigid wall

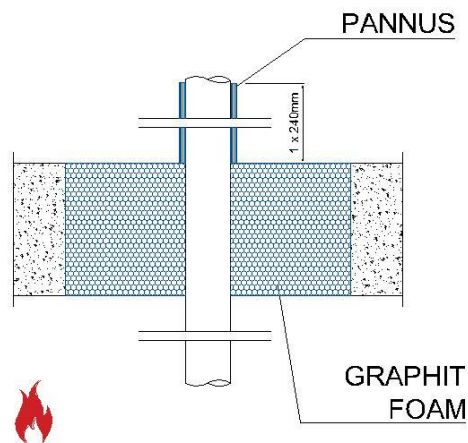
A.1.4.2.1 150 mm thick rigid wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	4 x 240mm	EI 180 C/C

A.1.4.3 Rigid floor

A.1.4.3.1 150 mm thick rigid floor

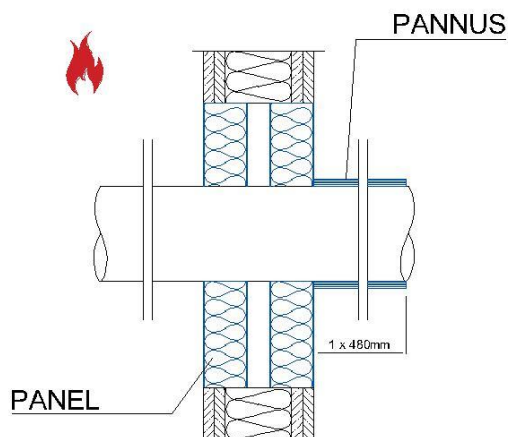
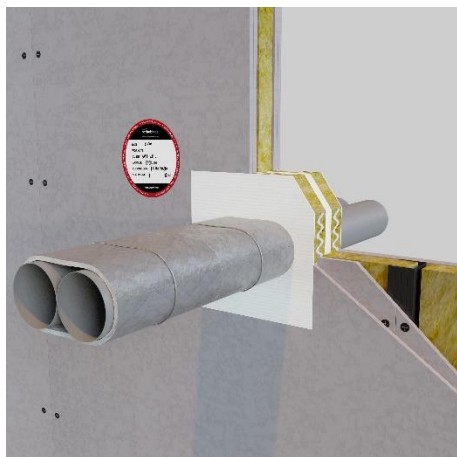


Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 180 U/C

A.1.5 Stainless steel pipes in series through PANEL

A.1.5.1 Flexible wall

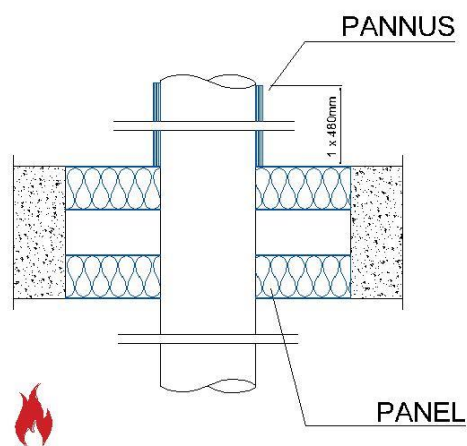
A.1.5.1.1 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Max n° pipes	Windings	N° PANEL	Classification
≤ 100	4,0	2	1 x 480mm	2	EI 120 C/C

A.1.5.2 Rigid floor

A.1.5.2.1 150 mm thick rigid floor

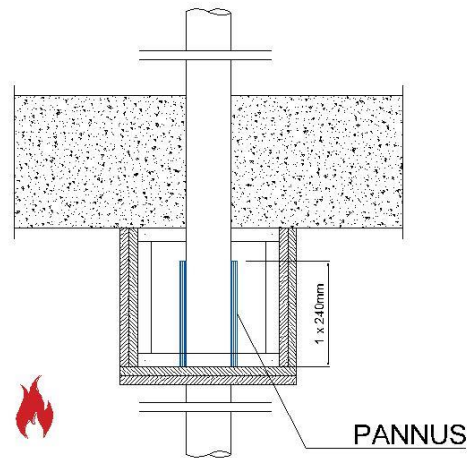


Pipe diameter (mm)	Pipe wall thickness (mm)	Max n° pipes	Windings	N° PANEL	Classification
≤ 108	4,0	2	1 x 480mm	2	EI 180 C/C

