INSTYTUT TECHNIKI BUDOWLANEJ

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European Technical Assessment

ETA-24/1047 of 19/12/2024

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	INTU FR UNICOAT P INTU FR UNIBOARD
Product family to which the construction product belongs	Fire Stopping and Fire Sealing Products. Penetration Seals
Manufacturer	INTUSEAL Sp. z o.o. ul. Kineskopowa 1 PL 05-500 Piaseczno, Poland
Manufacturing plant	Plant MPA1
This European Technical Assessment contains	65 pages including 3 Annexes 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	European Assessment Document (EAD) 350454-00-1104 “Fire Stopping and Fire Sealing Products. Penetration Seals”

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Specific Part

1 Technical description of the product

INTU FR UNICOAT P is an ablative paint used to form penetration seals where metal and combustible pipes and cables, single or in bundles, cable ladders and cable trays, penetrate walls and floors.

INTU FR UNIBOARD are mineral wool boards with nominal density of 140,0 kg/m^3, pre-painted with paint INTU FR UNICOAT P – dry film thickness 0,5 mm:
- on one side – in case of INTU FR UNIBOARD 1S,
- on both sides – in case of INTU FR UNIBOARD 2S.

Auxiliary products used with INTU FR UNICOAT P and INTU FR UNIBOARD are:
- flexible elastomeric foam (FEF) Kaiflex ST insulation, produced by Kaimann company, according to EN 14304, with reaction to fire class B_L-s2, d0 according to EN 13501-1,
- polyethylene foam (PE) insulation Tubolit DG Plus insulation, produced by Armacell company, according to EN 14313, with reaction to fire class B_L-s1, d0 according to EN 13501-1,
- mineral wool Paroc Hvac Lamella Mat AluCoat mat produced by Paroc company, according to EN 14303, with nominal density of 35 kg/m^3 and reaction to fire class A1 according to EN 13501-1,
- rock mineral wool with density of min. 35 kg/m^3 and reaction to fire class A1 according to EN 13501-1,
- INTU FR MASTIC according to ETA-19/0038,
- INTU FR GRAPHITE according to ETA-24/0152,
- INTU FR COLLAR L SLIM according to ETA-24/0497.

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

2.1 Intended use

The intended use of INTU FR UNICOAT P and INTU FR UNIBOARD is to reinstate the fire resistance performance of flexible wall, rigid wall or rigid floor constructions, where they are penetrated by metal pipes or combustible pipes, cables, cable ladders, cable trays and conduits.

The specific elements of construction that INTU FR UNICOAT P and INTU FR UNIBOARD may be used to provide a penetration seal in, are as follows:

Rigid walls: The wall must have a minimum thickness in accordance with Annex B, and comprise concrete or masonry separating elements, with a minimum density of 600 kg/m^3 in case of penetration seals given in Tables B1 to B4, B7, B9 to B11, B14, B16 and B23 to B24 in Annex B or 450 kg/m^3 in case of penetration seals given in Tables B17, B19 and B21 in Annex B.

Flexible walls: The wall must have a minimum thickness in accordance with Annex B, and comprise timber or steel studs lined on both faces with minimum two layers (with overall board layer thickness on one side equal to or greater than 25 mm) of type F or type DF gypsum plasterboards according to EN 520. 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.

Rigid floors: The floor must have a minimum thickness in accordance with Annex B, and comprise aerated concrete, concrete or reinforced concrete, with a minimum density of 550 kg/m^3.

The supporting construction shall be classified in accordance with EN 13501-2 for the required fire resistance period (equal to or greater than specified in Annex B).

INTU FR UNICOAT P and INTU FR UNIBOARD may be used to provide a penetration seal with specific combustible and metal pipes and cables (according to Annex A and Annex B).

Details of penetration seals are provided in Annex B and Annex C. Distances between the services in the multiple penetration seals are given in Annex A. Additional provisions are provided in Annex A.

The provisions made in this European Technical Assessment are based on an assumed working life of the product of 25 years, when installed in the works, provided that the penetration seal is subject to appropriate installation, in accordance with the manufacturer's recommendations. The indications given on the 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 choosing the right products in relation to the expected economically reasonable working life of the works.

2.2 Use category

Type Z_2: intended for use in internal conditions with humidity lower than 85% RH, excluding temperatures below 0°C, without exposure to rain or UV.

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

3.1 Performance of the product

3.1.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	No performance assessed
Resistance to fire	Annex C

3.1.2 Hygiene, health and the environment (BWR 3)

No performance assessed.

3.1.3 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Mechanical resistance and stability	No performance assessed
Resistance to impact / movement	No performance assessed
Adhesion	No performance assessed
Durability	Use category: Type Z_2

3.1.4 Protection against noise (BWR 5)

No performance assessed.

3.1.5 Energy economy and heat retention (BWR 6)

No performance assessed.

3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 350454-00-1104.

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

According to the Decision 1999/454/EC of the European Commission, as amended by Decision 2001/596/EC of the European Commission, the system 1 of assessment and verification of constancy of performance applies (see Annex V to regulation (EU) No 305/2011).

5 Technical details necessary for the implementation of the AVCP system, as provided in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 19/12/2024 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB

Additional provisions

- INTU FR UNICOAT P ablative paint shall be painted on both sides of the wall or floor (for details see Annex C).
- Double INTU FR UNIBOARD 1S board and single INTU FR UNIBOARD 2S board in flexible or rigid wall and rigid floor supporting constructions are used for:
  - large penetration seals of cables,
  - multiple penetration seals of pipes.
- The penetration seals are made with use of double INTU FR UNIBOARD 1S board, thickness of 2 x 50 mm, placed flush with one or both of the supporting construction surfaces or inside the partition.
- The penetration seals are made with use of single INTU FR UNIBOARD 2S board, thickness of 1 x 50 mm, placed flush with one of the supporting construction surfaces or inside the partition.
- The following services can be used in large penetration seal of cables with double INTU FR UNIBOARD 1S board or single INTU FR UNIBOARD 2S board in flexible or rigid wall and rigid floor:
  - small cables ($ø_{cable} \leq 21$ mm),
  - medium cables ($21 \text{ mm} < ø_{cable} \leq 50$ mm),
  - large cables ($50 \text{ mm} < ø_{cable} \leq 80$ mm),
  - cable bundle ($ø_{bundle} \leq 100$ mm, $ø_{cable} \leq 21$ mm),
  - non-sheathed cables ($ø_{cable} \leq 24$ mm),
  - rigid plastic conduits ($ø_{conduit} \leq 16$ mm) – only in flexible or rigid wall.
- The following services can be used in multiple penetration seals:
  - pipes:
    - plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided),
    - plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided),
    - plastic pipe without insulation sealed with use of INTU FR GRAPHITE mass,
    - metal pipe without insulation sealed with INTU FR UNICOAT P paint,
    - metal pipe with mineral wool insulation (case LI and LS),
  - pipes with single INTU FR UNIBOARD 2S board in flexible or rigid wall:
    - plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided),
    - metal pipe with mineral wool insulation,
  - pipes with double INTU FR UNIBOARD 1S board in rigid floor:
    - plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (one-sided),
    - plastic pipe without insulation sealed with use of INTU FR GRAPHITE mass,
    - metal pipe without insulation sealed with INTU FR UNICOAT P paint,
    - metal pipe with mineral wool insulation (case LS),
  - pipes with single INTU FR UNIBOARD 2S board in rigid floor:
    - plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (one-sided),
    - metal pipe with mineral wool insulation.
- The maximum dimensions (width x height) of penetration seals are:
  - in flexible or rigid wall made with use of double INTU FR UNIBOARD 1S board:
    - 1000 x 600 mm – in case of large penetration seal of cables,
    - 1000 x 600 mm – in case of horizontal orientation of multiple penetration seals of pipes,
    - 400 x 1000 mm – in case of vertical orientation of multiple penetration seals of pipes,
  - in flexible or rigid wall made with use of single INTU FR UNIBOARD 2S board:
    - 600 x 600 mm – in case of large penetration seal of cables,
    - 1000 x 600 mm – in case of multiple penetration seals of pipes,
  - in rigid floor made with use of double INTU FR UNIBOARD 1S board:
    - 1000 x 625 mm – in case of large penetration seal of cables,
    - 1200 x 625 mm – in case of horizontal orientation of multiple penetration seals of pipes,
  - in rigid floor made with use of single INTU FR UNIBOARD 2S board:
    - 625 x 1000 mm – in case of large penetration seal of cables,
    - 600 x 1200 mm – in case of multiple penetration seals of pipes.

- The services in the multiple penetration seals of pipes with double INTU FR UNIBOARD 1S board or single INTU FR UNIBOARD 2S board are placed in the following distances (according to figure A1 and Tables A1 to A4):
  - in rigid or flexible wall:
    - a_1 – distance between the pipe and the seal top edge (min. a_1 = 20 mm),
    - a_2 – distance between the pipe and the seal bottom edge (min. a_2 = 70 mm),
    - a_3 – distance between the pipe and the seal side edge (min. a_3 = 20 mm),
    - a_4 – distance between the adjacent penetration seals (min. a_4 = 10 mm),
  - in rigid floor:
    - a_1 – distance between the pipe and the short seal edge (min. a_1 = 50 mm),
    - a_3 – distance between the pipe and the long seal edge (min. a_3 = 30 mm),
    - a_4 – distance between the adjacent services (a_4 = 100 mm).

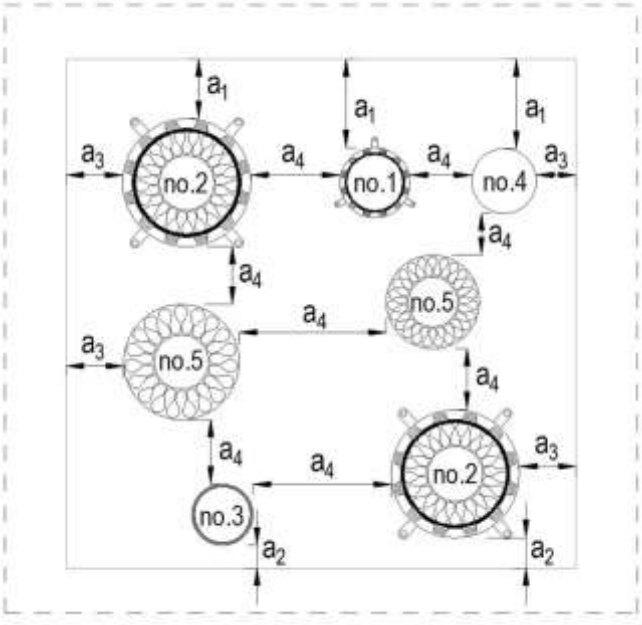


Fig. A1. Example of multiple penetration seal

Type of services:
no. 1 – plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars
no. 2 – plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars
no. 3 – plastic pipe without insulation sealed with use of INTU FR GRAPHITE mass
no. 4 – metal pipe without insulation sealed with INTU FR UNICOAT P paint
no. 5 – metal pipe with mineral wool insulation

Table A1. Minimum distances between the services in the multiple penetration seals of pipes made with use of single INTU FR UNIBOARD 2S board in flexible or rigid wall

Penetrating element	Top seal edge a_1	Bottom seal edge a_2	Side seal edge a_3	Type of adjacent service	a_4
Plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	20 mm	70 mm	20 mm	Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Metal pipe with mineral wool insulation	100 mm
Metal pipe with mineral wool insulation	20 mm	0 mm	0 mm	Metal pipe with mineral wool insulation	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm

Table A2. Minimum distances between the services in the multiple penetration seals of pipes made with use of single INTU FR UNIBOARD 2S board in rigid floor

Penetrating element	Short seal edge a_1	Long seal edge a_3	Type of adjacent service	a_4
Plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (one-sided)	50 mm	50 mm	Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (one-sided)	100 mm
			Metal pipe with mineral wool insulation	100 mm
Metal pipe with mineral wool insulation	50 mm	30 mm	Metal pipe with mineral wool insulation	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (one-sided)	100 mm

Table A3. Minimum distances between the services in the multiple penetration seals of pipes made with use of double INTU FR UNIBOARD 1S board in flexible or rigid wall

Penetrating element	Top seal edge a_1	Bottom seal edge a_2	Side seal edge a_3	Type of adjacent service	a_4
Plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	20 mm	70 mm	50 mm	Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
				Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm
				Metal pipe with mineral wool insulation	100 mm
Plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	30 mm	0 mm	30 mm	Plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
				Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm
				Metal pipe with mineral wool insulation	100 mm
Plastic pipe without insulation sealed with use of INTU FR GRAPHITE mass	100 mm	10 mm	10 mm	Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	10 mm
				Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm
				Metal pipe with mineral wool insulation	100 mm
Metal pipe without insulation sealed with INTU FR UNICOAT P paint	100 mm	100 mm	10 mm	Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	50 mm
				Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
				Metal pipe with mineral wool insulation	100 mm
Metal pipe with mineral wool insulation	100 mm	100 mm	0 mm	Metal pipe with mineral wool insulation	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe with PE insulation sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
				Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
				Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm

Table A4. Minimum distances between the services in the multiple penetration seals of pipes made with use of double INTU FR UNIBOARD 1S board in rigid floor

Penetrating element	Short seal edge a_1	Long seal edge a_3	Type of adjacent service	a_4
Plastic pipe without insulation sealed with use of INTU FR COLLAR L SLIM collars (one-sided)	60 mm	50 mm	Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
			Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm
			Metal pipe with mineral wool insulation	100 mm
Plastic pipe without insulation sealed with use of INTU FR GRAPHITE mass	100 mm	60 mm	Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
			Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm
			Metal pipe with mineral wool insulation	100 mm
Metal pipe without insulation sealed with INTU FR UNICOAT P paint	100 mm	80 mm	Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
			Metal pipe with mineral wool insulation	100 mm
Metal pipe with mineral wool insulation	50 mm	30 mm	Metal pipe with mineral wool insulation	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR COLLAR L SLIM collars (double-sided)	100 mm
			Plastic pipe (without insulation) sealed with use of INTU FR GRAPHITE mass	100 mm
			Metal pipe (without insulation) sealed with INTU FR UNICOAT P paint	100 mm

- The services in the large penetration seal of cables with double INTU FR UNIBOARD 1S board or single INTU FR UNIBOARD 2S board in flexible or rigid wall and rigid floor are placed in the following distances (according to figure A2):
  - a_1 – min. distance between the cable tray / ladder and long seal edge (top or bottom seal edge in case of walls): $a_1 = 0$ mm,
  - a_2 – min. distance between the cable trays / ladders: $a_2 = 0$ mm,
  - a_3 – min. distance between the cable tray / ladder and short seal edge (side seal edge in case of walls): $a_3 = 0$ mm,
  - a_4 – min. distance between the cable and top / short seal edge (top or bottom seal edge in case of walls): $a_4 = 0$ mm,
  - a_5 – min. distance between the cable (with or without cable carrier) and bottom edge of cable trays / ladders or between the cable without cable carrier and cable trays / ladders: $a_5 = 60$ mm.

