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European Technical Assessment

ETA-18/0593 of 31/12/2018

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	INTU FR WRAP INTU FR WRAP L
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 05-500 Piaseczno Poland
Manufacturing plant	INTUSEAL Sp. z o.o. ul. Kineskopowa 1 05-500 Piaseczno Poland
This European Technical Assessment contains	54 pages including 2 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 WRAP and INTU FR WRAP L are intumescent, graphite based, wrap pipe closure devices. They are used to form penetration seals where combustible pipes (with insulation or not) or insulated metal pipes (single or in bundles) penetrate walls and floors.

INTU FR WRAP is supplied in assembled form. It includes from 1 to 8 layers of an intumescent liner, with thickness of 2,0 mm, inserted into an outer layer made of PE foil or similar material. Width of the wrap (liner) is 60 or 100 mm.

INTU FR WRAP L is supplied in roll form in width of 60 or 100 mm and thickness of 2,0 mm. Length of rolls is up to 50 m. It can be supplied with self-adherent layer.

INTU FR WRAP and INTU FR WRAP L shall be wrapped around the pipe and may be cut to a required length (equal or greater than external circumference of the pipe), if necessary. They shall be pushed into the aperture in the separating element.

Auxiliary products used with INTU FR WRAP and INTU FR WRAP L to form single penetration seals are pipes insulation materials:

- synthetic, flexible elastomeric foam (FEF) in accordance with EN 14304 with reaction to fire class B_L-s3,d0, according to EN 13501-1, and with a nominal density of 40 – 80 kg/m^3,
- PE foam with reaction to fire class E, according to EN 13501-1, and with a nominal density of 30 kg/m^3.

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 WRAP and INTU FR WRAP L is to reinstate the fire resistance performance of flexible wall, rigid wall or rigid floor constructions, where they are penetrated by combustible pipes (with insulation or not) or insulated a metal pipes.

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

Rigid walls:	The wall must have a minimum thickness of 125 or 150 mm (for details see Annex B) and comprise concrete, reinforced concrete, aerated concrete, ceramic brick, cavity brick or checker brick, with a minimum density of 600 kg/m^3.
Flexible walls:	The wall must have a minimum thickness of 125 mm 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

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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 of 150 mm and comprise concrete, reinforced concrete, aerated concrete, with a minimum density of 1700 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 WRAP and INTU FR WRAP L may be used to provide a penetration seal with specific combustible and metal pipes (according to Annex B).

Details of penetration seals are provided in Annexes B. Additional provisions are provided in Annex A.

The performances given in this European Technical Assessment are based on an assumed working life of the product of 10 years. 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	E
Resistance to fire	Annex B

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
Durability	Use category: Type Z_2

3.1.4 Protection against noise (BWR 5)

No performance assessed.

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3.1.5 Energy economy and heat retention (BWR 6)

No performance assessed.

3.2 Methods used for the assessment

The assessment of the products has been made in accordance with the European Assessment Document EAD 350454-00-1104 "Fire Stopping and Fire Sealing Products. Penetration Seals".

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

According to Decision 99/454/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 31/12/2018 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB

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Additional provisions

- INTU FR WRAP and INTU FR WRAP L are placed, depending on the intended use, either on the both sides of the wall (two wraps), in the centre of the wall (one wrap) thickness or in the distance of max. 10 mm from the bottom of the floor (one wrap), in accordance with Annex B. In penetration seals in walls with two wraps, there shall be no gap between the wrap and the surface of the penetration seal (wrap shall be lined up with the surface of the wall).
- The gap between INTU FR WRAP or INTU FR WRAP L and the opening in separating element shall be filled with cement mortar and shall not be wider than:
  - 10 mm – in case of flexible walls,
  - 110 mm – in case of rigid walls and rigid floors.

  The mortar shall be put:
  - to the depth of at least 15 mm from the surface of the wall, on both sides of the wall – in case of flexible walls,
  - in the entire depth of the wall or floor – in case of rigid walls and rigid floors.
- Classifications given in Annex B are valid for specific pipes made of:
  - PVC-U according to EN 1329-1, EN 1453-1 or EN 1452-1,
  - PVC-C according to EN 1566-1,
  - PE according to EN 12201-2, EN 1519-1 and EN 12666-1,
  - PE-HD according to EN 1519-1 or EN 12666-1,
  - PE-RT according to EN ISO 21003-1,
  - PE-X according to EN ISO 21003-1,
  - PE-X/Al/PE-X according to EN ISO 21003-2,
  - PE-RT/Al/PE-RT according to EN ISO 21003-2,
  - PP according to EN 1451-1,
  - PP-R according to EN ISO 15874-2,
  - PP-R/Al/PP-R according to EN ISO 15874-1 and EN ISO 15874-2,
  - PP-R/PP-R-GF/PP-R according to EN ISO 15874-1 and EN ISO 15874-2,
  - ABS according to EN 1455-1,
  - SAN + PVC according to EN 1565-1,

  according to tables in Annex B.
- Classifications given in Annex B for steel and copper pipes are also valid for other metal pipes with:
  - thermal conductivity lower than respectively steel or copper, and
  - melting point at least equal to respectively steel or copper, and greater than:
    - 739 °C for the fire resistance class EI 15 and E 15,
    - 782 °C for the fire resistance class EI 20 and E 20,
    - 843 °C for the fire resistance class EI 30 and E 30,
    - 903 °C for the fire resistance class EI 45 and E 45,
    - 946 °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,
    - 1109 °C for the fire resistance class EI 180 and E 180,
    - 1153 °C for the fire resistance class EI 240 and E 240.
- The minimum distance between the penetration seals (between adjacent wraps) in supporting construction shall be:
  - not restricted – in case of plastic pipes made of PE-HD, PE-RT, PE-X, PE-X/Al/PE-X, PP, PP-R, PP-R/Al/PP-R or PP-R/PP-R-GF/PP-R, with diameter not greater than 50 mm,
  - not restricted – in case of plastic pipes made of PVC-U, with diameter not greater than 110 mm,
  - 100 mm – in case of other plastic pipes, not mentioned above,
  - 100 mm – in case of metal pipes.