A.1.6 Stainless steel pipes with an intermediate box

A.1.6.1 Rigid floor

A.1.6.1.1 200 mm thick rigid floor



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0	1 x 240mm	EI 120 C/U

Installation notes:

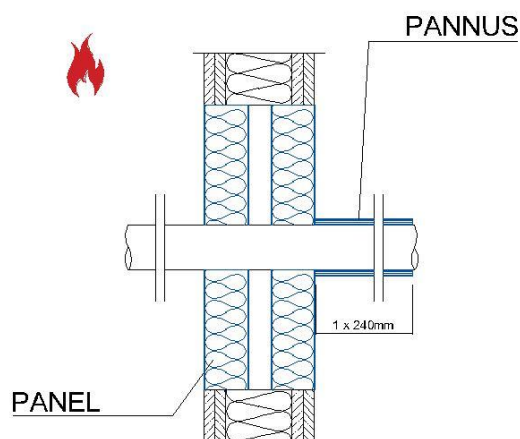
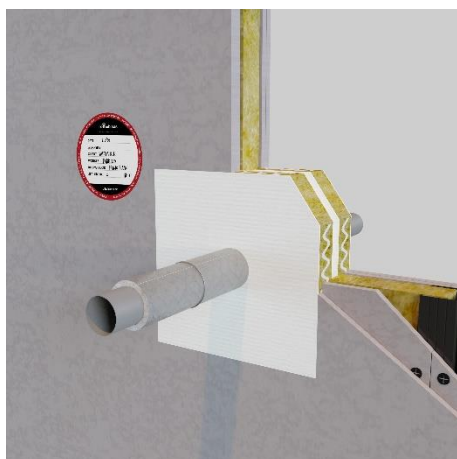
The box shall be installed according to the manufacturer's instructions. The box is made of a double layer of 25 mm thick 'Type F' gypsum plasterboards coated with fiberglass, according to EN 15283-1, which are fixed with steel screws of Ø3,5 mm x 55 mm to an internal steel structure made of L-profiles of 50 mm x 50 mm x 0,6 mm, fixed to the floor with steel anchors of Ø8 x 60 mm. The gypsum plasterboards fixed to each other with steel screws of Ø3,5 mm x 55 mm. The external dimensions of the box are 900 mm x 500 mm x 300 mm (height) The installation of the box shall not cause any adverse effect on the resistance to fire of the floor. PANNUS is installed inside the box following the standard procedure described in section 2.

A.2 Aluminium pipes

A.2.1 Aluminium pipes through the PANEL

A.2.1.1 Flexible wall

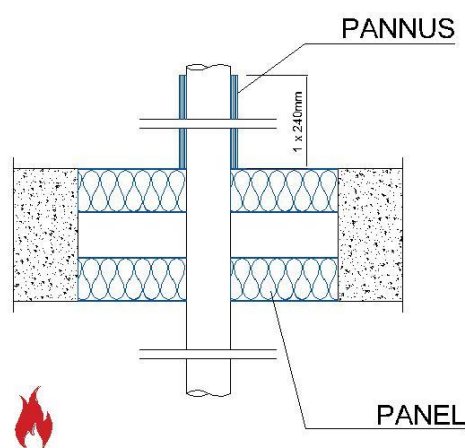
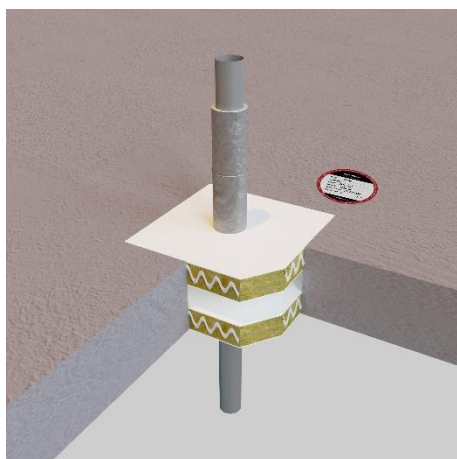
A.2.1.1.1 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 60	3,0	1 x 240mm	2	EI 120 C/C