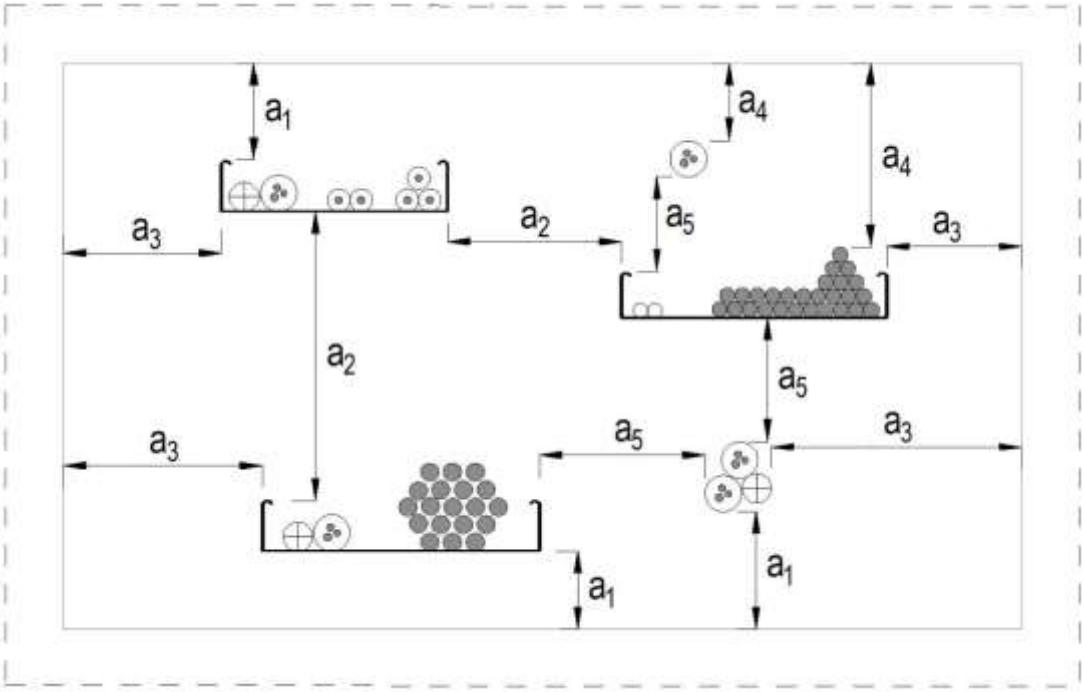


Fig. A2. Example of large cable penetration seal

Table A5. Minimum distances between the services in cable penetration seals in wall or floor

Type of seal	Supporting construction	Distances				
		a_1	a_2	a_3	a_4	a_5
INTU FR UNIBOARD 2S	Wall	0 mm	0 mm	0 mm	0 mm	60 mm
	Floor	0 mm	0 mm	0 mm	0 mm	60 mm
INTU FR UNIBOARD 1S	Wall	0 mm	0 mm	0 mm	0 mm	60 mm
	Floor	0 mm	0 mm	0 mm	0 mm	60 mm

- The minimum distances between the adjacent penetration seals made with use of INTU FR UNICOAT P, double INTU FR UNIBOARD 1S board or single INTU FR UNIBOARD 2S board in flexible or rigid wall and rigid floor is 100 mm.
- Services are placed in angle 90° to the supporting construction.
- Pipes shall be supported at maximum 400 mm away from both sides of the wall constructions and from the upper face of floor constructions.
- Cables shall be supported at maximum 400 mm away from the surface of separating element for first attachment, excluding cases where the cable support does not pass through the penetration seal, where the first support should be at a distance of maximum 150 mm.

- Classifications given in Annex B are valid for plastic pipes:
  - PE-HD according to EN 1519-1 or EN 12666-1,
  - PE according to EN 12201-2, EN 1519-1, EN 12666-1 or EN ISO 15494,
  - PE-X according to EN ISO 15875-2,
  - ABS according to EN 1455-1 or EN ISO 15493,
  - SAN + PVC according to ISO 19220,
  - PP according to EN 1451-1, DIN 8077, DIN 8078, DIN 16962, EN 15874-2 or EN ISO 15494,
  - PVC-U according to EN 1329-1, EN 1453-1, EN ISO 1452-2 or EN ISO 15493,
  - PVC-C according to EN 1566-1, EN ISO 15493 or EN ISO 15877-2,
  - PP-R according to EN ISO 15874-2, DIN 8077 or DIN 8078,

  according to tables in Annex B.

- Classifications given in Annex B for copper and steel pipes are also valid for other metal pipe materials with:
  - thermal conductivity lower than respectively copper and galvanized steel, and
  - melting point at least equal to respectively copper and galvanized steel, and greater than:
    - 739°C for the fire resistance class EI 15 and E 15,
    - 781°C for the fire resistance class EI 20 and E 20,
    - 842°C for the fire resistance class EI 30 and E 30,
    - 902°C for the fire resistance class EI 45 and E 45,
    - 945°C for the fire resistance class EI 60 and E 60,
    - 1006°C for the fire resistance class EI 90 and E 90,
    - 1049°C for the fire resistance class EI 120 and E 120,
    - 1110°C for the fire resistance class EI 180 and E 180,
    - 1153°C for the fire resistance class EI 240 and E 240.

- Classifications given in Annex B for cables are valid for:
  - small cables that are currently and commonly used in building practice in Europe, with maximum diameter of 21 mm, including optical fibre cables, except tied bundles, waveguides and non-sheathed cables (wires),
  - medium cables that are currently and commonly used in building practice in Europe, with diameter greater than 21 mm and maximum diameter of 50 mm, including optical fibre cables and coaxial cables with maximum diameter of 28 mm, except tied bundles, waveguides and non-sheathed cables (wires),
  - large cables that are currently and commonly used in building practice in Europe, with diameter greater than 50 mm and maximum diameter of 80 mm, including optical fibre cables, except tied bundles, waveguides and non-sheathed cables (wires),
  - tied cable bundles with diameter of less than or equal to $ø_{bundle}$ given in the appropriate point, made of cables commonly used in building practice in Europe to a maximum diameter of 21 mm, including optical fibre cables, except waveguides and non-sheathed cables (wires),

  according to tables in Annex B.

- Classifications given in Annex B for cables sealed with INTU FR UNIBOARD 1S board or INTU FR UNIBOARD 2S board are valid for cables which can be placed on cable trays, ladders or brackets made of galvanized steel or other metal with melting point greater than:
  - 739°C for the fire resistance class 15 min,
  - 781°C for the fire resistance class 20 min,
  - 842°C for the fire resistance class 30 min,
  - 902°C for the fire resistance class 45 min,
  - 945°C for the fire resistance class 60 min,
  - 1006°C for the fire resistance class 90 min,
  - 1049°C for the fire resistance class 120 min.

  Where appropriate the cable carries should be discontinued on both sides of the penetration seal – not passing through the seal, according to Annex B and Annex C.

- Classifications given in Annex B for insulated pipes are valid for pipes with sustained and continued insulation made of Kaiflex ST flexible elastomeric foam (FEF) or Tubolit DG Plus (PE) insulation (for details see clause 1 of ETA) and does not cover locally insulated or non-insulated pipes. The thickness of insulation shall remain in accordance with ETA provisions.

- Classifications given in Annex B for metal pipes with Paroc Hvac Lamella Mat AluCoat mat local sustained mineral wool insulation concerns locally insulated pipes in case LS (local sustained) and does not cover locally insulated pipes in case LI (local interrupted) or non-insulated pipes. The length of insulation can be increased but may not be reduced. The thickness of insulation shall remain in accordance with ETA provisions.

- Classifications given in Annex B for metal pipes with Paroc Hvac Lamella Mat AluCoat mat local interrupted mineral wool insulation concerns locally insulated pipes in case LI (local interrupted) and does not cover locally insulated pipes in case LS (local sustained) or non-insulated pipes. The length of insulation can be increased but may not be reduced. The thickness of insulation shall remain in accordance with ETA provisions.

Table B1. Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR COLLAR L SLIM and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C1 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Number of collars x intumescent material width x thickness [mm]	Fire resistance class
PE-HD / PE / PE-X / ABS / SAN + PVC	D ≤ 75	3,0 – 6,8	2 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**
	75 < D ≤ 90	3,5 – 8,2	2 x 30,0 x 8,0	
	90 < D ≤ 110	4,2 – 10,0	2 x 30,0 x 10,0	
PP	D ≤ 75	1,9 – 12,5	2 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**
	75 < D ≤ 90	2,2 – 15,0	2 x 30,0 x 8,0	
	90 < D ≤ 110	2,7 – 18,3	2 x 30,0 x 10,0	
PP-R	D ≤ 20	≥ 2,3	2 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**
	20 < D ≤ 25	≥ 2,7	2 x 30,0 x 4,0	
	25 < D ≤ 32	3,3 – 12,5	2 x 30,0 x 4,0	
	32 < D ≤ 40	3,9 – 12,5	2 x 30,0 x 4,0	
	40 < D ≤ 50	4,8 – 12,5	2 x 30,0 x 4,0	
	50 < D ≤ 63	5,8 – 12,5	2 x 30,0 x 4,0	
	63 < D ≤ 75	6,8 – 12,5	2 x 30,0 x 4,0	
	75 < D ≤ 90	8,2 – 15,0	2 x 30,0 x 8,0	
	90 < D ≤ 110	10,0 – 18,3	2 x 30,0 x 10,0	
PVC-U / PVC-C	D ≤ 75	1,8 – 5,6	2 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**
	75 < D ≤ 90	1,9 – 6,7	2 x 30,0 x 8,0	
	90 < D ≤ 110	2,0 – 8,1	2 x 30,0 x 10,0	

Table B2. Resistance to fire classification of plastic pipes with polyethylene foam (PE) continuous insulation (case CS), placed on the floor, penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR COLLAR L SLIM (U-shaped) and double INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C2a in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness x length [mm]	Number of collars x intumescent material width x thickness [mm]	Fire resistance class
PP-R	D ≤ 20	2,3	9	2 x 30,0 x 10,0	**EI 120-U/C** **EI 120-C/C**
		6,9	25	2 x 30,0 x 10,0	**EI 120-U/C** **EI 120-C/C**
		7,0 – 12,5	25	2 x 30,0 x 10,0	**EI 90-U/C** **EI 90-C/C**
	20 < D ≤ 50	6,9	25	2 x 30,0 x 10,0	**EI 120-U/C** **EI 120-C/C**
		7,0 – 12,5	25	2 x 30,0 x 10,0	**EI 90-U/C** **EI 90-C/C**
	50 < D ≤ 75	12,5	25	2 x 30,0 x 10,0	**EI 90-U/C** **EI 90-C/C**

Table B3. Resistance to fire classification of PP-R pipes with polyethylene foam (PE) continuous insulation (case CS), placed on the floor, with following dimensions:

- **pipe No. 1: diameter of: D ≤ 20 mm, pipe wall thickness of: t = 2,3 mm, polyethylene foam (PE) insulation thickness of: 9 mm,**
- **pipe No. 2: diameter of: D ≤ 50 mm, pipe wall thickness of: t = 6,9 mm, polyethylene foam (PE) insulation thickness of: 25 mm,**

penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR COLLAR L SLIM (U-shaped) and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C2b in Annex C:

Fire resistance class:
EI 120-U/C
EI 120-C/C

Table B4. Resistance to fire classification of PE-HD / PE / PE-X / ABS / SAN + PVC pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR COLLAR L SLIM and INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C3a, C3b and C3c in Annex C:

Pipe diameter [mm]	Pipe wall thickness [mm]	Number of collars x intumescent material width x thickness [mm]	Fire resistance class	Figure in Annex C
D ≤ 75	3,0 – 6,8	2 x 30,0 x 4,0	**EI 60 / E 90-U/C** **EI 60 / E 90-C/C**	**Fig. C3c**
75 < D ≤ 90	3,5 – 8,2	2 x 30,0 x 8,0		
90 < D ≤ 110	4,2 – 10,0	2 x 30,0 x 10,0		
D ≤ 75	3,0 – 6,8	2 x 30,0 x 4,0	**EI 60 / E 90-U/C** [1)] **EI 60 / E 90-C/C** [1)]	**Fig. C3a**
75 < D ≤ 90	3,5 – 8,2	2 x 30,0 x 8,0		
90 < D ≤ 110	4,2 – 10,0	2 x 30,0 x 10,0		
D ≤ 75	3,0	2 x 30,0 x 4,0	**EI 90 / E 120-U/C** [2)] **EI 90 / E 120-C/C** [2)]	**Fig. C3b**
	3,1 – 6,8	2 x 30,0 x 4,0	**EI 60 / E 120-U/C** [2)] **EI 60 / E 120-C/C** [2)]	
75 < D ≤ 90	3,5 – 6,0	2 x 30,0 x 8,0	**EI 90 / E 120-U/C** [2)] **EI 90 / E 120-C/C** [2)]	
	6,1 – 8,2	2 x 30,0 x 8,0	**EI 60 / E 120-U/C** [2)] **EI 60 / E 120-C/C** [2)]	
90 < D ≤ 110	4,2 – 10,0	2 x 30,0 x 10,0	**EI 90 / E 120-U/C** [2)] **EI 90 / E 120-C/C** [2)]	

[1)] valid only in case of fire acting from the INTU FR UNIBOARD 2S side

[2)] valid only in case of fire acting from the opposite side to the INTU FR UNIBOARD 2S