INTU FR WRAP and INTU FR WRAP L	Annex A
Additional provisions	of European Technical Assessment ETA-18/0593

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- Pipes shall be supported at maximum 400 mm away from both faces of the wall constructions and from the upper face of floor constructions.
- Classifications given in Annex B for insulated pipes is valid for pipes with sustained and continued insulation made of flexible elastomeric foam (FEF) or PE foam (for details see clause 1 of ETA) and does not cover locally insulated or non-insulated pipes. The thickness, density and reaction to fire of insulation shall remain in accordance with ETA provisions.
- Services are placed in angle 90° to the supporting construction.

Table of contents (Annex B):

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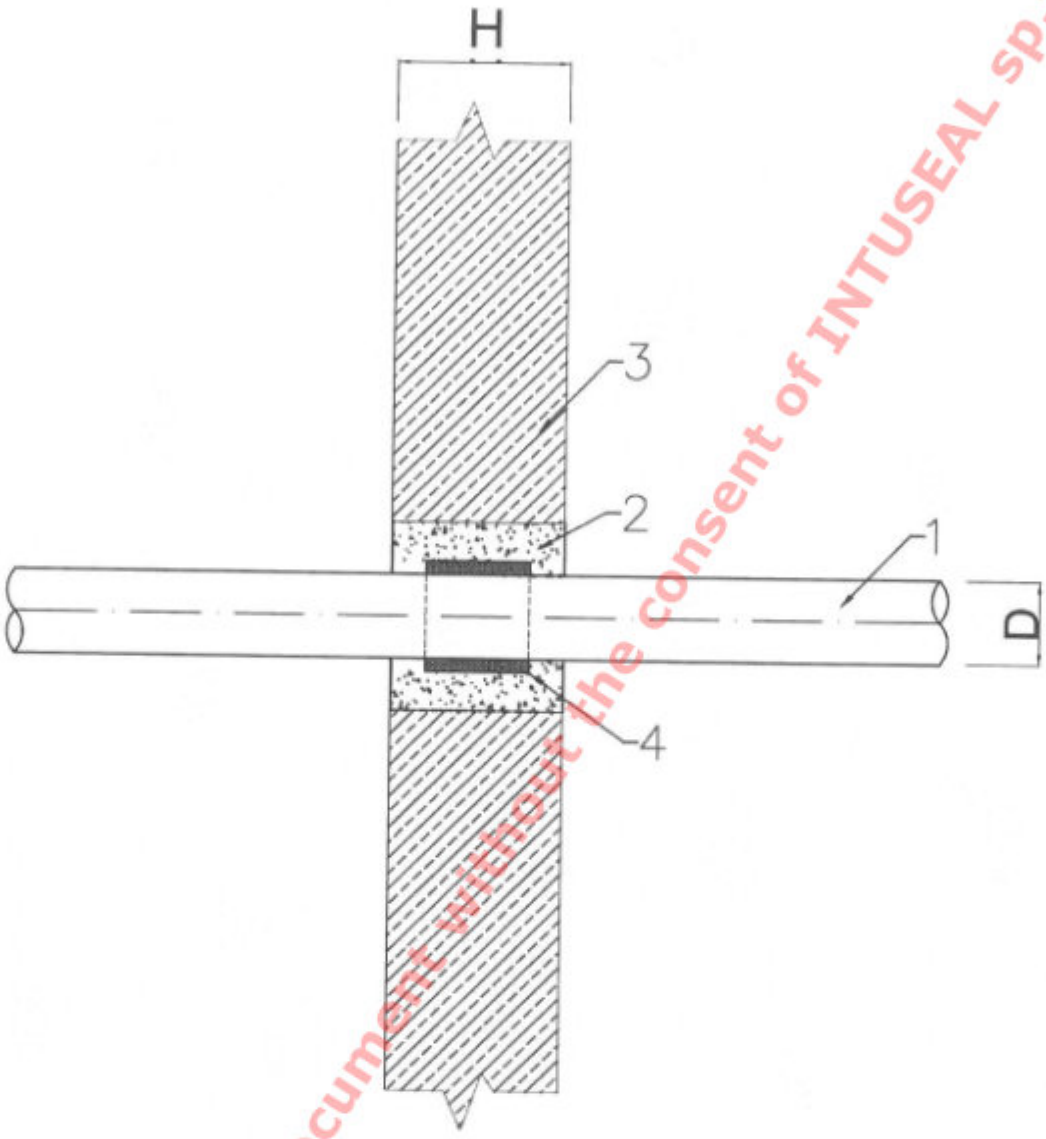
Plastic pipe penetration seal in rigid wall, made with use of INTU FR WRAP or INTU FR WRAP L



1 Plastic pipe, with diameter of D and pipe wall thickness t
2 Space between the wrap and wall filled with cement mortar; ring with max. 110 mm width, on the whole depth of the wall
3 Rigid wall with thickness of H ≥ 150 mm
4 INTU FR WRAP or INTU FR WRAP L (one wrap placed in the centre of the wall thickness)

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INTU FR WRAP and INTU FR WRAP L	**Annex B1**
Penetration seals made with use of INTU FR WRAP or INTU FR WRAP L Plastic pipes penetration seals in rigid wall	of European Technical Assessment ETA-18/0593

Resistance to fire classification of plastic pipes penetration seals, made in accordance with Annex A and Annex B1.

Table B2.1 PVC-U or PVC-C pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PVC-U or PVC-C	D ≤ 32	1,8 – 3,6	60 x 2,0	EI 240 – U/C EI 240 – C/C
		3,7 – 4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C
	32 < D ≤ 40	1,8 – 3,6	60 x 2,0	EI 240 – U/C EI 240 – C/C
		3,7 – 4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C
	40 < D ≤ 50	1,8 – 3,6	60 x 2,0	EI 240 – U/C EI 240 – C/C
		3,7 – 4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C
	50 < D ≤ 55	1,9 – 3,5	60 x 2,0	EI 180 – U/C EI 180 – C/C
		3,6	60 x 2,0	EI 240 – U/C EI 240 – C/C
		3,7 – 4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C
	55 < D ≤ 63	1,9 – 3,5	60 x 2,0	EI 180 – U/C EI 180 – C/C
		3,6	60 x 2,0	EI 240 – U/C EI 240 – C/C
		3,7 – 4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C
	63 < D ≤ 75	1,9 – 3,5	60 x 2,0	EI 180 – U/C EI 180 – C/C
		3,6	60 x 2,0	EI 240 – U/C EI 240 – C/C
		3,7 – 4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C
	75 < D ≤ 90	2,1 – 3,5	60 x 4,0	EI 120 – U/C EI 120 – C/C
		3,6	60 x 4,0	EI 240 – U/C EI 240 – C/C
		3,6 – 4,1	60 x 4,0	EI 180 – U/C EI 180 – C/C
		4,2	60 x 4,0	EI 180 – U/C EI 180 – C/C
	90 < D ≤ 110	2,2 – 3,5	60 x 4,0	EI 120 – U/C EI 120 – C/C
		3,6	60 x 4,0	EI 240 – U/C EI 240 – C/C
		3,6 – 4,1	60 x 4,0	EI 180 – U/C EI 180 – C/C
		4,2	60 x 2,0	EI 180 – U/C EI 180 – C/C