A.2.1.2 Rigid floor

A.2.1.2.1 150 mm thick rigid floor



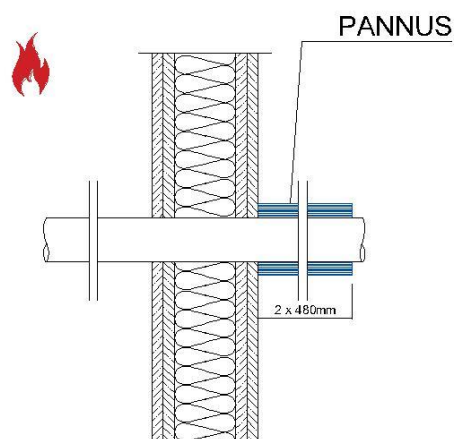
Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 60	3,0	1 x 240mm	2	EI 180 C/C

A.3 Copper pipes

A.3.1 Copper pipes through the constructive element

A.3.1.1 Flexible wall

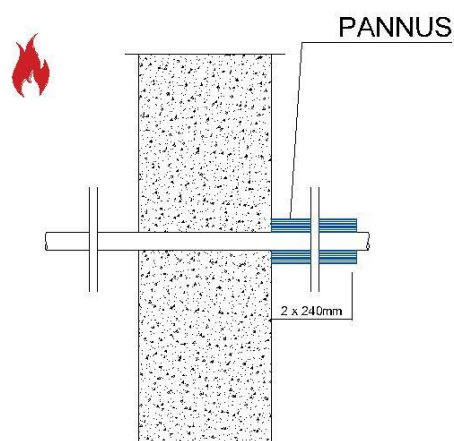
A.3.1.1.1 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 50	1,0-4,0	2 x 480mm	EI 120 U/C

A.3.1.2 Rigid wall

A.3.1.2.1 150 mm thick rigid wall

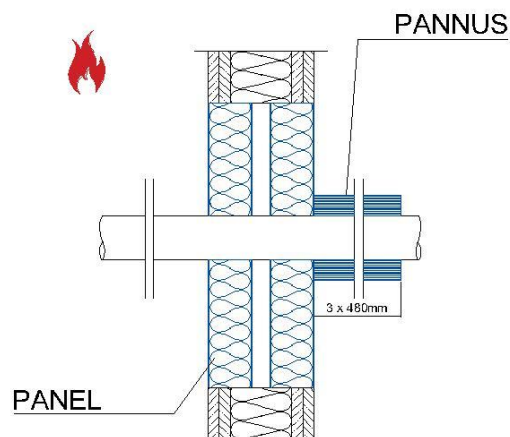


Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	Classification
≤ 20	1,0	2 x 240mm	EI 180 C/C

A.3.2 Copper pipes through the PANEL

A.3.2.1 Flexible wall

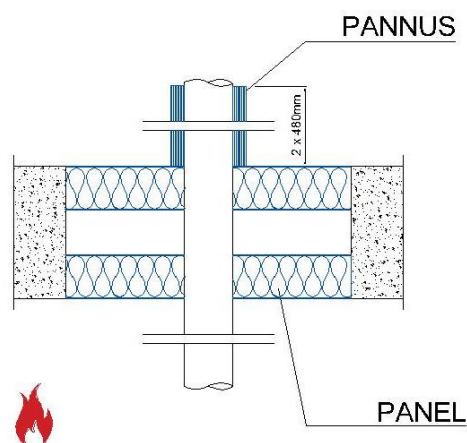
A.3.2.1.1 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 6	1,0	3 x 480mm	2	EI 120 C/C
≤ 50	4,0	3 x 480mm	2	EI 120 C/C