Table B5. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of one-sided INTU FR COLLAR L SLIM and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C4a and C4b in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Number of collars x intumescent material width x thickness [mm]	Fire resistance class	Figure in Annex C
PE-HD / PE / PE-X / ABS / SAN + PVC	D ≤ 75	3,0 – 6,8	1 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**	**Fig. C4a and C4b**
	75 < D ≤ 90	3,5 – 8,2	1 x 30,0 x 8,0		
	90 < D ≤ 110	4,2 – 10,0	1 x 30,0 x 10,0		
	110 < D ≤ 125	5,8 – 9,9	2 x 30,0 x 14,0		
	125 < D ≤ 160	9,5	2 x 30,0 x 18,0		
PP	D ≤ 75	1,9 – 12,5	1 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**	**Fig. C4a and C4b**
	75 < D ≤ 90	2,2 – 15,0	1 x 30,0 x 8,0		
	90 < D ≤ 110	2,7 – 18,3	1 x 30,0 x 10,0		
	110 < D ≤ 125	3,1 – 14,0	2 x 30,0 x 14,0		
	125 < D ≤ 160	3,9	2 x 30,0 x 18,0		
PP-R	D ≤ 20	≥ 2,3	1 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**	**Fig. C4a**
	20 < D ≤ 25	≥ 2,7	1 x 30,0 x 4,0		
	25 < D ≤ 32	3,3 – 12,5	1 x 30,0 x 4,0		
	32 < D ≤ 40	3,9 – 12,5	1 x 30,0 x 4,0		
	40 < D ≤ 50	4,8 – 12,5	1 x 30,0 x 4,0		
	50 < D ≤ 63	5,8 – 12,5	1 x 30,0 x 4,0		
	63 < D ≤ 75	6,8 – 12,5	1 x 30,0 x 4,0		
	75 < D ≤ 90	8,2 – 15,0	1 x 30,0 x 8,0		
	90 < D ≤ 110	10,0 – 18,3	1 x 30,0 x 10,0		
PVC-U / PVC-C	D ≤ 75	1,8 – 5,6	1 x 30,0 x 4,0	**EI 120-U/C EI 120-C/C**	**Fig. C4a**
	75 < D ≤ 90	1,9 – 6,7	1 x 30,0 x 8,0		
	90 < D ≤ 110	2,0 – 8,1	1 x 30,0 x 10,0		

Table B6. Resistance to fire classification of PE-HD / PE / PE-X / ABS / SAN + PVC pipes (without insulation) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of one-sided INTU FR COLLAR L SLIM and INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C5a, C5b and C5c in Annex C:

Pipe diameter [mm]	Pipe wall thickness [mm]	Number of collars x intumescent material width x thickness [mm]	Fire resistance class	Figure in Annex C
D ≤ 75	3,0 – 6,8	1 x 30,0 x 4,0	**EI 90-U/C EI 90-C/C**	**Fig. C5a, C5b and C5c**
75 < D ≤ 90	3,5 – 8,2	1 x 30,0 x 8,0		
90 < D ≤ 110	4,2 – 10,0	1 x 30,0 x 10,0		

Table B7. Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with double-sided INTU FR GRAPHITE mass and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C6 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR GRAPHITE mass width x thickness [mm]	Fire resistance class
PP	D ≤ 75	1,9 – 12,4	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		12,5 – 18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	75 < D ≤ 90	2,2 – 14,9	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		15,0 – 18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	90 < D ≤ 110	2,7 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
PP-R	D ≤ 20	≥ 2,8	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
	20 < D ≤ 25	≥ 3,2	2 x 25,0 x 10,0 ÷ 20,0	
	25 < D ≤ 32	≥ 3,8	2 x 25,0 x 10,0 ÷ 20,0	
	32 < D ≤ 40	4,4 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	40 < D ≤ 50	5,2 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	50 < D ≤ 63	6,2 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	63 < D ≤ 75	7,2 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	75 < D ≤ 90	8,4 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	90 < D ≤ 110	10,0 – 18,2	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		18,3	2 x 25,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
PVC-U / PVC-C	D ≤ 75	1,5 – 1,9	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
		2,0	2 x 25,0 x 10,0 ÷ 20,0	**EI 60 / E 90-U/C EI 60 / E 90-C/C**
		2,1 – 8,1	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
	75 < D ≤ 90	1,7 – 1,9	2 x 25,0 x 10,0 ÷ 20,0	
		2,0	2 x 25,0 x 10,0 ÷ 20,0	**EI 60 / E 90-U/C EI 60 / E 90-C/C**
		2,1 – 8,1	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**
	90 < D ≤ 110	2,0	2 x 25,0 x 10,0 ÷ 20,0	**EI 60 / E 90-U/C EI 60 / E 90-C/C**
		2,1 – 8,1	2 x 25,0 x 10,0 ÷ 20,0	**EI 45-U/C EI 45-C/C**

Table B8. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with one-sided INTU FR GRAPHITE mass and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C7 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR GRAPHITE mass depth x width [mm]	Fire resistance class
PP-R	D ≤ 20	≥ 2,3	1 x 50,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	20 < D ≤ 25	≥ 2,7	1 x 50,0 x 10,0 ÷ 20,0	
	25 < D ≤ 32	3,3 – 12,5	1 x 50,0 x 10,0 ÷ 20,0	
	32 < D ≤ 40	3,9 – 12,5	1 x 50,0 x 10,0 ÷ 20,0	
	40 < D ≤ 50	4,8 – 12,5	1 x 50,0 x 10,0 ÷ 20,0	
	50 < D ≤ 63	5,8 – 12,5	1 x 50,0 x 10,0 ÷ 20,0	
	63 < D ≤ 75	6,8 – 12,5	1 x 50,0 x 10,0 ÷ 20,0	
	75 < D ≤ 90	8,2 – 15,0	1 x 50,0 x 10,0 ÷ 20,0	
	90 < D ≤ 110	10,0 – 18,3	1 x 50,0 x 10,0 ÷ 20,0	
PVC-U / PVC-C	D ≤ 75	1,5 – 8,1	1 x 50,0 x 10,0 ÷ 20,0	**EI 90-U/C EI 90-C/C**
	75 < D ≤ 90	1,7 – 8,1	1 x 50,0 x 10,0 ÷ 20,0	
	90 < D ≤ 110	2,0 – 8,1	1 x 50,0 x 10,0 ÷ 20,0	

Table B9. Resistance to fire classification of metal pipes with mineral wool mat local sustained insulation (case LS) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C8 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g x length L_w [mm]	INTU FR UNIBOARD 1S layers x thickness [mm]	Fire resistance class
copper	D ≤ 28,0	≥ 1,0	20 x 500	2 x 50	**EI 120-C/U EI 120-C/C**
	28,0 < D ≤ 33,7	≥ 1,1	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	33,7 < D ≤ 42,4	≥ 1,2	50 x 700	2 x 50	
	42,4 < D ≤ 54,0	≥ 1,4	50 x 700	2 x 50	
	54,0 < D ≤ 66,7	≥ 1,6	50 x 700	2 x 50	
	66,7 < D ≤ 76,1	≥ 1,8	50 x 700	2 x 50	
	76,1 < D ≤ 88,9	≥ 2,0	50 x 700	2 x 50	
steel	D ≤ 67,0	1,5 – 3,9	30 x 500	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	67,0 < D ≤ 76,1	1,6 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	76,1 < D ≤ 88,9	1,8 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	88,9 < D ≤ 108,0	2,0 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	108,0 < D ≤ 114,3	2,1 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	114,3 < D ≤ 139,7	2,6 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	139,7 < D ≤ 159,0	2,9 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	159,0 < D ≤ 168,3	3,1 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	168,3 < D ≤ 177,8	3,3 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	177,8 < D ≤ 193,7	3,5 – 3,9	50 x 700	2 x 50	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	193,7 < D ≤ 219,1	≥ 4,0	50 x 700	2 x 50	

Table B10. Resistance to fire classification of steel pipes with mineral wool mat local sustained insulation (case LI) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C9 in Annex C:

Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g x length L_w [mm]	INTU FR UNIBOARD 1S layers x thickness [mm]	Fire resistance class
D ≤ 114,3	≥ 3,6	50 x 500	2 x 50	**EI 90-C/U** **EI 90-C/C**

Table B11. Resistance to fire classification of metal pipes with mineral wool mat local sustained insulation (case LS) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C10a, C10b and C10c in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g x length L_w [mm]	INTU FR UNIBOARD 2S layers x thickness [mm]	Fire resistance class	Figure in Annex C
copper	D ≤ 28,0	≥ 1,0	20 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	**Fig. C10c**
	28,0 < D ≤ 33,7	≥ 1,2	30 x 500	1 x 50		
	33,7 < D ≤ 42,4	≥ 1,6	30 x 500	1 x 50		
	42,4 < D ≤ 54,0	≥ 2,0	30 x 500	1 x 50		
copper	D ≤ 28,0	≥ 1,0	20 x 500	1 x 50	**EI 60 / E 90-C/U [1)]** **EI 60 / E 90-C/C [1)]**	**Fig. C10a**
	28,0 < D ≤ 33,7	≥ 1,2	30 x 500	1 x 50		
	33,7 < D ≤ 42,4	≥ 1,6	30 x 500	1 x 50		
	42,4 < D ≤ 54,0	≥ 2,0	30 x 500	1 x 50		
copper	D ≤ 28,0	≥ 1,0	20 x 500	1 x 50	**EI 60 / E 120-C/U [2)]** **EI 60 / E 120-C/C [2)]**	**Fig. C10b**
	28,0 < D ≤ 33,7	≥ 1,2	30 x 500	1 x 50		
	33,7 < D ≤ 42,4	≥ 1,6	30 x 500	1 x 50		
	42,4 < D ≤ 54,0	≥ 2,0	30 x 500	1 x 50		
steel	D ≤ 67,0	1,5 – 3,5	30 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	**Fig. C10c**
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U** **EI 60 / E 120-C/C**	
	67,0 < D ≤ 76,1	1,9 – 3,5	50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U** **EI 60 / E 120-C/C**	
	76,1 < D ≤ 88,9	2,5 – 3,5	50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U** **EI 60 / E 120-C/C**	
	88,9 < D ≤ 108,0	3,3 – 3,5	50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U** **EI 60 / E 120-C/C**	
	108,0 < D ≤ 114,3	≥ 3,6	50 x 500	1 x 50		
steel	D ≤ 67,0	1,5 – 3,5	30 x 500	1 x 50	**EI 60 / E 90-C/U [1)]** **EI 60 / E 90-C/C [1)]**	**Fig. C10a**
		≥ 3,6	30 x 500	1 x 50		
			50 x 500	1 x 50	**EI 60 / E 120-C/U [1)]** **EI 60 / E 120-C/C [1)]**	
	67,0 < D ≤ 76,1	1,9 – 3,5	50 x 500	1 x 50	**EI 60 / E 90-C/U [1)]** **EI 60 / E 90-C/C [1)]**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U [1)]** **EI 60 / E 120-C/C [1)]**	
	76,1 < D ≤ 88,9	2,5 – 3,5	50 x 500	1 x 50	**EI 60 / E 90-C/U [1)]** **EI 60 / E 90-C/C [1)]**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U [1)]** **EI 60 / E 120-C/C [1)]**	
	88,9 < D ≤ 108,0	3,3 – 3,5	50 x 500	1 x 50	**EI 60 / E 90-C/U [1)]** **EI 60 / E 90-C/C [1)]**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 120-C/U [1)]** **EI 60 / E 120-C/C [1)]**	
	108,0 < D ≤ 114,3	≥ 3,6	50 x 500	1 x 50		

[1)] valid only in case of fire acting from the INTU FR UNIBOARD 2S side

[2)] valid only in case of fire acting from the opposite side to the INTU FR UNIBOARD 2S

Table B11, cont. Resistance to fire classification of metal pipes with mineral wool mat local sustained insulation (case LS) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C10a and C10b in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g x length L_w [mm]	INTU FR UNIBOARD 2S layers x thickness [mm]	Fire resistance class	Figure in Annex C
steel	D ≤ 67,0	1,5 – 3,5	30 x 500	1 x 50	**EI 60 / E 120-C/U** [2)] **EI 60 / E 120-C/C** [2)]	**Fig. C10b**
		≥ 3,6	30 x 500	1 x 50		
			50 x 500	1 x 50	**EI 90 / E 120-C/U** [2)] **EI 90 / E 120-C/C** [2)]	
	67,0 < D ≤ 76,1	1,9 – 3,5	50 x 500	1 x 50	**EI 60 / E 120-C/U** [2)] **EI 60 / E 120-C/C** [2)]	
		≥ 3,6	50 x 500	1 x 50	**EI 90 / E 120-C/U** [2)] **EI 90 / E 120-C/C** [2)]	
	76,1 < D ≤ 88,9	2,5 – 3,5	50 x 500	1 x 50	**EI 60 / E 120-C/U** [2)] **EI 60 / E 120-C/C** [2)]	
		≥ 3,6	50 x 500	1 x 50	**EI 90 / E 120-C/U** [2)] **EI 90 / E 120-C/C** [2)]	
	88,9 < D ≤ 108,0	3,3 – 3,5	50 x 500	1 x 50	**EI 60 / E 120-C/U** [2)] **EI 60 / E 120-C/C** [2)]	
		≥ 3,6	50 x 500	1 x 50	**EI 90 / E 120-C/U** [2)]	
	108,0 < D ≤ 114,3	≥ 3,6	50 x 500	1 x 50	**EI 90 / E 120-C/C** [2)]	

[2)] valid only in case of fire acting from the opposite side to the INTU FR UNIBOARD 2S