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Table B2.1 PVC-U or PVC-C pipes (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PVC-U or PVC-C	110 < D ≤ 125	3,4 – 6,1	100 x 8,0	EI 120 – U/C EI 120 – C/C
		6,2	100 x 8,0	EI 120 – U/C EI 120 – C/C
			100 x 10,0	EI 240 – U/C EI 240 – C/C
		6,3 – 9,5	100 x 10,0	EI 180 – U/C EI 180 – C/C
	125 < D ≤ 160	6,2	100 x 10,0	EI 240 – U/C EI 240 – C/C
		6,3 – 9,5	100 x 10,0	EI 180 – U/C EI 180 – C/C
	160 < D ≤ 170	5,9	100 x 16,0	EI 180 – U/C EI 180 – C/C
		6,0 – 6,1	100 x 14,0	EI 180 – U/C EI 180 – C/C
		6,2 – 9,1	100 x 12,0	EI 120 – U/C EI 120 – C/C
	170 < D ≤ 185	5,9	100 x 16,0	EI 180 – U/C EI 180 – C/C
		6,0	100 x 14,0	EI 180 – U/C EI 180 – C/C
		6,1 – 8,4	100 x 12,0	EI 120 – U/C EI 120 – C/C
	185 < D ≤ 200	5,9	100 x 16,0	EI 180 – U/C EI 180 – C/C
		5,9 – 7,7	100 x 16,0	EI 120 – U/C EI 120 – C/C

Table B2.2 PE-HD, PE, ABS or SAN+PVC pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	D ≤ 32	2,0 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
	32 < D ≤ 40	2,3 – 6,7	60 x 2,0	EI 120 – U/C EI 120 – C/C
		6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
	40 < D ≤ 50	2,6 – 6,7	60 x 2,0	EI 120 – U/C EI 120 – C/C
		6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 2,0	EI 120 – U/C EI 120 – C/C

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Table B2.2 PE-HD, PE, ABS or SAN+PVC pipes (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	50 < D ≤ 55	2,7 – 6,7	60 x 2,0	EI 120 – U/C EI 120 – C/C
		6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
	55 < D ≤ 63	2,9 – 6,7	60 x 2,0	EI 120 – U/C EI 120 – C/C
		6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
	63 < D ≤ 75	3,3 – 6,7	60 x 2,0	EI 120 – U/C EI 120 – C/C
		6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
	75 < D ≤ 90	3,7 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	90 < D ≤ 110	4,2 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	110 < D ≤ 125	4,8 – 9,4	100 x 8,0	EI 120 – U/C EI 120 – C/C
		9,5	100 x 8,0	EI 120 – U/C EI 120 – C/C
		9,5	100 x 10,0	EI 180 – U/C EI 180 – C/C
	125 < D ≤ 160	6,2 – 9,4	100 x 10,0	EI 120 – U/C EI 120 – C/C
		9,5	100 x 10,0	EI 180 – U/C EI 180 – C/C
	160 < D ≤ 170	6,6 – 9,1	100 x 12,0	EI 90 – U/C EI 90 – C/C
		9,2 – 10,1	100 x 12,0	EI 60 – U/C EI 60 – C/C
		10,2 – 11,0	100 x 14,0	EI 60 – U/C EI 60 – C/C
		11,1 – 11,9	100 x 16,0	EI 60 – U/C EI 60 – C/C
	170 < D ≤ 185	7,2 – 8,4	100 x 14,0	EI 90 – U/C EI 90 – C/C
		8,5 – 11,0	100 x 14,0	EI 60 – U/C EI 60 – C/C
		11,1 – 11,9	100 x 16,0	EI 60 – U/C EI 60 – C/C
	185 < D ≤ 200	7,7	100 x 16,0	EI 90 – U/C EI 90 – C/C
		7,8 – 11,9	100 x 16,0	EI 60 – U/C EI 60 – C/C

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Table B2.3 PP pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP	D ≤ 32	1,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		1,9 – 18,4	60 x 2,0	EI 180 – U/C EI 180 – C/C
	32 < D ≤ 40	1,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		1,9 – 18,4	60 x 2,0	EI 180 – U/C EI 180 – C/C
	40 < D ≤ 50	1,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		1,9 – 18,4	60 x 2,0	EI 180 – U/C EI 180 – C/C
	50 < D ≤ 55	1,9 – 18,4	60 x 2,0	EI 180 – U/C EI 180 – C/C
	55 < D ≤ 63	1,9 – 18,4	60 x 2,0	EI 180 – U/C EI 180 – C/C
	63 < D ≤ 75	1,9 – 18,4	60 x 2,0	EI 180 – U/C EI 180 – C/C
	75 < D ≤ 90	2,3 – 18,3	60 x 4,0	EI 180 – U/C EI 180 – C/C
		18,4	60 x 4,0	EI 180 – U/C EI 180 – C/C
	90 < D ≤ 110	2,7 – 18,3	60 x 4,0	EI 180 – U/C EI 180 – C/C
		18,4	60 x 4,0	EI 180 – U/C EI 180 – C/C
	110 < D ≤ 125	3,8 – 16,7	100 x 8,0	EI 60 – U/C EI 60 – C/C
	125 < D ≤ 160	5,5 – 12,5	100 x 10,0	EI 60 – U/C EI 60 – C/C
	160 < D ≤ 170	6,1 – 11,3	100 x 12,0	EI 60 – U/C EI 60 – C/C
	170 < D ≤ 185	6,9 – 9,5	100 x 14,0	EI 60 – U/C EI 60 – C/C
	185 < D ≤ 200	7,7	100 x 16,0	EI 60 – U/C EI 60 – C/C

Table B2.4 PE-RT pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-RT	D ≤ 20	2,0	60 x 2,0	EI 240 – U/C EI 240 – C/C