A.3.2.2 Rigid floor

A.3.2.2.1 150 mm thick rigid floor

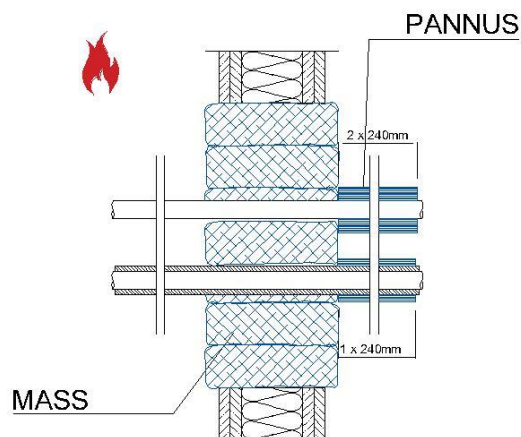
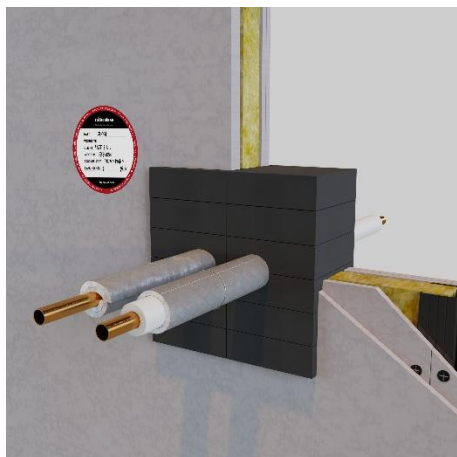


Pipe diameter (mm)	Pipe wall thickness (mm)	Windings	N° PANEL	Classification
≤ 54	1,5	2 x 480mm	2	EI 180 U/C

A.3.3 Copper pipes through the MASS

A.3.3.1 Flexible wall

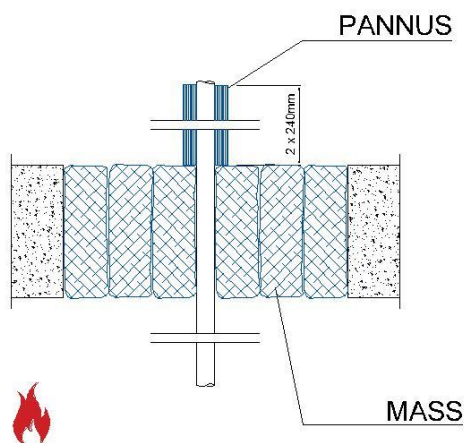
A.3.3.1.1 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Insulation thickness	Windings	Depth MASS	Classification
≤ 20	2,0	-	2 x 240mm	150	EI 120 C/C
		6,0	1 x 240mm	150	EI 120 C/C

A.3.3.2 Rigid floor

A.3.3.2.1 150 mm thick rigid floor

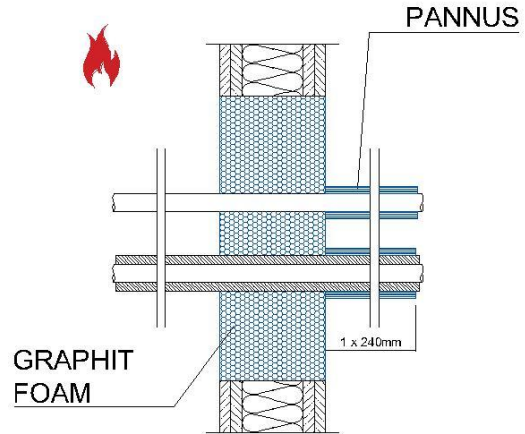
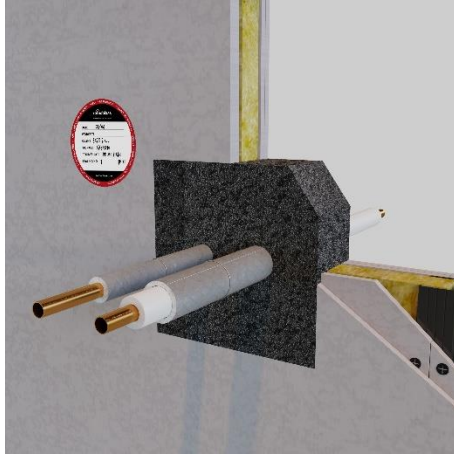


Pipe diameter (mm)	Pipewall thickness (mm)	Windings	Depth MASS	Classification
≤ 20	2,0	2 x 240mm	150	EI 180 C/C

A.3.4 Copper pipes through GRAPHIT FOAM

A.3.4.1 Flexible wall

A.3.4.1.1 120 mm thick flexible wall



Pipe diameter (mm)	Pipe wall thickness (mm)	Insulation thickness	Windings	Classification
≤ 20	1,0	-	1 x 240mm	EI 120 U/C
		10	1 x 240mm	EI 120 U/C