Table B12. Resistance to fire classification of metal pipes with mineral wool mat local sustained insulation (case LS) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C11 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g_w x length L_w [mm]	INTU FR UNIBOARD 1S layers x thickness [mm]	Fire resistance class
copper	D ≤ 28,0	≥ 1,0	20 x 500	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
	28,0 < D ≤ 33,7	≥ 1,1	50 x 700	2 x 50	
	33,7 < D ≤ 42,4	≥ 1,2	50 x 700	2 x 50	
	42,4 < D ≤ 54,0	≥ 1,4	50 x 700	2 x 50	
	54,0 < D ≤ 66,7	≥ 1,6	50 x 700	2 x 50	
	66,7 < D ≤ 76,1	≥ 1,8	50 x 700	2 x 50	
	76,1 < D ≤ 88,9	≥ 2,0	50 x 700	2 x 50	
steel	D ≤ 67,0	≥ 1,5	30 x 500	2 x 50	**EI 120-C/U EI 120-C/C**
	67,0 < D ≤ 76,1	1,6 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	76,1 < D ≤ 88,9	1,8 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	88,9 < D ≤ 108,0	2,0 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	108,0 < D ≤ 114,3	2,1 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	114,3 < D ≤ 139,7	2,6 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	139,7 < D ≤ 159,0	2,9 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	159,0 < D ≤ 168,3	3,1 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	168,3 < D ≤ 177,8	3,3 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	177,8 < D ≤ 193,7	3,5 – 3,9	50 x 700	2 x 50	**EI 90 / E 120-C/U EI 90 / E 120-C/C**
		≥ 4,0	50 x 700	2 x 50	**EI 120-C/U EI 120-C/C**
	193,7 < D ≤ 219,1	≥ 4,0	50 x 700	2 x 50	

Table B13. Resistance to fire classification of metal pipes with mineral wool mat local sustained insulation (case LS) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C12a and C12b in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g_w x length L_w [mm]	INTU FR UNIBOARD 2S layers x thickness [mm]	Fire resistance class	Figure in Annex C
copper	D ≤ 28,0	≥ 1,0	20 x 500	1 x 50	**EI 45 / E 90-C/U** **EI 45 / E 90-C/C**	**Fig. C12c**
			30 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
	28,0 < D ≤ 33,7	≥ 1,2	30 x 500	1 x 50	**EI 45 / E 90-C/U** **EI 45 / E 90-C/C**	
	33,7 < D ≤ 42,4	≥ 1,6	30 x 500	1 x 50		
	42,4 < D ≤ 54,0	≥ 2,0	30 x 500	1 x 50		
copper	D ≤ 28,0	≥ 1,0	20 x 500	1 x 50	**EI 45 / E 90-C/U** [1] **EI 45 / E 90-C/C** [1]	**Fig. C12a**
			30 x 500	1 x 50	**EI 60 / E 90-C/U** [1] **EI 60 / E 90-C/C** [1]	
	28,0 < D ≤ 33,7	≥ 1,2	30 x 500	1 x 50	**EI 45 / E 90-C/U** [1] **EI 45 / E 90-C/C** [1]	
	33,7 < D ≤ 42,4	≥ 1,6	30 x 500	1 x 50		
	42,4 < D ≤ 54,0	≥ 2,0	30 x 500	1 x 50		
copper	D ≤ 28,0	1,0 – 1,9	20 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	**Fig. C12b**
		≥ 2,0	20 x 500	1 x 50		
			30 x 500	1 x 50	**EI 60 / E 120-C/U** [2] **EI 60 / E 120-C/C** [2]	
	28,0 < D ≤ 33,7	1,2 – 1,9	30 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	
		≥ 2,0	30 x 500	1 x 50	**EI 60 / E 90-C/U** [2] **EI 60 / E 90-C/C** [2]	
	33,7 < D ≤ 42,4	1,6 – 1,9	30 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	
		≥ 2,0	30 x 500	1 x 50	**EI 60 / E 90-C/U** [2] **EI 60 / E 90-C/C** [2]	
	42,4 < D ≤ 54,0	≥ 2,0	30 x 500	1 x 50		
steel	D ≤ 67,0	1,5 – 3,5	30 x 500	1 x 50	**EI 45 / E 90-C/U** **EI 45 / E 90-C/C**	**Fig. C12c**
		≥ 3,6	30 x 500	1 x 50		
			50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
	67,0 < D ≤ 76,1	1,9 – 3,5	50 x 500	1 x 50	**EI 45 / E 90-C/U** **EI 45 / E 90-C/C**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
	76,1 < D ≤ 88,9	2,5 – 3,5	50 x 500	1 x 50	**EI 45 / E 90-C/U** **EI 45 / E 90-C/C**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
	88,9 < D ≤ 108,0	3,3 – 3,5	50 x 500	1 x 50	**EI 45 / E 90-C/U** **EI 45 / E 90-C/C**	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**	
	108,0 < D ≤ 114,3	≥ 3,6	50 x 500	1 x 50		

[1] valid only in case of INTU FR UNIBOARD 2S placed on bottom side of the floor

[2] valid only in case of INTU FR UNIBOARD 2S placed flush with top side of the floor

Table B13, cont. Resistance to fire classification of metal pipes with mineral wool mat local sustained insulation (case LS) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C12a and C12b in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness g_w x length L_w [mm]	INTU FR UNIBOARD 2S layers x thickness [mm]	Fire resistance class	Figure in Annex C
steel	D ≤ 67,0	≥ 1,5	30 x 500	1 x 50	**EI 45 / E 90-C/U** [1] **EI 45 / E 90-C/C** [1]	**Fig. C12a**
			50 x 500	1 x 50	**EI 60 / E 90-C/U** [1] **EI 60 / E 90-C/C** [1]	
	67,0 < D ≤ 76,1	≥ 1,9	50 x 500	1 x 50		
	76,1 < D ≤ 88,9	≥ 2,5	50 x 500	1 x 50		
	88,9 < D ≤ 108,0	≥ 3,3	50 x 500	1 x 50		
	108,0 < D ≤ 114,3	≥ 3,6	50 x 500	1 x 50		
steel	D ≤ 67,0	1,5 – 3,5	30 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	**Fig. C12b**
		≥ 3,6	30 x 500	1 x 50		
			50 x 500	1 x 50	**EI 60 / E 90-C/U** [2] **EI 60 / E 90-C/C** [2]	
	67,0 < D ≤ 76,1	1,9 – 3,5	50 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 90-C/U** [2] **EI 60 / E 90-C/C** [2]	
	76,1 < D ≤ 88,9	2,5 – 3,5	50 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 90-C/U** [2] **EI 60 / E 90-C/C** [2]	
	88,9 < D ≤ 108,0	3,3 – 3,5	50 x 500	1 x 50	**EI 45 / E 90-C/U** [2] **EI 45 / E 90-C/C** [2]	
		≥ 3,6	50 x 500	1 x 50	**EI 60 / E 90-C/U** [2] **EI 60 / E 90-C/C** [2]	
	108,0 < D ≤ 114,3	≥ 3,6	50 x 500	1 x 50		

[1] valid only in case of INTU FR UNIBOARD 2S placed on bottom side of the floor

[2] valid only in case of INTU FR UNIBOARD 2S placed flush with top side of the floor

Table B14. Resistance to fire classification of metal pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR UNICOAT P and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C13 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNIBOARD 1S board layers x thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
galvanized steel	D ≤ 42,0	≥ 1,5	2 x 50	1,0 x 500	**EI 60 / E 90-C/U** **EI 60 / E 90-C/C**

Table B15. Resistance to fire classification of metal pipes (without insulation) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNICOAT P and INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C14 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNIBOARD 1S board layers x thickness [mm]	INTU FR UNICOAT P thickness x length L_u [mm]	Fire resistance class
copper	D ≤ 28,0	≥ 1,0	2 x 50	1 x 500	**EI 45 / E 120-C/U** **EI 45 / E 120-C/C**
	28,0 < D ≤ 33,7	≥ 1,2	2 x 50	1 x 500	**EI 30 / E 120-C/U** **EI 30 / E 120-C/C**
	33,7 < D ≤ 42,4	≥ 1,6	2 x 50	1 x 500	
	42,4 < D ≤ 54,0	≥ 2,0	2 x 50	1 x 500	
galvanized steel	D ≤ 42,0	≥ 1,5	2 x 50	1 x 500	**EI 90 / E 120-C/U** **EI 90 / E 120-C/C**

Table B16. Resistance to fire classification of metal pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of INTU FR UNICOAT P, in accordance with Annex A and Fig. C15 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
copper	D ≤ 54	≥ 2,0	2,0 x 450,0	**EI 45 / E 120-C/U** **EI 45 / E 120-C/c**
galvanized steel	D ≤ 42	≥ 1,5	1,0 x 450,0	**EI 90 / E 120-C/U** **EI 90 / E 120-C/C**
			2,0 x 450,0	**EI 120-C/U** **EI 120-C/C**

Table B17. Resistance to fire classification of metal pipes (without insulation) penetration seals in rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNICOAT P, in accordance with Annex A and Fig. C16 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
copper	D ≤ 54	≥ 2,0	1,0 x 500,0	**EI 120-C/U EI 120-C/C**
galvanized steel	D ≤ 66,7	≥ 2,0	1,0 x 500,0	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
	66,7 < D ≤ 76,1	≥ 2,3	1,0 x 500,0	
	76,1 < D ≤ 88,9	≥ 2,7	1,0 x 500,0	
	88,9 < D ≤ 108,0	≥ 3,4	1,0 x 500,0	
	108,0 < D ≤ 114,3	≥ 3,6	1,0 x 500,0	
	114,3 < D ≤ 139,7	≥ 3,8	1,0 x 500,0	
	139,7 < D ≤ 159,0	≥ 3,9	1,0 x 500,0	
	159,0 < D ≤ 168,3	≥ 4,0	1,0 x 500,0	

Table B18. Resistance to fire classification of galvanized steel pipes (without insulation) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNICOAT P, in accordance with Annex A and Fig. C17 and C20 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNICOAT P thickness x length L_u [mm]	Fire resistance class	Figure in Annex C
galvanized steel	D ≤ 42,0	≥ 1,5	1,0 x 500,0	**EI 120-C/U EI 120-C/C**	**Fig. C17**
	42,0 < D ≤ 54,0	≥ 1,8	1,0 x 500,0	**EI 45 / E 120-C/U EI 45 / E 120-C/C**	
	54,0 < D ≤ 66,7	≥ 2,2	1,0 x 500,0		
	66,7 < D ≤ 76,1	≥ 2,5	1,0 x 500,0		
	76,1 < D ≤ 88,9	≥ 2,9	1,0 x 500,0		
	88,9 < D ≤ 108,0	≥ 3,4	1,0 x 500,0		
	108,0 < D ≤ 114,3	≥ 3,6	1,0 x 500,0		
	114,3 < D ≤ 139,7	≥ 3,8	1,0 x 500,0		
	139,7 < D ≤ 159,0	≥ 3,9	1,0 x 500,0		
	159,0 < D ≤ 168,3	≥ 4,0	1,0 x 500,0		
galvanized steel	D ≤ 88,9	≥ 1,5	1,0 x 500,0	**EI 60 / E 120-C/U EI 60 / E 120-C/C**	**Fig. C20**
	88,9 < D ≤ 108,0	≥ 3,4	1,0 x 500,0	**EI 45 / E 120-C/U EI 45 / E 120-C/C**	
	108,0 < D ≤ 114,3	≥ 3,6	1,0 x 500,0		

Table B19. Resistance to fire classification of metal pipes (without insulation) penetration seals in rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR UNICOAT P, in accordance with Annex A and Fig. C18 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
copper	D ≤ 28	≥ 1,0	1,0 x 500,0	**EI 90 / E 120-C/U** **EI 90 / E 120-C/U**
galvanized steel	D ≤ 42	≥ 1,5	1,0 x 500,0	**EI 120-C/U** **EI 120-C/C**

Table B20. Resistance to fire classification of galvanized steel pipes (without insulation) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of double-sided INTU FR UNICOAT P, in accordance with Annex A and Fig. C18 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
galvanized steel	D ≤ 42,0	≥ 1,5	1,0 x 500,0	**EI 120-C/U** **EI 120-C/C**
	42,0 < D ≤ 54,0	≥ 1,8	1,0 x 500,0	**EI 45 / E 120-C/U** **EI 45 / E 120-C/C**
	54,0 < D ≤ 66,7	≥ 2,2	1,0 x 500,0	
	66,7 < D ≤ 76,1	≥ 2,5	1,0 x 500,0	
	76,1 < D ≤ 88,9	≥ 2,9	1,0 x 500,0	
	88,9 < D ≤ 108,0	≥ 3,4	1,0 x 500,0	
	108,0 < D ≤ 114,3	≥ 3,6	1,0 x 500,0	

Table B21. Resistance to fire classification of galvanized steel pipes with mineral wool mat local interrupted insulation (case LI) penetration seals in rigid wall thickness of: t ≥ 100 mm, made with use of double-sided INTU FR UNICOAT P, in accordance with Annex A and Fig. C19 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness x length L_w [mm]	INTU FR UNICOAT P thickness x length L_u [mm]	Fire resistance class
galvanized steel	D ≤ 114,3	≥ 3,6	20 x 200	1,0 x 500,0	**EI 60 / E 120-C/U EI 60 / E 120-C/C**
	114,3 < D ≤ 139,7	≥ 3,8	20 x 200	2,0 x 500,0	**EI 45 / E 120-C/U EI 45 / E 120-C/C**
	139,7 < D ≤ 159,0	≥ 3,9	20 x 200	2,0 x 500,0	
	159,0 < D ≤ 168,3	≥ 4,0	20 x 200	2,0 x 500,0	

Table B22. Resistance to fire classification of galvanized steel pipes with mineral wool mat local interrupted insulation (case LI) penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNICOAT P, in accordance with Annex A and Fig. C21 in Annex C:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Mineral wool mat thickness x length L_w [mm]	INTU FR UNICOAT P thickness x length L_u [mm]	Fire resistance class
galvanized steel	D ≤ 114,3	≥ 3,6	20 x 200	1,0 x 500,0	**EI 90 / E 120-C/U** **EI 90 / E 120-C/C**
			20 x 350	1,0 x 500,0	**EI 120-C/U** **EI 120-C/C**
	114,3 < D ≤ 139,7	≥ 3,8	20 x 200	2,0 x 500,0	**EI 60 / E 120-C/U** **EI 60 / E 120-C/C**
	139,7 < D ≤ 159,0	≥ 3,9	20 x 200	2,0 x 500,0	
	159,0 < D ≤ 168,3	≥ 4,0	20 x 200	2,0 x 500,0	

Table B23. Resistance to fire classification of cable penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNICOAT P and double INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C22 in Annex C:

Type of cables	Cable diameter [mm]	INTU FR UNIBOARD 1S layers x thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
Small cables	ø ≤ 21	2 x 50	1,0 x 160,0	**EI 90 / E 120**
Medium cables	21 < ø ≤ 50	2 x 50	1,0 x 160,0	
Large cables	50 < ø ≤ 80	2 x 50	1,0 x 160,0	
Cable bundle	$ø_{cable}$ ≤ 21 $ø_{bundle}$ ≤ 100	2 x 50	1,0 x 160,0	
Non-sheathed cables (wires)	ø ≤ 24	2 x 50	1,0 x 160,0	
NYCWY 4x185/95 [1)]	according to HD 603.3G	2 x 50	1,0 x 160,0	
N2XH-J 4x185 [1)]	according to HD 604.5G	2 x 50	1,0 x 160,0	
Small cables	ø ≤ 21	2 x 50	1,0 x 160,0	**EI 120 [2)]**
Cable bundle	$ø_{cable}$ ≤ 21 $ø_{bundle}$ ≤ 100	2 x 50	1,0 x 160,0	
Non-sheathed cables (wires)	ø ≤ 24	2 x 50	1,0 x 160,0	
NYCWY 4x185/95 [1)]	according to HD 603.3G	2 x 50	1,0 x 160,0	
N2XH-J 4x185 [1)]	according to HD 604.5G	2 x 50	1,0 x 160,0	

[1)] single cable penetration seal

[2)] valid only in case where the cable support does not pass through the penetration seal and / or in case where following cable carriers are passing through the seal:
- perforated steel tray width of max. 500 mm and thickness of 1,5 mm,
- non-perforated steel tray width of max. 500 mm and thickness of 1,5 mm,
- steel ladder width of max. 200 mm and thickness of 1,0 mm,

provided that the distance between adjacent cable trays / ladders in case of cable trays / ladders placed in one row is min 100 mm.