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Table B2.5 PE-RT/Al/PE-RT pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-RT/Al/PE-RT	D ≤ 20	2,0 – 7,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
	20 < D ≤ 75	7,5	60 x 2,0	EI 240 – U/C EI 240 – C/C

Table B2.6 PE-X pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-X	D ≤ 20	2,0	60 x 2,0	EI 240 – U/C EI 240 – C/C

Table B2.7 PE-X/Al/PE-X pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-X/Al/PE-X	D ≤ 75	7,5	60 x 2,0	EI 120 – U/C EI 120 – C/C

Table B2.8 PP-R pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R	D ≤ 20	3,4	60 x 2,0	EI 240 – U/C EI 240 – C/C

Table B2.9 PP-R/Al/PP-R pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R/Al/PP-R	D ≤ 110	18,3	60 x 2,0	EI 240 – U/C EI 240 – C/C

Table B2.10 PP-R/PP-R-GF/PP-R pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R/PP-R-GF/PP-R	D ≤ 110	18,3	60 x 2,0	EI 180 – U/C EI 180 – C/C

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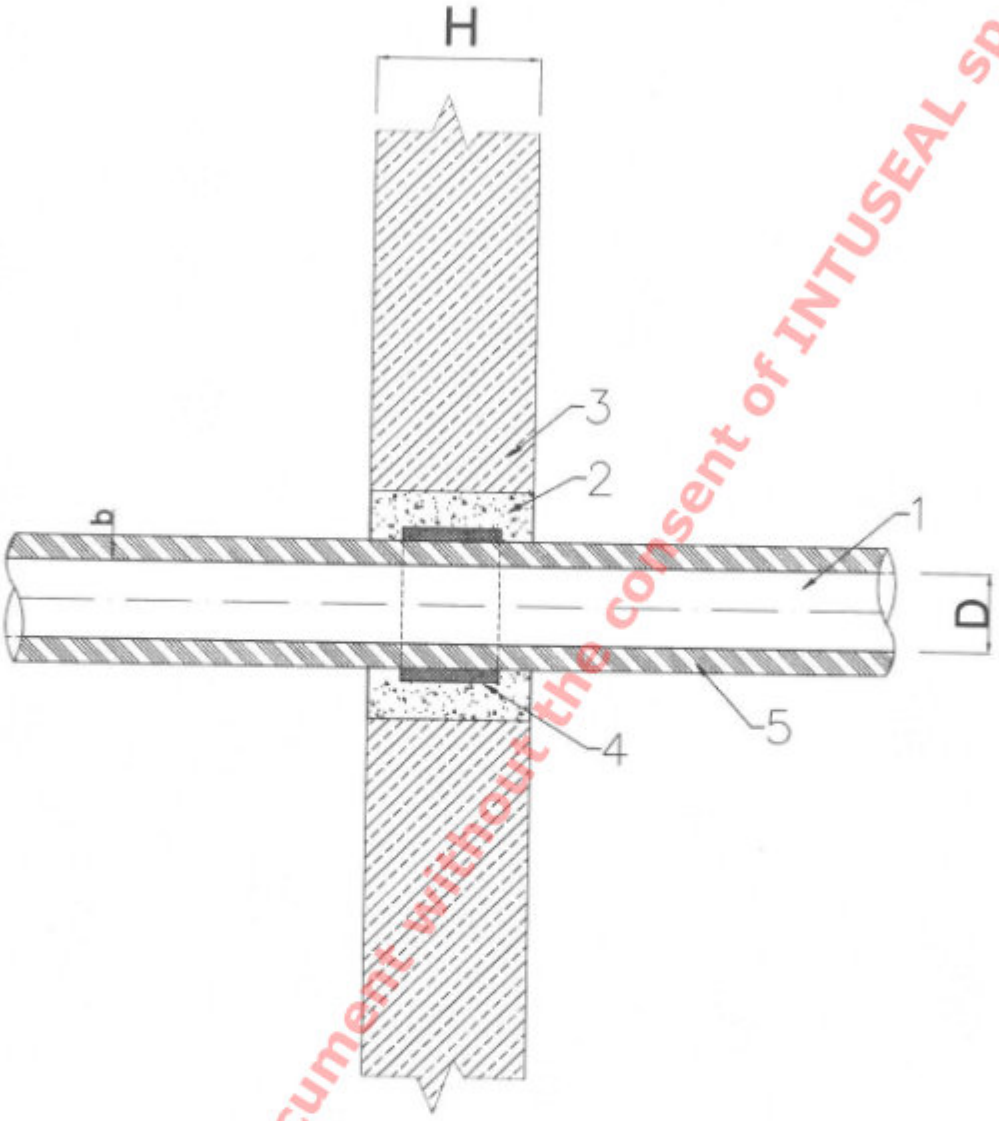
Insulated metal pipe penetration seal in rigid wall, made with use of INTU FR WRAP L



1 Metal pipe, with diameter of D and pipe wall thickness t, in continuous flexible elastomeric foam (FEF) insulation, with thickness of b
2 Space between the wrap and wall filled with cement mortar; ring with max. 110 mm width, on the whole depth of the wall
3 Rigid wall with thickness of H ≥ 150 mm
4 INTU FR WRAP L (one wrap placed in the centre of the wall thickness)

INTU FR WRAP and INTU FR WRAP L	Annex B3
Penetration seals made with use of INTU FR WRAP L Metal pipes penetration seals in rigid wall	of European Technical Assessment ETA-18/0593

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Resistance to fire classification of metal pipes penetration seals, made in accordance with Annex A and Annex B3.