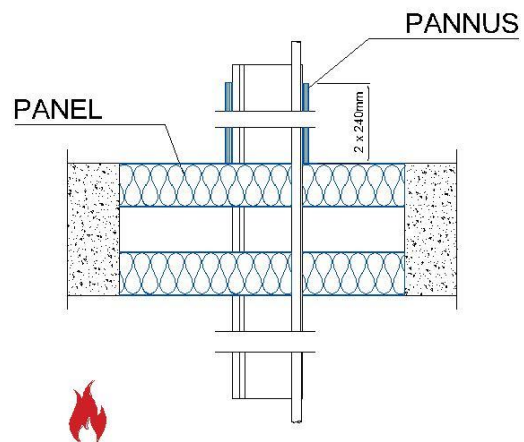
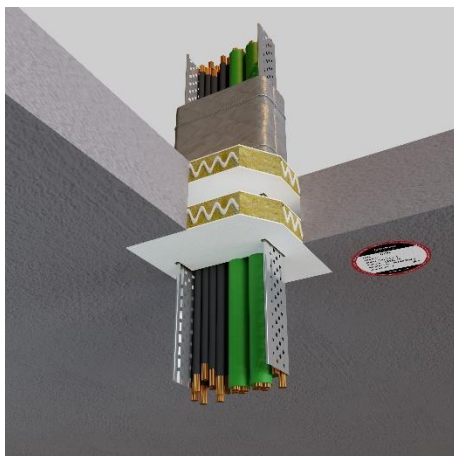
Note: tested in series configuration with 6 pipes (2 of them with insulation) protected all together with PANNUS

A.4 Cable trays

A.4.1 Cable trays through PANEL

A.4.1.1 Rigid floor

A.4.1.1.1 150 mm thick rigid floor

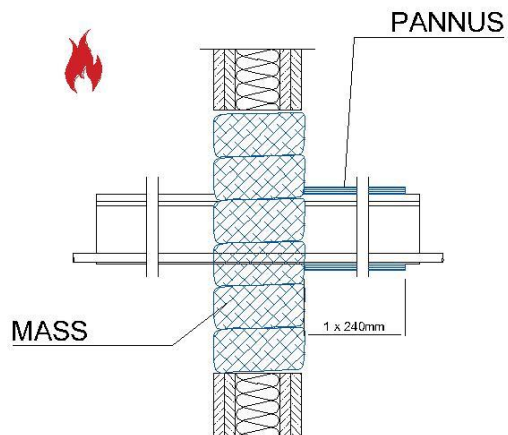
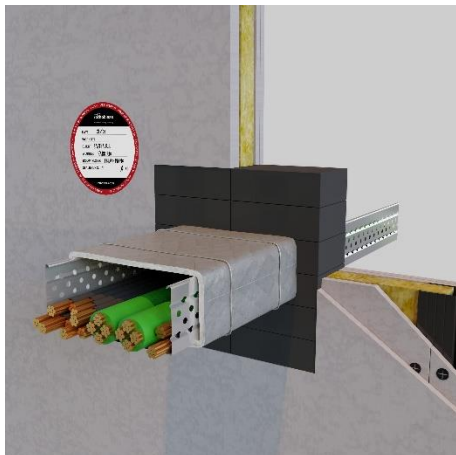