Table B24. Resistance to fire classification of cable penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of INTU FR UNICOAT P and single INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C23a, C23b and C23c in Annex C:

Type of cables	Cable diameter [mm]	INTU FR UNIBOARD 2S layers x thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class	Figure in Annex C
Small cables	ø ≤ 21	1 x 50	1,0 x 200,0	**EI 60**	**Fig. C23c**
Medium cables	21 < ø ≤ 50	1 x 50	1,0 x 200,0		
Large cables	50 < ø ≤ 80	1 x 50	1,0 x 200,0		
Cable bundle	$Ø_{cable}$ ≤ 21 $Ø_{bundle}$ ≤ 100	1 x 50	1,0 x 200,0		
Non-sheathed cables (wires)	ø ≤ 24	1 x 50	1,0 x 200,0		
Rigid plastic conduits	ø ≤ 16	1 x 50	1,0 x 200,0	**EI 60-U/U** [1)] **EI 60-C/U** [1)] **EI 60-U/C** [1)] **EI 60-C/C** [1)]	**Fig. C23a**
Small cables	ø ≤ 21	1 x 50	1,0 x 150,0	**EI 60 / E 120** [2)]	**Fig. C23b**
Medium cables	21 < ø ≤ 50	1 x 50	1,0 x 150,0		
Large cables	50 < ø ≤ 80	1 x 50	1,0 x 150,0		
Cable bundle	$Ø_{cable}$ ≤ 21 $Ø_{bundle}$ ≤ 100	1 x 50	1,0 x 150,0		
Non-sheathed cables (wires)	ø ≤ 24	1 x 50	1,0 x 150,0		

[1)] valid only in case of fire acting from the INTU FR UNIBOARD 2S side

[2)] valid only in case of fire acting from the opposite side to the INTU FR UNIBOARD 2S

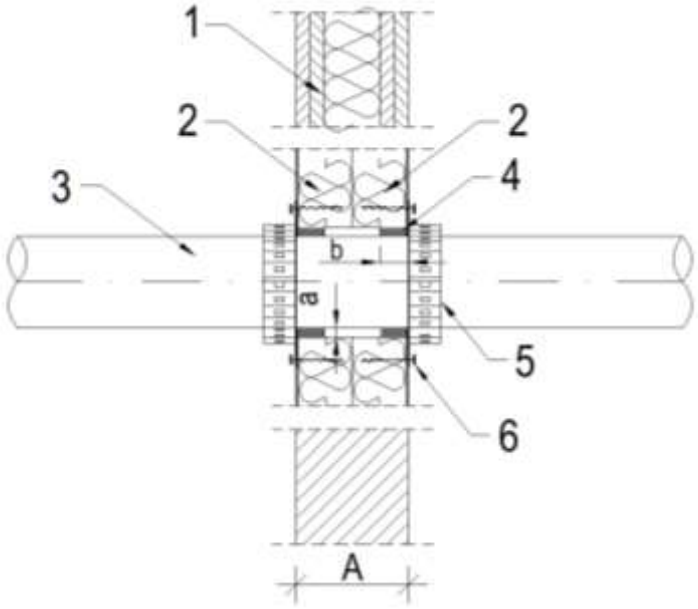
Table B25. Resistance to fire classification of cable penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNICOAT P and double INTU FR UNIBOARD 1S, in accordance with Annex A and Fig. C24 in Annex C:

Type of cables	Cable diameter [mm]	INTU FR UNIBOARD 1S layers x thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class
Small cables	ø ≤ 21	2 x 50	1,0 x 160,0	**EI 120**
Medium cables	21 < ø ≤ 50	2 x 50	1,0 x 160,0	
Large cables	50 < ø ≤ 80	2 x 50	1,0 x 160,0	
Cable bundle	$ø_{cable}$ ≤ 21 $ø_{bundle}$ ≤ 100	2 x 50	1,0 x 160,0	
Non-sheathed cables (wires)	ø ≤ 24	2 x 50	1,0 x 160,0	

Table B26. Resistance to fire classification of cable penetration seals in rigid floor thickness of: t ≥ 150 mm, made with use of INTU FR UNICOAT P and single INTU FR UNIBOARD 2S, in accordance with Annex A and Fig. C25 in Annex C:

Type of cables	Cable diameter [mm]	INTU FR UNIBOARD 2S layers x thickness [mm]	INTU FR UNICOAT P thickness x length L [mm]	Fire resistance class	Figure in Annex C
Small cables	ø ≤ 21	1 x 50	1,0 x 200,0	**EI 60 / E 90**	**Fig. C25**
Medium cables	21 < ø ≤ 50	1 x 50	1,0 x 200,0		
Large cables	50 < ø ≤ 80	1 x 50	1,0 x 200,0		
Cable bundle	$ø_{cable}$ ≤ 21 $ø_{bundle}$ ≤ 100	1 x 50	1,0 x 200,0		
Non-sheathed cables (wires)	ø ≤ 24	1 x 50	1,0 x 200,0		

Fig. C1. Plastic pipe (without insulation) penetration seals made with use of INTU FR COLLAR L SLIM collars (double-sided) in flexible or rigid wall

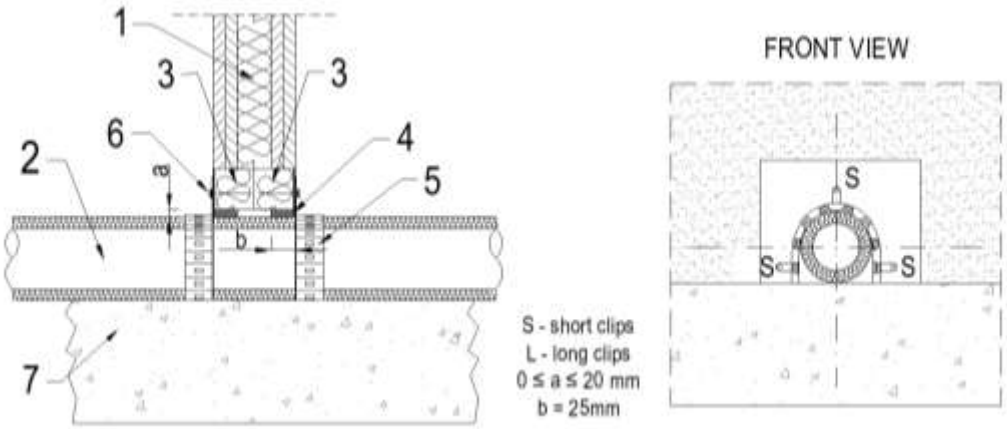


1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
3 Plastic pipe
4 Gap filled with INTU FR MASTIC – area between the pipe and INTU FR UNIBOARD 1S board, ring with max. width: a = 20 mm, on the minimum depth: b = 25 mm on both sides of the seal
5 Intumescent pipe collar roll INTU FR COLLAR L SLIM (double-sided – one collar on each side of the seal)
6 Steel Fire Spring fastener, length of 40 mm

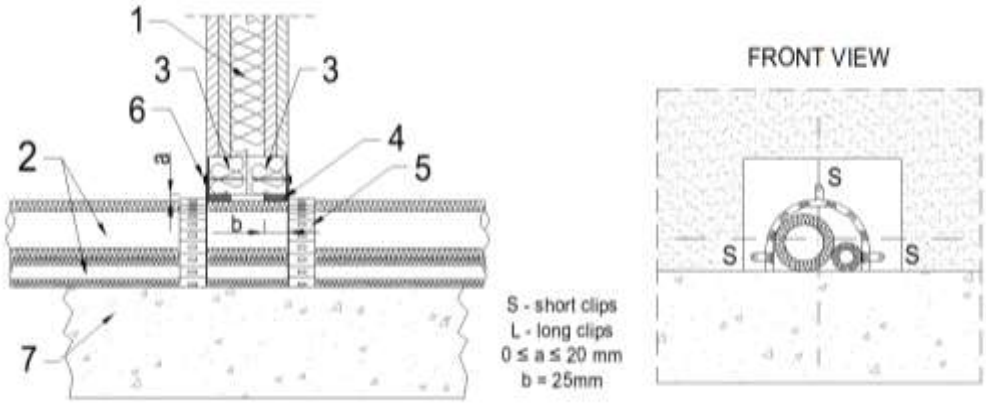
INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C1** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes (without insulation) penetration seals in flexible or rigid wall	

Fig. C2. Plastic pipe with polyethylene foam (PE) insulation penetration seals made with use of INTU FR COLLAR L SLIM collars (double-sided) in flexible or rigid wall

a)



b)



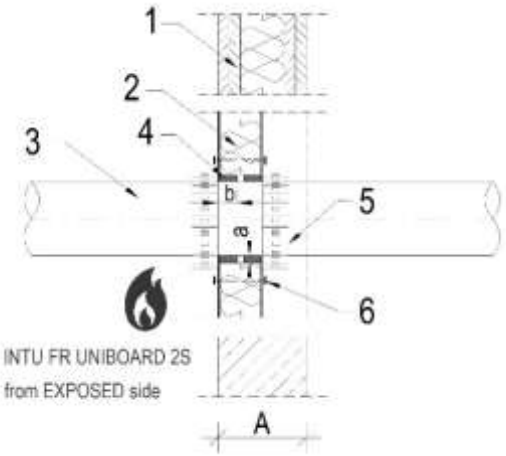
1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Plastic pipe with continuous polyethylene foam (PE) insulation
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
4 Gap filled with INTU FR MASTIC – area between the pipe and INTU FR UNIBOARD 1S board, ring with max. width: a = 20 mm, on the minimum depth: b = 25 mm on both sides of the seal
5 Intumescent pipe collar INTU FR COLLAR L SLIM (double-sided – one collar on each side of the seal)
6 Steel Fire Spring fastener, length of 40 mm
7 Rigid floor supporting construction

Note: S, L – short and long clips for fixing of collars

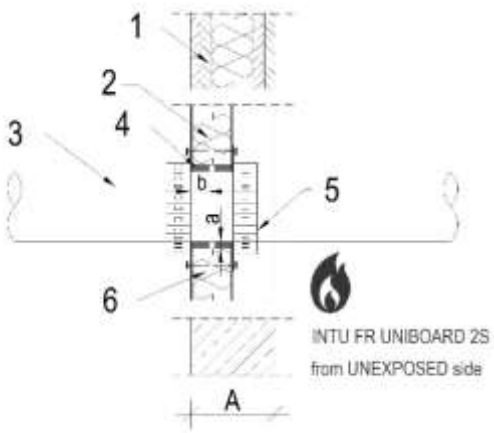
INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C2** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes with insulation penetration seals in flexible or rigid wall	

Fig. C3. Plastic pipe (without insulation) penetration seals made with use of INTU FR COLLAR L SLIM collars (double-sided) in flexible or rigid wall

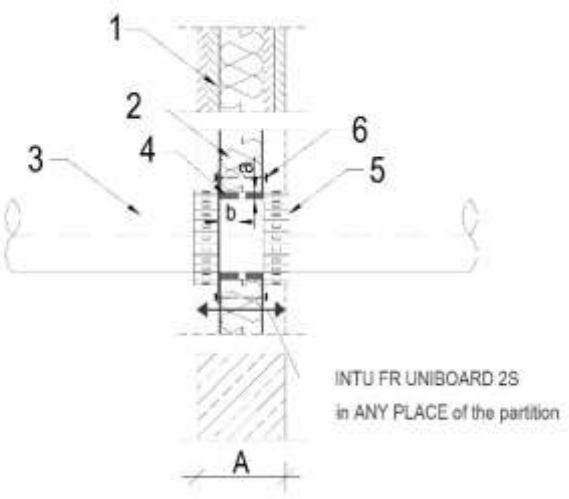
a)



b)



c)