Table B4.1 Copper pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	D ≤ 15,0	1,0 – 1,4	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 19	60 x 4,0	EI 180 – C/U EI 180 – C/C
			20 – 22	60 x 4,0	EI 180 – C/U EI 180 – C/C
			23 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		≥ 1,5	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 19	60 x 4,0	EI 180 – C/U EI 180 – C/C
			20 – 22	60 x 4,0	EI 180 – C/U EI 180 – C/C
			23 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	15,0 < D ≤ 42,4	1,4	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 19	60 x 4,0	EI 180 – C/U EI 180 – C/C
			20 – 22	60 x 4,0	EI 180 – C/U EI 180 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 50	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
		1,5 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 19	60 x 4,0	EI 180 – C/U EI 180 – C/C
			20 – 22	60 x 4,0	EI 180 – C/U EI 180 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 50	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C

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Table B4.1 Copper pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	42,4 < D ≤ 44,5	1,4	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 19	60 x 4,0	EI 180 – C/U EI 180 – C/C
			20 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 50	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
		1,5 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 19	60 x 4,0	EI 180 – C/U EI 180 – C/C
			20 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 50	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	44,5 < D ≤ 54,0	1,5 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 19	60 x 4,0	EI 120 – C/U EI 120 – C/C
			20 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 50	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	54,0 < D ≤ 57,0	1,6 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 60 – C/U EI 60 – C/C
			17 – 22	60 x 4,0	EI 60 – C/U EI 60 – C/C
			23 – 25	60 x 6,0	EI 60 – C/U EI 60 – C/C
			26 – 30	60 x 6,0	EI 60 – C/U EI 60 – C/C
			31 – 36	60 x 6,0	EI 60 – C/U EI 60 – C/C
			37 – 45	60 x 8,0	EI 60 – C/U EI 60 – C/C

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Table B4.1 Copper pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	54,0 < D ≤ 57,0	1,6 – 14,2	46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C
	57,0 < D ≤ 63,5	1,6 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 60 – C/U EI 60 – C/C
			23 – 25	60 x 6,0	EI 60 – C/U EI 60 – C/C
			26 – 30	60 x 6,0	EI 60 – C/U EI 60 – C/C
			31 – 36	60 x 6,0	EI 60 – C/U EI 60 – C/C
			37 – 45	60 x 8,0	EI 60 – C/U EI 60 – C/C
			46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C
	63,5 < D ≤ 70,0	1,7 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			23 – 25	60 x 6,0	EI 60 – C/U EI 60 – C/C
			26 – 30	60 x 6,0	EI 60 – C/U EI 60 – C/C
			31 – 36	60 x 6,0	EI 60 – C/U EI 60 – C/C
			37 – 45	60 x 8,0	EI 60 – C/U EI 60 – C/C
			46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C
	70,0 < D ≤ 76,1	1,8 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C

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Table B4.1 Copper pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	70,0 < D ≤ 76,1	1,8 – 14,2	23 – 25	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			26 – 30	60 x 6,0	EI 60 – C/U EI 60 – C/C
			31 – 36	60 x 6,0	EI 60 – C/U EI 60 – C/C
			37 – 45	60 x 8,0	EI 60 – C/U EI 60 – C/C
			46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C
	76,1 < D ≤ 82,5	1,8 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			23 – 25	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			26 – 30	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			31 – 36	60 x 6,0	EI 60 – C/U EI 60 – C/C
			37 – 45	60 x 8,0	EI 60 – C/U EI 60 – C/C
			46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C
	82,5 < D ≤ 88,9	1,9 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			23 – 25	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			26 – 30	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			31 – 36	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			37 – 45	60 x 8,0	EI 60 – C/U EI 60 – C/C
			46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C

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Table B4.1 Copper pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	88,9 < D ≤ 101,6	2,0 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			23 – 25	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			26 – 30	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			31 – 36	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			37 – 45	60 x 8,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			46 – 49	60 x 8,0	EI 60 – C/U EI 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C
	101,6 < D ≤ 108	2,0 – 14,2	9	60 x 2,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			10 – 11	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			12 – 16	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			17 – 22	60 x 4,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			23 – 25	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			26 – 30	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
	101,6 < D ≤ 108	2,0 – 14,2	31 – 36	60 x 6,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			37 – 45	60 x 8,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			46 – 49	60 x 8,0	EI 30 / E 60 – C/U EI 30 / E 60 – C/C
			50	60 x 8,0	EI 60 – C/U EI 60 – C/C

Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	D ≤ 42,4	2,0 – 14,2	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	D ≤ 42,4	2,0 – 14,2	37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	42,4 < D ≤ 44,5	2,1 – 2,5	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	44,5 < D ≤ 54,0	2,2 – 2,5	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	54,0 < D ≤ 57,0	2,2 – 2,5	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	54,0 < D ≤ 57,0	2,2 – 2,5	50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	57,0 < D ≤ 63,5	2,3 – 2,5	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	63,5 < D ≤ 70,0	2,4 – 2,5	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	70,0 < D ≤ 76,1	2,5	9	60 x 2,0	EI 180 – C/U EI 180 – C/C
			10 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 36	60 x 6,0	EI 180 – C/U EI 180 – C/C
			37 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	76,1 < D ≤ 82,5	2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	82,5 < D ≤ 88,9	2,6 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 23	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			24 – 36	60 x 6,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			37 – 49	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			50	60 x 8,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
	88,9 < D ≤ 101,6	2,9 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 180 – C/U EI 180 – C/C
			21 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 31	60 x 6,0	EI 180 – C/U EI 180 – C/C
			32 – 34	60 x 6,0	EI 180 – C/U EI 180 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	88,9 < D ≤ 101,6	2,9 – 14,2	35 – 38	60 x 8,0	EI 180 – C/U EI 180 – C/C
			39 – 46	60 x 8,0	EI 180 – C/U EI 180 – C/C
			47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	101,6 < D ≤ 108	3,0 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 180 – C/U EI 180 – C/C
			24 – 31	60 x 6,0	EI 180 – C/U EI 180 – C/C
			32 – 34	60 x 6,0	EI 180 – C/U EI 180 – C/C
			35 – 38	60 x 8,0	EI 180 – C/U EI 180 – C/C
			39 – 46	60 x 8,0	EI 180 – C/U EI 180 – C/C
			47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	108 < D ≤ 114,3	3,2 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			24 – 31	60 x 6,0	EI 180 – C/U EI 180 – C/C
			32 – 34	60 x 6,0	EI 180 – C/U EI 180 – C/C
			35 – 38	60 x 8,0	EI 180 – C/U EI 180 – C/C
			39 – 46	60 x 8,0	EI 180 – C/U EI 180 – C/C
			47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	114,3 < D ≤ 127	3,4 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	114,3 < D ≤ 127	3,4 – 14,2	17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			24 – 31	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			32 – 34	60 x 6,0	EI 180 – C/U EI 180 – C/C
			35 – 38	60 x 8,0	EI 180 – C/U EI 180 – C/C
			39 – 46	60 x 8,0	EI 180 – C/U EI 180 – C/C
			47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	127< D ≤ 133	3,5 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			24 – 31	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			32 – 34	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			35 – 38	60 x 8,0	EI 180 – C/U EI 180 – C/C
			39 – 46	60 x 8,0	EI 180 – C/U EI 180 – C/C
			47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	133< D ≤ 139,7	3,7 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			24 – 31	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			32 – 34	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			35 – 38	60 x 8,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			39 – 46	60 x 8,0	EI 180 – C/U EI 180 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	133< D ≤ 139,7	3,7 – 14,2	47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	139,7< D ≤ 152,4	3,9 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			24 – 31	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			32 – 34	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			35 – 38	60 x 8,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			39 – 46	60 x 8,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			47 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	152,4< D ≤ 159	4,0 – 14,2	9	60 x 2,0	EI 60 / E 240 – C/U EI 60 / E 240 – C/C
			10 – 16	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			17 – 20	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			21 – 23	60 x 4,0	EI 60 / E 180 – C/U EI 60 / E 180 – C/C
			24 – 31	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			32 – 34	60 x 6,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			35 – 38	60 x 8,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			39 – 46	60 x 8,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			47 – 49	60 x 8,0	EI 90 / E 180 – C/U EI 90 / E 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	159 < D ≤ 169	4,0 – 14,2	16 – 23	60 x 4,0	EI 60 / E 90 – C/U EI 60 / E 90 – C/C
			24 – 36	60 x 6,0	EI 60 / E 90 – C/U EI 60 / E 90 – C/C
			37 – 49	60 x 8,0	EI 60 / E 90 – C/U EI 60 / E 90 – C/C
			50	60 x 8,0	EI 90 – C/U EI 90 – C/C