Cable type (mm)	Windings	N° PANEL	Classification
Medium	2 x 240mm	2	EI 120

A.4.2 Cable trays through MASS

A.4.2.1 Flexible wall

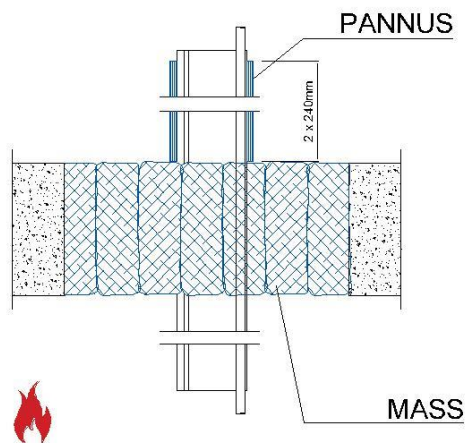
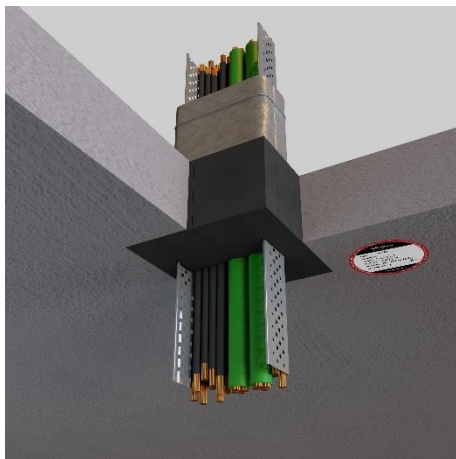
A.4.2.1.1 100 mm thick flexible wall



Cable type (mm)	Windings	Depth MASS	Classification
Medium	1 x 240mm	100	EI 120

A.4.2.2 Rigid floor

A.4.2.2.1 150 mm thick rigid floor

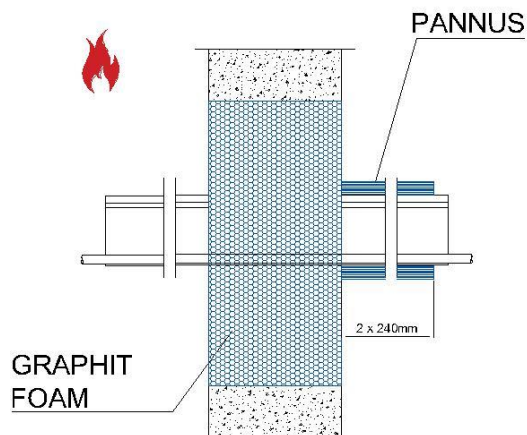
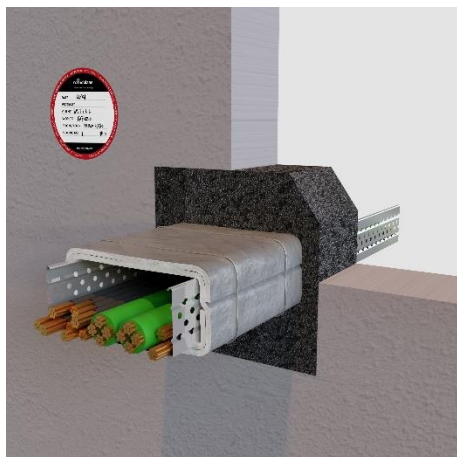


Cable type (mm)	Windings	Depth MASS	Classification
Medium	2 x 240mm	150	EI 60

A.4.3 Cable trays through GRAPHIT FOAM

A.4.3.1 Rigid wall

A.4.3.1.1 150 mm thick rigid wall

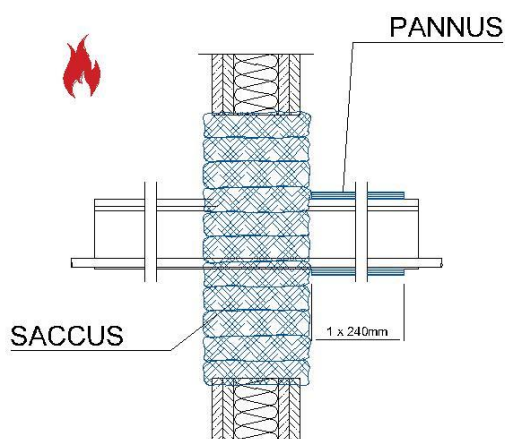
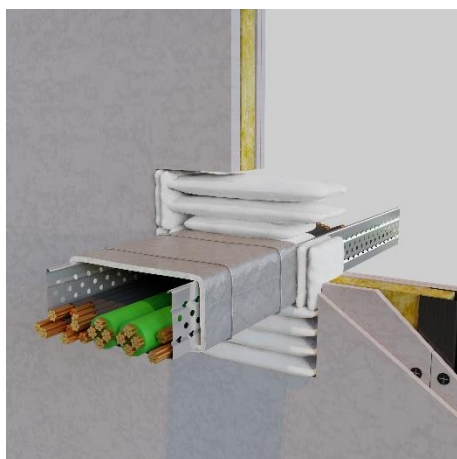