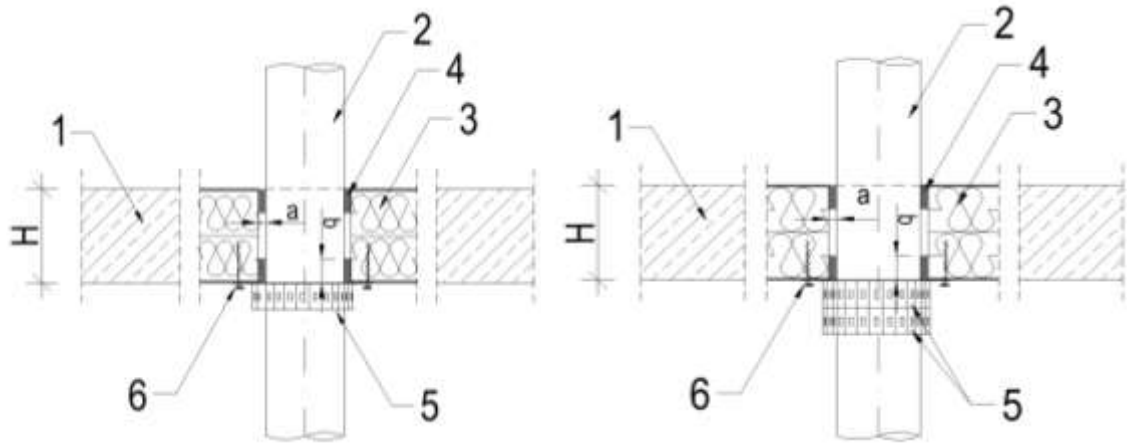


1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Single INTU FR UNIBOARD 2S board (1 x 50 mm)
3 Plastic pipe
4 Gap filled with INTU FR MASTIC – area between the pipe and INTU FR UNIBOARD 2S board, ring with max. width: a = 20 mm, on the minimum depth: b = 25 mm on both sides of the seal
5 Intumescent pipe collar INTU FR COLLAR L SLIM (double-sided – one collar on each side of the seal)
6 Steel Fire Spring fastener, length of 40 mm

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C3** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes (without insulation) penetration seals in flexible or rigid wall	

Fig. C4. Plastic pipe (without insulation) penetration seals made with use of INTU FR COLLAR L SLIM collars (one-sided) in rigid floor

a) **b)**

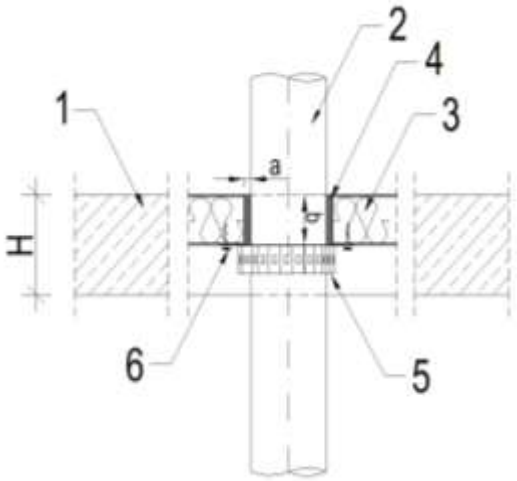


1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Plastic pipe
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm) flush with bottom and top floor surfaces
4 Gap filled with INTU FR MASTIC – area between the pipe and INTU FR UNIBOARD 1S board, ring with max. width: a = 20 mm, on the minimum depth: b = 25 mm on both sides of the seal
5 Intumescent pipe collar INTU FR COLLAR L SLIM (one-sided – single or double collar on the bottom side of the seal)
6 Steel Fire Spring fastener, length of 40 mm

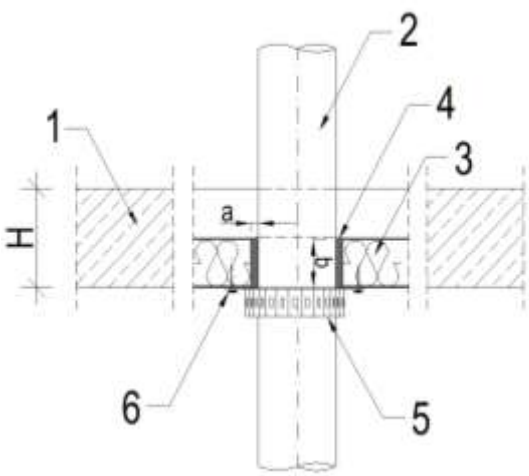
INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C4** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes (without insulation) penetration seals in rigid floor	

Fig. C5. Plastic pipe (without insulation) penetration seals made with use of INTU FR COLLAR L SLIM collars (one-sided) in rigid floor

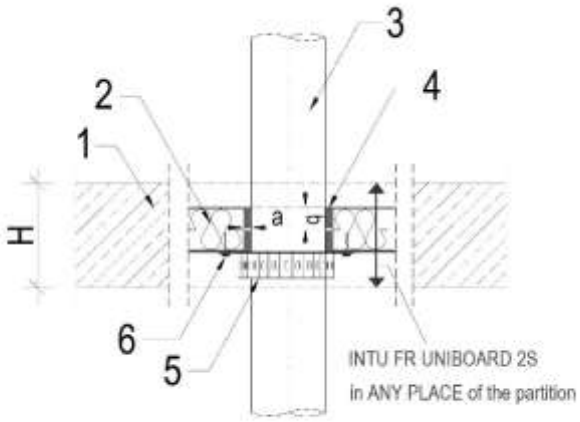
a)



b)



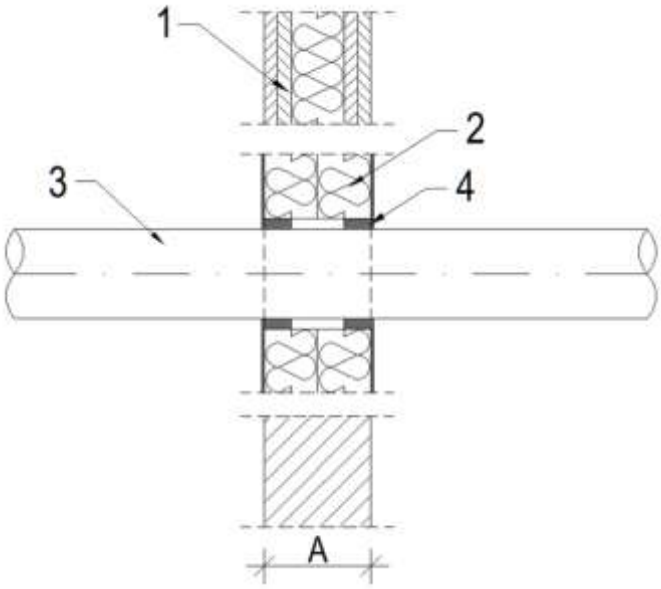
c)



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Plastic pipe
3 Single INTU FR UNIBOARD 2S board (1 x 50 mm)
4 Gap filled with INTU FR MASTIC – area between the pipe and INTU FR UNIBOARD 2S board, ring with max. width: a = 20 mm, on the minimum depth: b = 25 mm on both sides of the seal
5 Intumescent pipe collar INTU FR COLLAR L SLIM (one-sided – one collar on the bottom side of the seal)
6 Steel Fire Spring fastener, length of 40 mm

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C5** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes (without insulation) penetration seals in rigid floor	

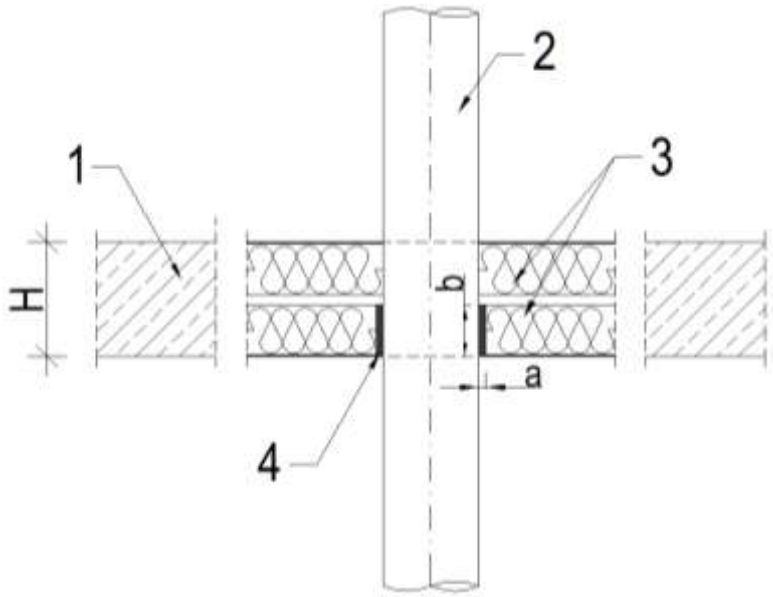
Fig. C6. Plastic pipe (without insulation) penetration seals made with use of INTU FR GRAPHITE mass in flexible or rigid wall



1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
3 Plastic pipe
4 Gap filled with INTU FR GRAPHITE sealant – area between the pipe and INTU FR UNIBOARD 1S board, ring with width: a = 10 to 20 mm, on the minimum depth: b = 25 mm on both sides of the seal

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C6** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes (without insulation) penetration seals in flexible or rigid wall	

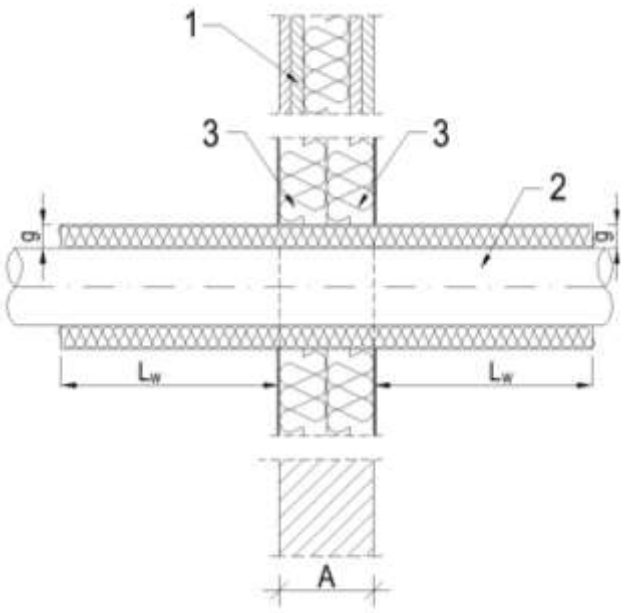
Fig. C7. Plastic pipe (without insulation) penetration seals made with use of INTU FR GRAPHITE mass in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Plastic pipe
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm) flush with bottom and top floor surfaces
4 Gap filled with INTU FR GRAPHITE sealant – area between the pipe and bottom INTU FR UNIBOARD 1S board, ring with width: a = 10 to 20 mm, on the whole depth of the bottom mineral wool board b = 50 mm

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C7** of European Technical Assessment ETA-24/1047
Construction details Plastic pipes (without insulation penetration) seals in rigid floor	

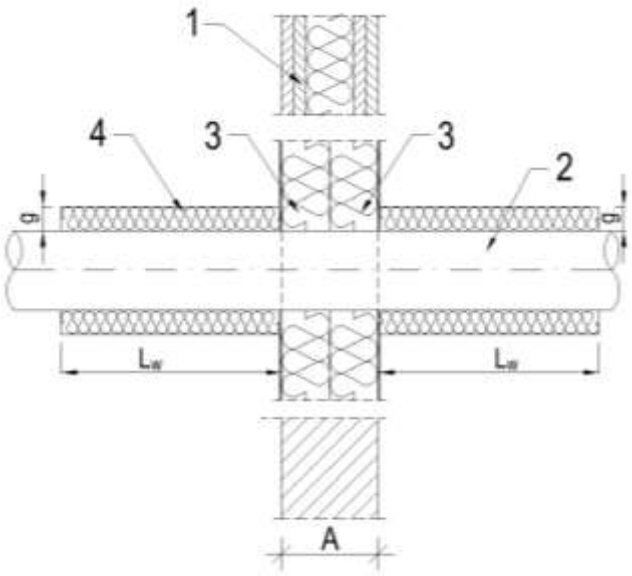
Fig. C8. Metal pipe with mineral wool insulation in flexible or rigid wall



1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Metal pipe with local sustained insulation (case LS) made of mineral wool mat with length L_w and thickness g, according to table B9
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C8** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in flexible or rigid wall	

Fig. C9. Metal pipe with mineral wool insulation in flexible or rigid wall

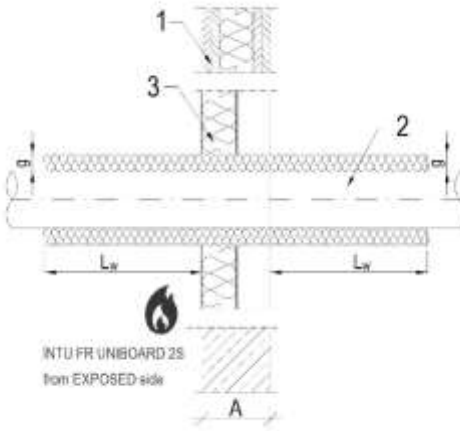


1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Metal pipe
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
4 Local interrupted insulation (case LI) made of mineral wool mat with length L_W and thickness g, according to table B10

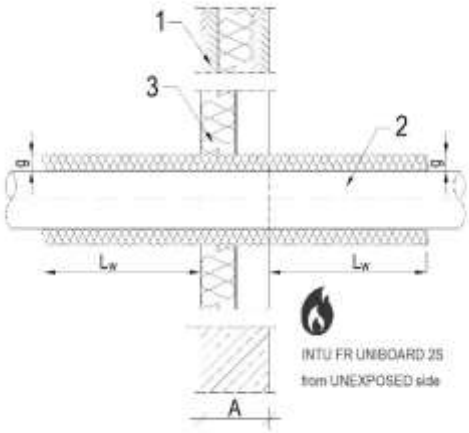
INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C9** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in flexible or rigid wall	

Fig. C10. Metal pipe with mineral wool insulation penetration seals in flexible or rigid wall

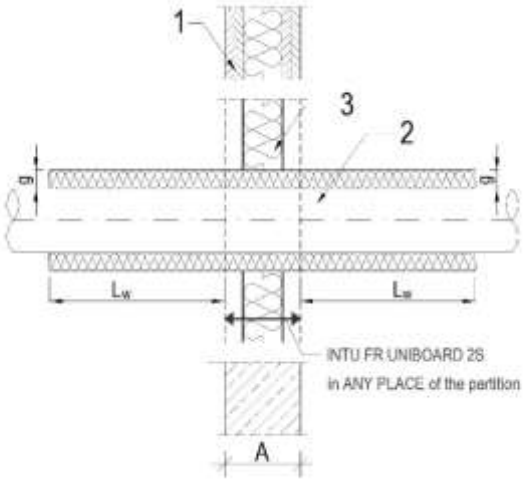
a)



b)