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Table B4.2 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	169 < D ≤ 180	4,0 – 14,2	24 – 36	60 x 6,0	EI 60 / E 90 – C/U EI 60 / E 90 – C/C
			37 – 49	60 x 8,0	EI 60 / E 90 – C/U EI 60 / E 90 – C/C
			50	60 x 8,0	EI 90 – C/U EI 90 – C/C
	180 < D ≤ 200	4,0 – 14,2	38 – 49	60 x 8,0	EI 60 / E 90 – C/U EI 60 / E 90 – C/C
			50	60 x 8,0	EI 90 – C/U EI 90 – C/C
	200 < D ≤ 219	4,0 – 14,2	50	60 x 8,0	EI 90 – C/U EI 90 – C/C

Table B4.3 Copper pipes with PE foam insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	D ≤ 6,35	≥ 0,8	9	60 x 4,0	EI 240 – C/U EI 240 – C/C
	6,35 < D ≤ 15,88	≥ 1,0	9	60 x 4,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C

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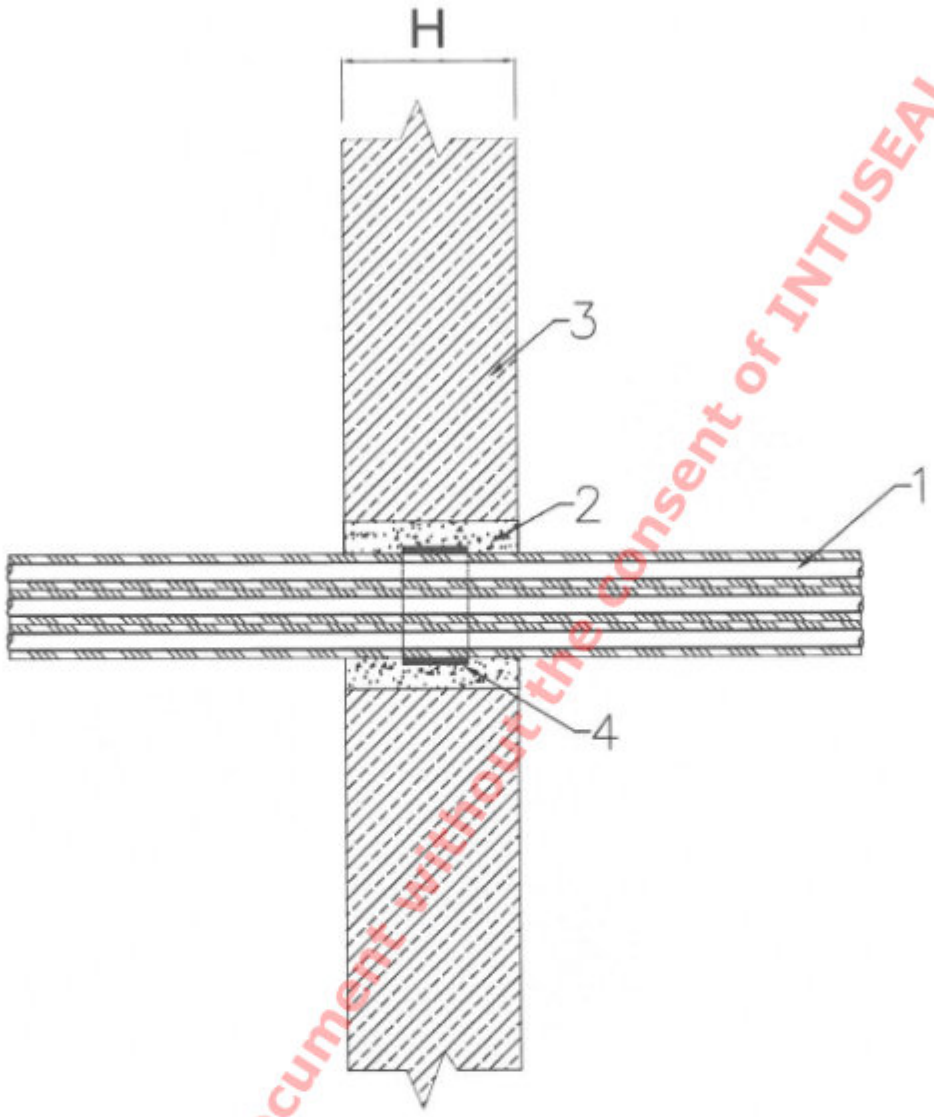
Plastic or insulated metal pipes bundle penetration seal in rigid wall, made with use of INTU FR WRAP L



1 Metal pipes bundle (max. 3 pipes with diameter of D and pipe wall thickness t, in continuous PE foam insulation) or plastic pipes bundle (max. 3 pipes with diameter of D and pipe wall thickness t)
2 Space between the wrap and wall filled with cement mortar; ring with max. 110 mm width, on the whole depth of the wall
3 Rigid wall with thickness of H ≥ 150 mm
4 INTU FR WRAP L (one wrap placed in the centre of the wall thickness); all pipes wrapped with one wrap or each pipe wrapped individually

INTU FR WRAP and INTU FR WRAP L	Annex B5
Penetration seals made with use of INTU FR WRAP L Plastic or metal pipes bundles penetration seals in rigid wall	of European Technical Assessment ETA-18/0593

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Resistance to fire classification of plastic or metal pipes bundles penetration seals, made in accordance with Annex A and Annex B5.