Cable type (mm)	Windings	Classification
Medium	2 x 240mm	EI 180

A.4.4 Cable trays through SACCUS

A.4.4.1 Flexible wall

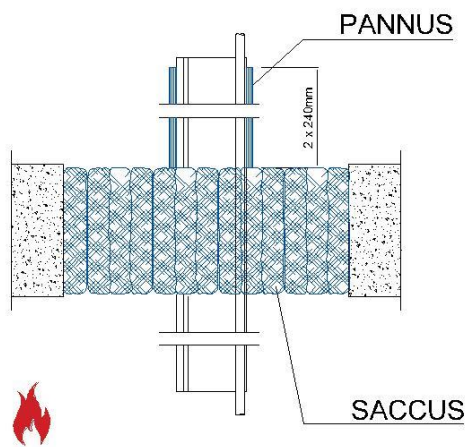
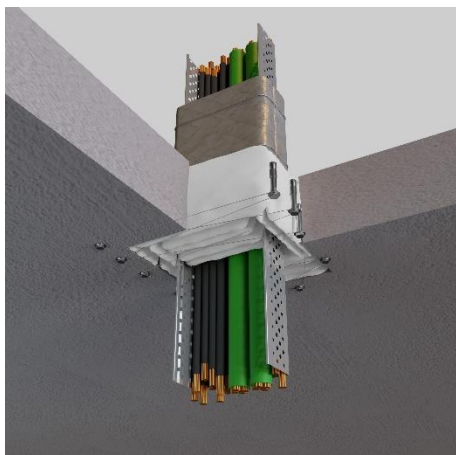
A.4.4.1.1 100 mm thick flexible wall



Cable type (mm)	Windings	Depth SACCUS	Classification
Medium	1 x 240mm	120	EI 120

A.4.4.2 Rigid floor

A.4.4.2.1 150 mm thick rigid floor



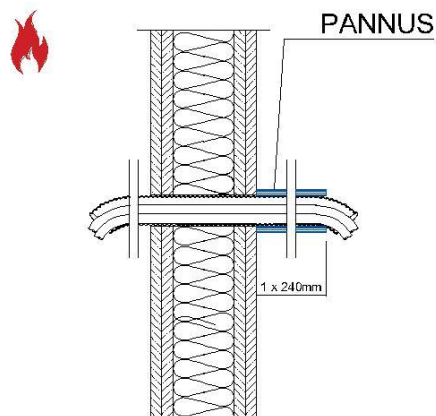
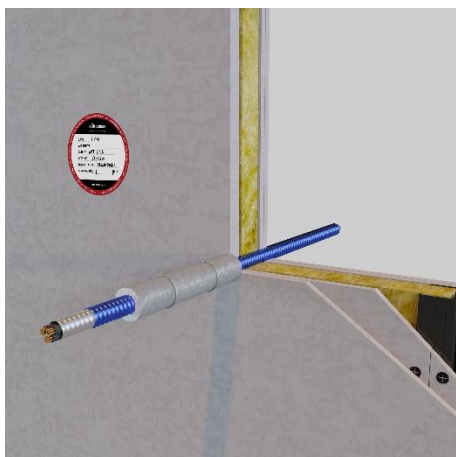
Cable type (mm)	Windings	Depth SACCUS	Classification
Medium	2 x 240mm	150	EI 90