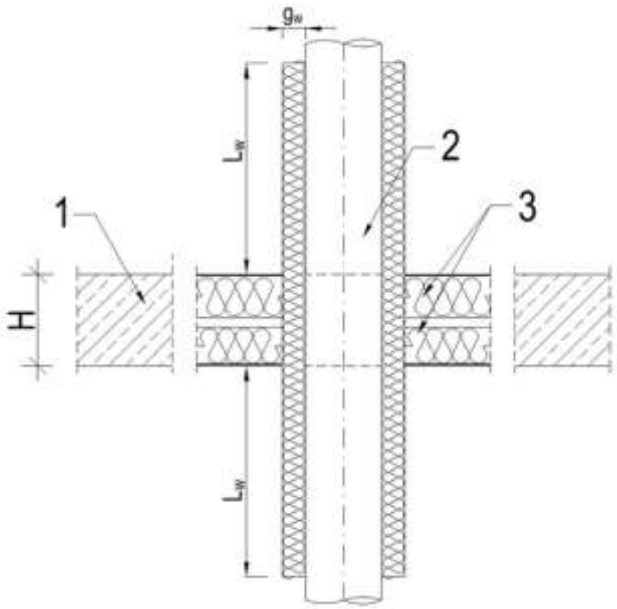
c)



1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Metal pipe, with local sustained insulation (case LS) made of mineral wool mat with length L_w and thickness g, according to table B11
3 Single INTU FR UNIBOARD 2S board (1 x 50 mm)

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C10** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in flexible or rigid wall	

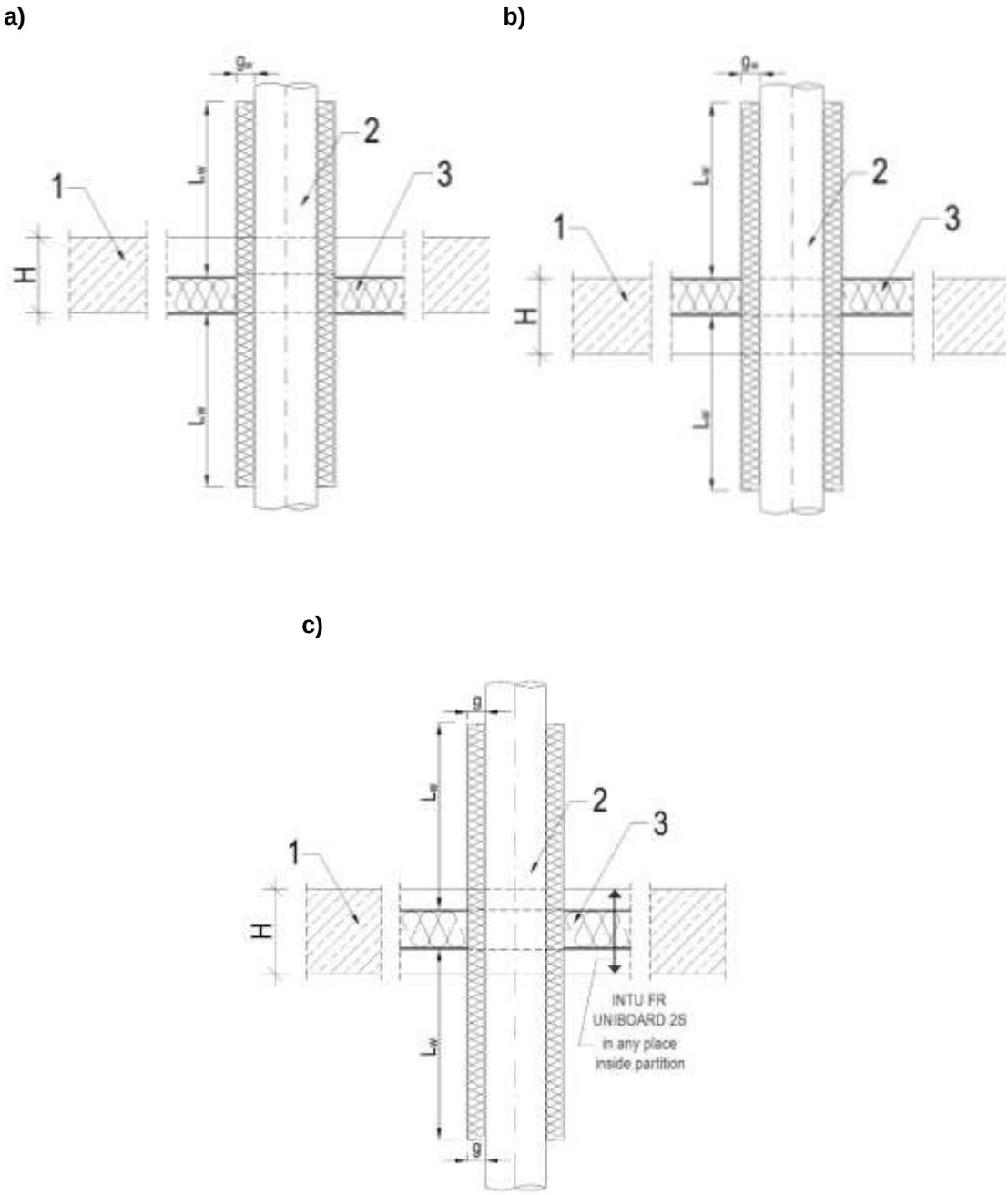
Fig. C11. Metal pipe with mineral wool insulation in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Metal pipe with local sustained insulation (case LS) made of mineral wool mat with length L_w and thickness g_w, according to table B12
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C11** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in rigid floor	

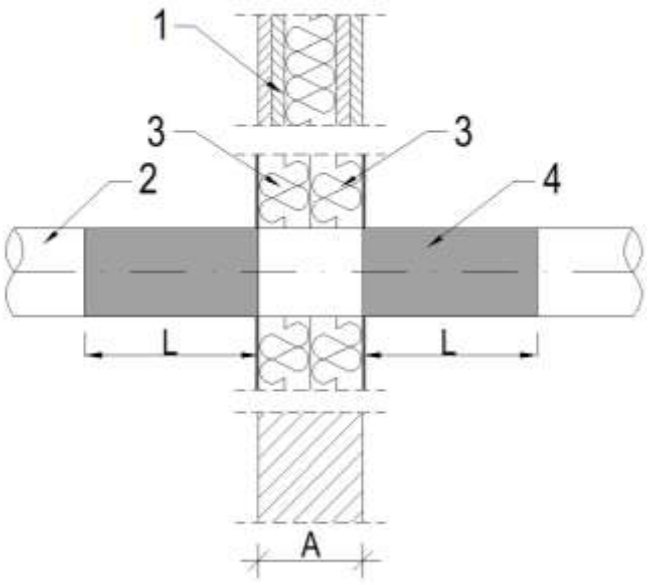
Fig. C12. Metal pipe with mineral wool insulation penetration seals in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Metal pipe with local sustained insulation (case LS) made of mineral wool mat with length L_w and thickness g_w, according to table B13
3 Single INTU FR UNIBOARD 2S board (1 x 50 mm)

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C12** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in rigid floor	

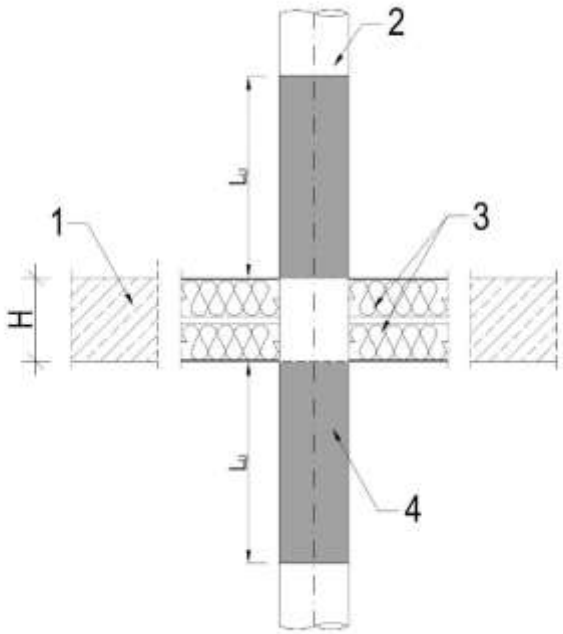
Fig. C13. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in flexible or rigid wall



1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Metal pipe
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
4 INTU FR UNICOAT P paint with length L according to table B14

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C13** of European Technical Assessment ETA-24/1047
Construction details Metal pipes (without insulation) penetration seals in flexible or rigid wall	

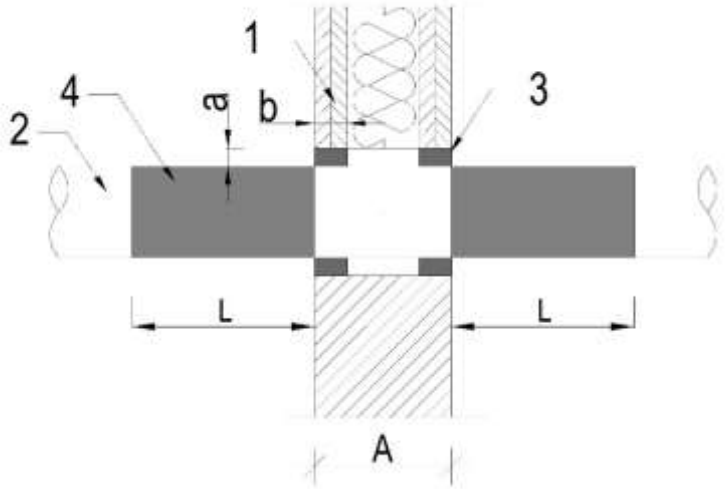
Fig. C14. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Metal pipe
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
4 INTU FR UNICOAT P paint with length L_u according to table B15

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C14** of European Technical Assessment ETA-24/1047
Construction details Metal pipes (without insulation) penetration seals in rigid floor	

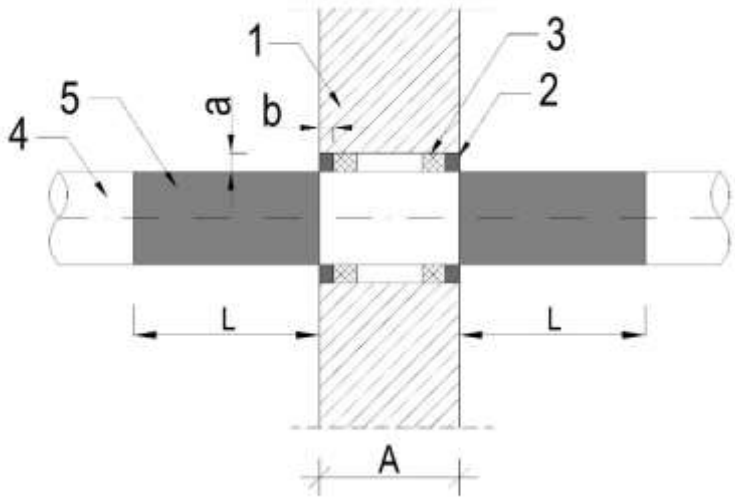
Fig. C15. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in flexible or rigid wall



1 Flexible or rigid wall supporting construction thickness of: A ≥ 125 mm
2 Metal pipe
3 Gap filled with INTU FR MASTIC – area between the pipe and supporting construction ring with max. width:
4 INTU FR UNICOAT P paint on both sides of the wall: length L according to table B16

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C15** of European Technical Assessment ETA-24/1047
Construction details Metal pipes (without insulation) penetration seals in flexible or rigid wall	

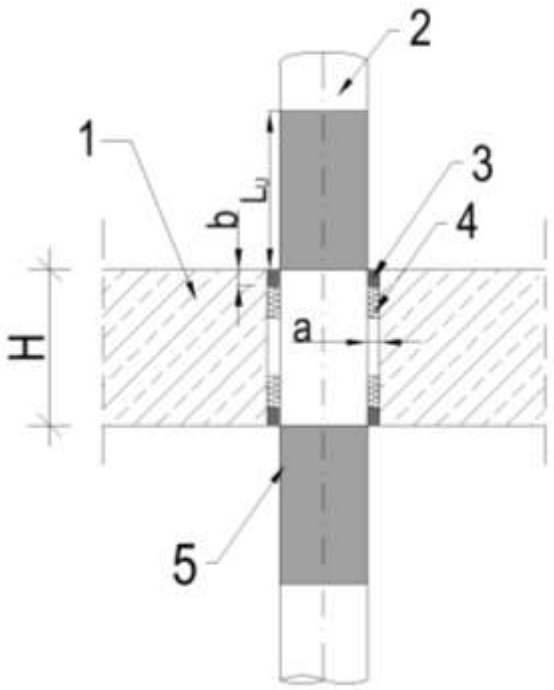
Fig. C16. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in rigid wall



1 Rigid wall supporting construction thickness of: A ≥ 100 mm
2 Gap filled with INTU FR MASTIC – area between the pipe and supporting construction ring with max. width: a = 30 mm, on the minimum depth: b = 15 mm on both sides of the wall
3 Backfill material – rock mineral wool with density of min. 35 kg/m^3 and reaction to fire class A1 according to EN 13501-1, depth of 15 mm
4 Metal pipe
5 INTU FR UNICOAT P paint on both sides of the wall: length L according to table B17

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C16** of European Technical Assessment ETA-24/1047
Construction details Metal pipes (without insulation) penetration seals in rigid wall	

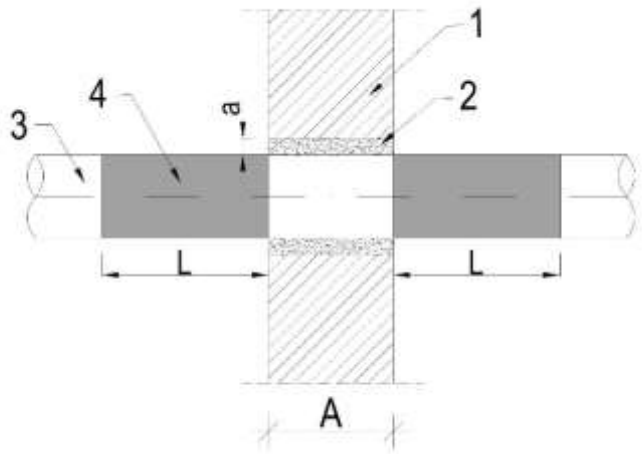
Fig. C17. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Metal pipe
3 Gap filled with INTU FR MASTIC – area between the pipe and supporting construction ring with max. width: a = 20 mm, on the minimum depth: b = 25 mm on both sides of the floor
4 Backfill material – rock mineral wool with density of min. 35 kg/m^3 and reaction to fire class A1 according to EN 13501-1, depth of 25 mm
5 INTU FR UNICOAT P paint on both sides of the floor with length L_u according to table B18