Table B6.1 Copper pipes bundle with PE foam:

- bundle of max. 2 pipes with diameter of D ≤ 6,35 mm and pipe wall thickness of t = 0,8 mm and max. 1 pipe with diameter of D ≤ 15,88 mm and pipe wall thickness of t = 1,0 mm,
- PE foam insulation thickness of 9 mm,
- intumescent material of INTU FR WRAP L (width x thickness): 60 x 4,0 mm

Fire resistance class: EI 180 – C/U
Fire resistance class: EI 180 – C/C

Table B6.2 Plastic pipes bundle:

- bundle of max. 2 PE-HD, PE, ABS or SAN+PVC pipes with diameter of D ≤ 32 mm and pipe wall thickness of t = 2,0 mm and max. 1 PVC-U or PVC-C pipe with diameter of D ≤ 50 mm and pipe wall thickness of t = 1,8 mm,
- intumescent material of INTU FR WRAP L (width x thickness): 60 x 2,0 mm

Fire resistance class: EI 240 – C/U
Fire resistance class: EI 240 – C/C

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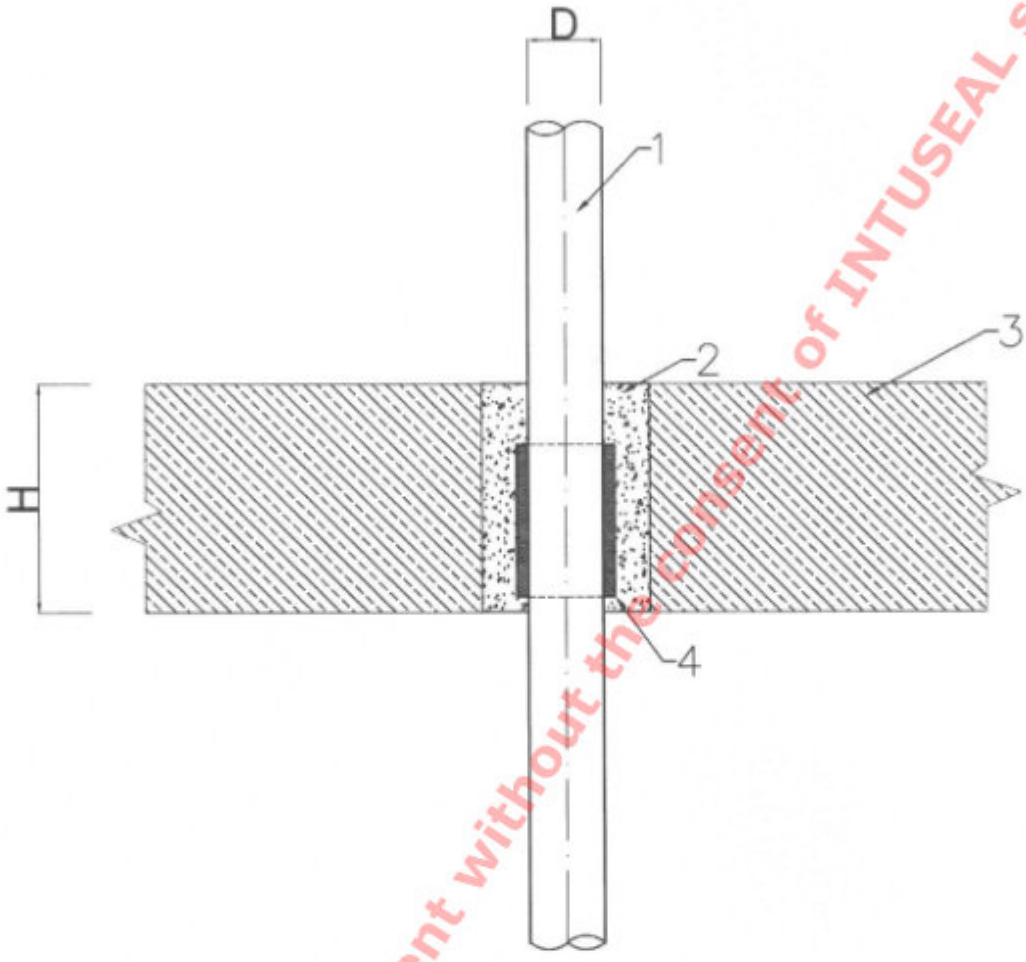
Plastic pipe penetration seal in rigid floor, made with use of INTU FR WRAP or INTU FR WRAP L



1 Plastic pipe, with diameter of D and pipe wall thickness t
2 Space between the wrap and floor filled with cement mortar; ring with max. 110 mm width, on the whole depth of the floor
3 Rigid floor with thickness of H ≥ 150 mm
4 INTU FR WRAP or INTU FR WRAP L (one wrap placed in the distance of max. 10 mm from the bottom of the floor)

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INTU FR WRAP and INTU FR WRAP L	**Annex B7**
Penetration seals made with use of INTU FR WRAP or INTU FR WRAP L Plastic pipes penetration seals in rigid floor	of European Technical Assessment ETA-18/0593

Resistance to fire classification of plastic pipes penetration seals, made in accordance with Annex A and Annex B7.