A.5 Cables in flexible metal conduits

A.5.1 Cables in flexible metal conduits through the constructive element

A.5.1.1 Flexible wall

A.5.1.1.1 120 mm thick flexible wall



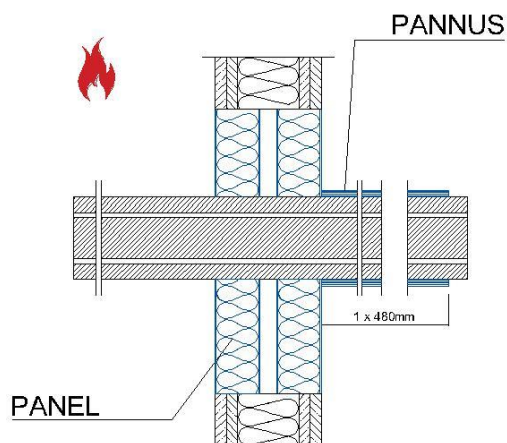
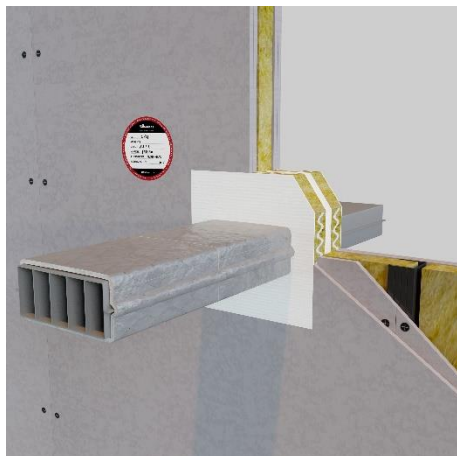
Conduit dimensions (mm)	Conduit wall thickness (mm)	Cable type (mm)	Windings	Classification
≤ 24,7	2,1	Small	1 x 240mm	EI 120

A.6 Busbar

A.6.1 Busbar through PANEL

A.6.1.1 Flexible wall

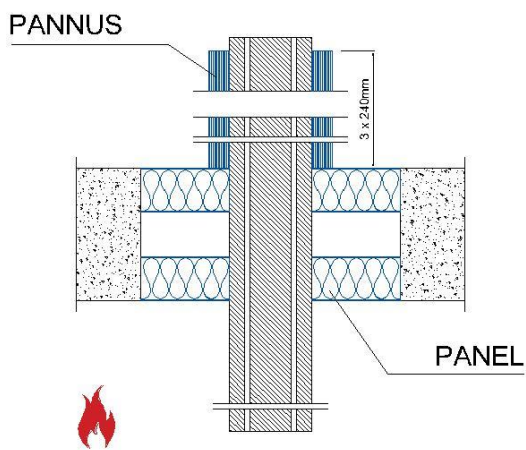
A.6.1.1.1 120 mm thick flexible wall



Busbar dimensions (mm)	Windings	N° PANEL	Classification
≤ 200x80	1 x 480mm	2	EI 120

A.6.1.2 Rigid floor

A.6.1.2.1 150 mm thick rigid floor



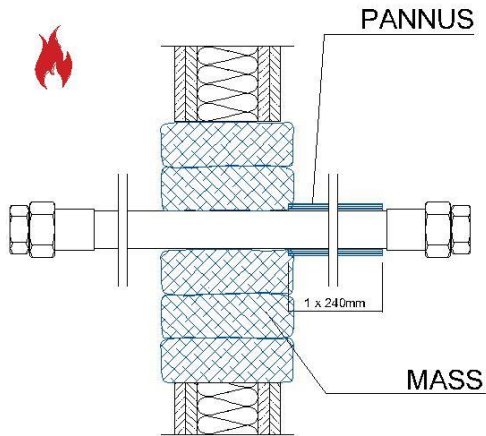
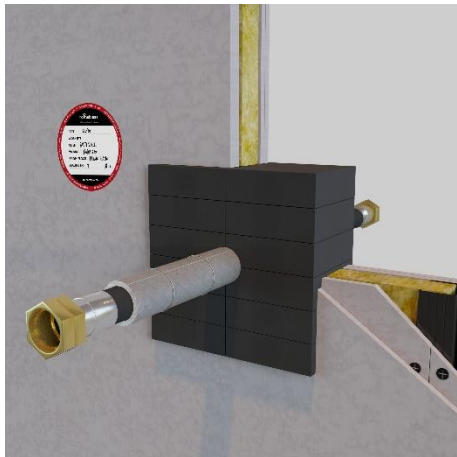
Busbar dimensions (mm)	Windings	N° PANEL	Classification
≤ 200x80	3 x 240mm	2	EI 180

A.7 Hydraulic hose

A.7.1 Hydraulic hose through MASS

A.7.1.1 Flexible wall

A.7.1.1.1 120 mm thick flexible wall



Hose dimensions (mm)	Hose wall thickness (mm)	Windings	Depth MASS	Classification
≤ 43,5	5,85	1 x 240mm	150	EI 120 C/C