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C17** of European Technical Assessment ETA-24/1047
Construction details Metal pipes without insulation penetration seals in rigid wall	

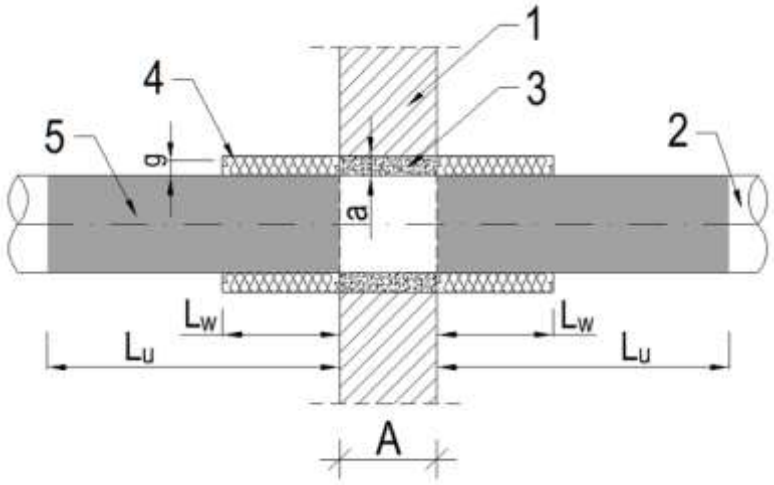
Fig. C18. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in rigid wall



1 Rigid wall supporting construction thickness of: A ≥ 100 mm
2 Gap filled with cement mortar – area between the pipe and supporting construction ring with max. width: a = 30 mm, on the whole depth of the wall
3 Metal pipe
4 INTU FR UNICOAT P paint on both sides of the wall with length L according to tables B19 and B20

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C18** of European Technical Assessment ETA-24/1047
Construction details Metal pipes without insulation penetration seals in rigid wall	

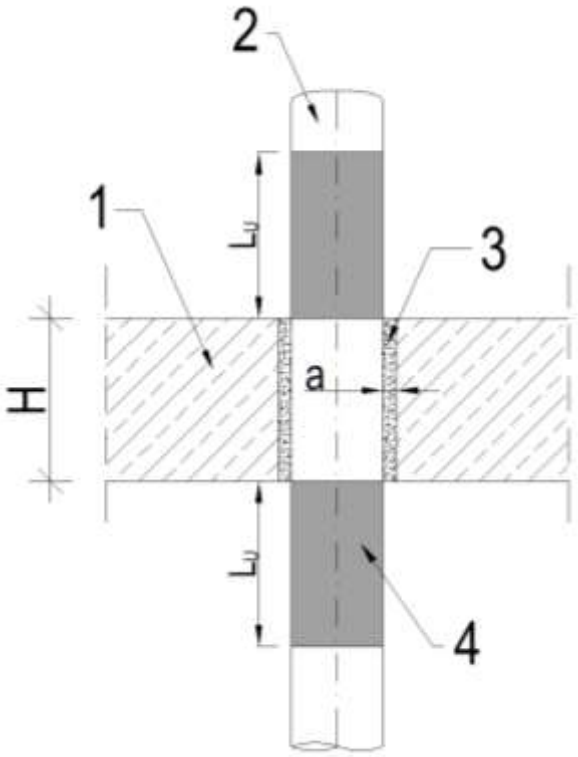
Fig. C19. Metal pipe with mineral wool insulation penetration seals made with use of INTU FR UNICOAT P paint in rigid wall



1 Rigid wall supporting construction thickness of: A ≥ 100 mm
2 Metal pipe
3 Gap filled with cement mortar – area between the pipe and supporting construction ring with max. width: a = 30 mm, on the whole depth of the wall
4 Local interrupted insulation – mineral wool mat with thickness g = 20 mm and length L_w according to table B21
5 INTU FR UNICOAT P paint on both sides of the wall with length L_u according to table B21

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C19** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in rigid wall	

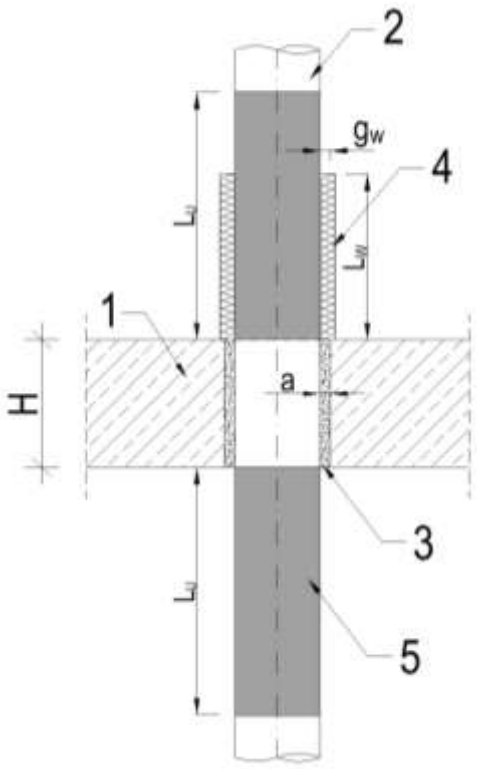
Fig. C20. Metal pipe (without insulation) penetration seals made with use of INTU FR UNICOAT P paint in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Metal pipe
3 Gap filled with cement mortar – area between the pipe and supporting construction ring with max. width: a = 30 mm, on the whole depth of the floor
4 INTU FR UNICOAT P paint on both sides of the floor with length L_u according to table B18

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C20** of European Technical Assessment ETA-24/1047
Construction details Metal pipes without insulation penetration seals in rigid floor	

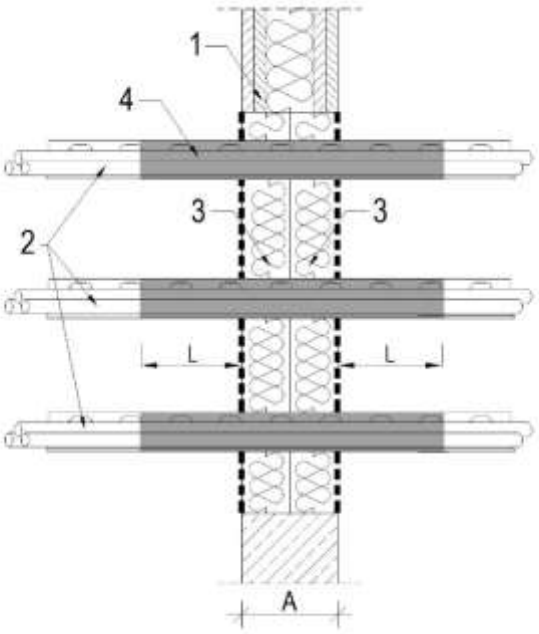
Fig. C21. Metal pipe with mineral wool insulation penetration seals made with use of INTU FR UNICOAT P paint in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 Metal pipe
3 Gap filled with cement mortar – area between the pipe and supporting construction ring with max. width: a = 30 mm, on the whole depth of the floor
4 Local interrupted insulation – mineral wool mat with thickness g_w = 20 mm and length L_w according to table B22
5 INTU FR UNICOAT P paint on both sides of the floor with length L_u according to table B22

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C21** of European Technical Assessment ETA-24/1047
Construction details Metal pipes with insulation penetration seals in rigid floor	

Fig. C22. Cable penetration seals made with use of INTU FR UNICOAT P paint in flexible or rigid wall

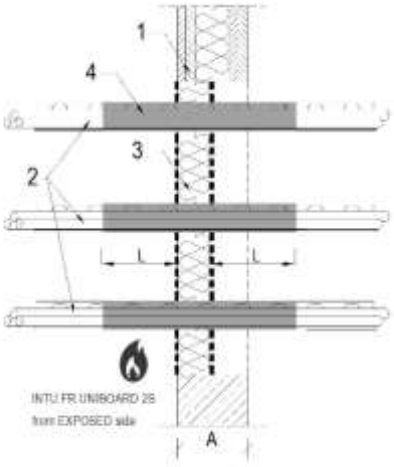


1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Cable, bundle of cables, cable tray / ladder
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm)
4 INTU FR UNICOAT P paint: length L according to table B23

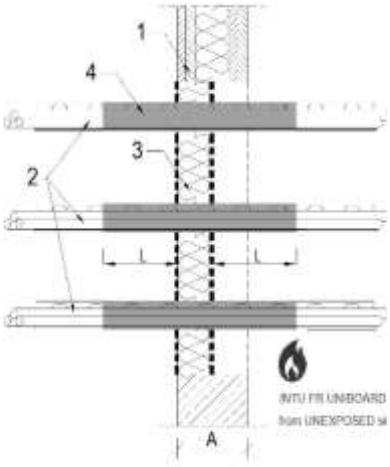
INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C22** of European Technical Assessment ETA-24/1047
Construction details Cable penetration seals in flexible or rigid wall	

Fig. C23. Cable penetration seals made with use of INTU FR UNICOAT P paint in flexible or rigid wall

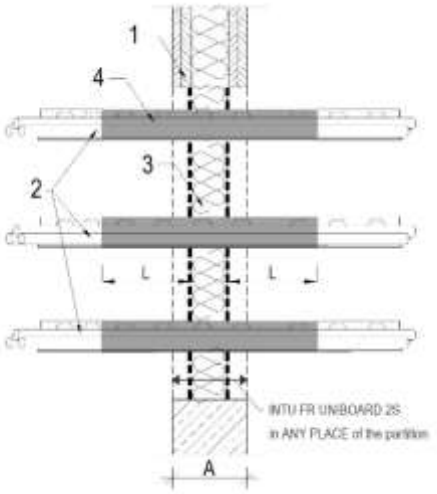
a)



b)



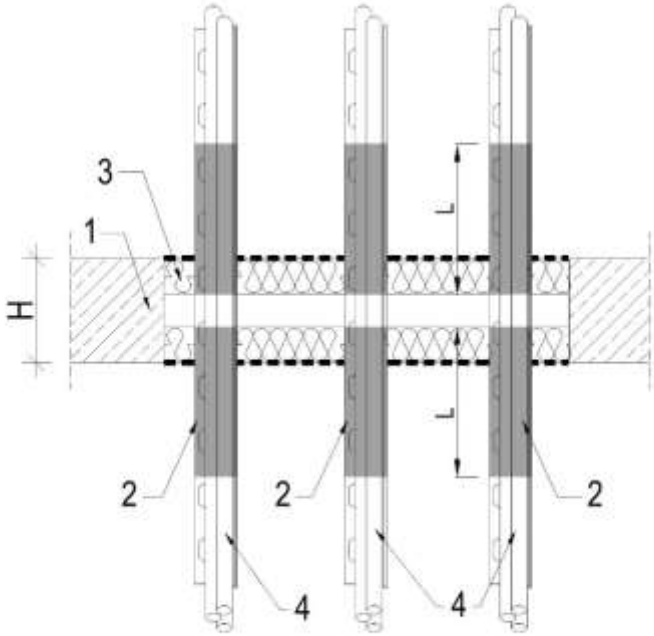
c)



1 Flexible or rigid wall supporting construction thickness of: A ≥ 100 mm
2 Cable, bundle of cables, cable tray / ladder
3 Single INTU FR UNIBOARD 2S board (1 x 50 mm)
4 INTU FR UNICOAT P paint: length L according to table B24

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C23** of European Technical Assessment ETA-24/1047
Construction details Cable penetration seals in flexible or rigid wall	

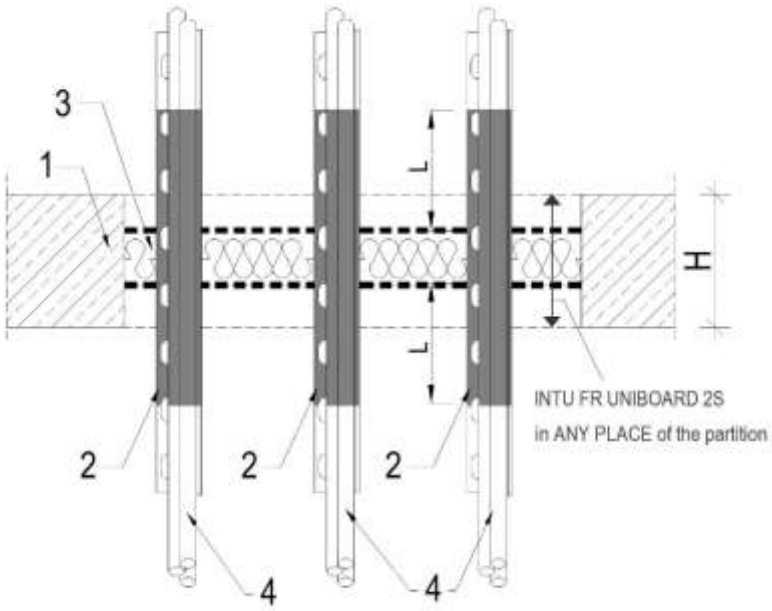
Fig. C24. Cable penetration seals made with use of INTU FR UNICOAT P paint in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 INTU FR UNICOAT P paint: length L according to table B25
3 Double INTU FR UNIBOARD 1S board (2 x 50 mm) flush with bottom and top floor surfaces
4 Cable, bundle of cables, cable tray / ladder

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C24** of European Technical Assessment ETA-24/1047
Construction details Cable penetration seals in rigid floor	

Fig. C25. Cable penetration seals made with use of INTU FR UNICOAT P paint in rigid floor



1 Rigid floor supporting construction thickness of: H ≥ 150 mm
2 INTU FR UNICOAT P paint: length L according to table B26
3 Single INTU FR UNIBOARD 2S board (1 x 50 mm), covered by INTU FR UNICOAT P paint, dry layer thickness of 0,5 mm
4 Cable, bundle of cables, cable tray / ladder

INTU FR UNICOAT P, INTU FR UNIBOARD	**Annex C25** of European Technical Assessment ETA-24/1047
Construction details Cable penetration seals in rigid floor	