Table B8.1 PVC-U or PVC-C pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PVC-U or PVC-C	D ≤ 32	1,8 – 4,2	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
	32 < D ≤ 40	1,8 – 4,2	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
	40 < D ≤ 50	1,8 – 4,2	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
	50 < D ≤ 55	1,9 – 4,2	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
	55 < D ≤ 63	1,9 – 4,2	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
	63 < D ≤ 75	1,9 – 4,2	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
	75 < D ≤ 90	2,1 – 3,4	60 x 4,0	**EI 240 – U/C** **EI 240 – C/C**
		3,5 – 4,2	60 x 4,0	**EI 180 – U/C** **EI 180 – C/C**
	90 < D ≤ 110	2,2	60 x 4,0	**EI 240 – U/C** **EI 240 – C/C**
		2,2 – 4,2	60 x 4,0	**EI 180 – U/C** **EI 180 – C/C**
	110 < D ≤ 125	2,5 – 3,9	100 x 8,0	**EI 120 – U/C** **EI 120 – C/C**
		4,0 – 5,3	100 x 8,0	**EI 240 – U/C** **EI 240 – C/C**
		5,4 – 7,7	100 x 10,0	**EI 240 – U/C** **EI 240 – C/C**
	125 < D ≤ 160	3,2 – 7,6	100 x 10,0	**EI 120 – U/C** **EI 120 – C/C**
		7,7	100 x 10,0	**EI 240 – U/C** **EI 240 – C/C**
	160 < D ≤ 170	4,4 – 7,6	100 x 12,0	**EI 120 – U/C** **EI 120 – C/C**
		7,7	100 x 12,0	**EI 240 – U/C** **EI 240 – C/C**
	170 < D ≤ 185	6,1 – 7,6	100 x 14,0	**EI 120 – U/C** **EI 120 – C/C**
		7,7	100 x 14,0	**EI 240 – U/C** **EI 240 – C/C**
	185 < D ≤ 200	7,7	100 x 16,0	**EI 240 – U/C** **EI 240 – C/C**

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Table B8.2 PE-HD, PE, ABS or SAN+PVC pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	D ≤ 32	2,0 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	32 < D ≤ 40	2,2 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	40 < D ≤ 50	2,5 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	50 < D ≤ 55	2,6 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	55 < D ≤ 63	2,8 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	63 < D ≤ 75	3,0 – 6,8	60 x 2,0	EI 240 – U/C EI 240 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	75 < D ≤ 90	3,6 – 5,7	60 x 4,0	EI 240 – U/C EI 240 – C/C
		5,8 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	90 < D ≤ 110	5,7	60 x 4,0	EI 240 – U/C EI 240 – C/C
		5,8 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	110 < D ≤ 125	4,8 – 5,8	100 x 8,0	EI 240 – U/C EI 240 – C/C
		5,9 – 6,2	100 x 8,0	EI 120 – U/C EI 120 – C/C
		5,9 – 6,2	100 x 10,0	EI 240 – U/C EI 240 – C/C
		6,3 – 9,5	100 x 8,0	EI 120 – U/C EI 120 – C/C
		6,3 – 9,5	100 x 10,0	EI 240 – U/C EI 240 – C/C
		9,6 – 9,9	100 x 8,0	EI 120 – U/C EI 120 – C/C
	125 < D ≤ 160	6,2 – 9,5	100 x 10,0	EI 240 – U/C EI 240 – C/C
	160 < D ≤ 170	6,6 – 10,1	100 x 12,0	EI 90 – U/C EI 90 – C/C
		10,2 – 11,0	100 x 14,0	EI 90 – U/C EI 90 – C/C
		11,1 – 11,9	100 x 16,0	EI 90 – U/C EI 90 – C/C

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Table B8.2 PE-HD, PE, ABS or SAN+PVC pipes (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	170 < D ≤ 185	7,2 – 11,0	100 x 14,0	EI 90 – U/C EI 90 – C/C
		11,1 – 11,9	100 x 16,0	EI 90 – U/C EI 90 – C/C
	185 < D ≤ 200	7,7 – 11,9	100 x 16,0	EI 90 – U/C EI 90 – C/C

Table B8.3 PP pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP	D ≤ 32	1,8 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	32 < D ≤ 40	1,8 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	40 < D ≤ 50	1,8 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	50 < D ≤ 55	1,9 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	55 < D ≤ 63	1,9 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	63 < D ≤ 75	1,9 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	75 < D ≤ 90	2,3 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	90 < D ≤ 110	2,7 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	110 < D ≤ 125	3,6 – 3,7	100 x 8,0	EI 45 – U/C EI 45 – C/C
		3,8 – 14,8	100 x 8,0	EI 90 – U/C EI 90 – C/C
		14,9 – 16,7	100 x 8,0	EI 45 – U/C EI 45 – C/C
	125 < D ≤ 160	5,5 – 6,1	100 x 10,0	EI 45 – U/C EI 45 – C/C
		6,2	100 x 10,0	EI 90 – U/C EI 90 – C/C
		6,3 – 12,5	100 x 10,0	EI 45 – U/C EI 45 – C/C

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Table B8.3 PP pipes (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP	160 < D ≤ 170	6,1 – 11,3	100 x 12,0	EI 45 – U/C EI 45 – C/C
	170 < D ≤ 185	6,9 – 9,5	100 x 14,0	EI 45 – U/C EI 45 – C/C
	185 < D ≤ 200	7,7	100 x 16,0	EI 45 – U/C EI 45 – C/C

Table B8.4 PE-RT/Al/PE-RT pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-RT/Al/PE-RT	D ≤ 20	2,0	60 x 2,0	EI 240 – U/C EI 240 – C/C
		2,1 – 7,5	60 x 2,0	EI 180 / E 240 – U/C EI 180 / E 240 – C/C
	20 < D ≤ 75	7,5	60 x 2,0	EI 180 / E 240 – U/C EI 180 / E 240 – C/C

Table B8.5 PE-X/Al/PE-X pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-X/Al/PE-X	D ≤ 20	2,0 – 7,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
	20 < D ≤ 75	7,5	60 x 2,0	EI 240 – U/C EI 240 – C/C

Table B8.6 PP-R/Al/PP-R pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R/Al/PP-R	D ≤ 20	3,4 – 12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	20 < D ≤ 75	12,5	60 x 2,0	EI 240 – U/C EI 240 – C/C
		12,6 – 18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C
	20 < D ≤ 110	18,4	60 x 4,0	EI 240 – U/C EI 240 – C/C

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Table B8.7 PP-R/PP-R-GF/PP-R pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R/PP-R-GF/PP-R	D ≤ 20	2,8 – 12,5	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
		12,6 – 18,4	60 x 4,0	**EI 240 – U/C** **EI 240 – C/C**
	20 < D ≤ 75	12,5	60 x 2,0	**EI 240 – U/C** **EI 240 – C/C**
		12,6 – 18,4	60 x 4,0	**EI 240 – U/C** **EI 240 – C/C**
	20 < D ≤ 110	18,4	60 x 4,0	**EI 240 – U/C** **EI 240 – C/C**

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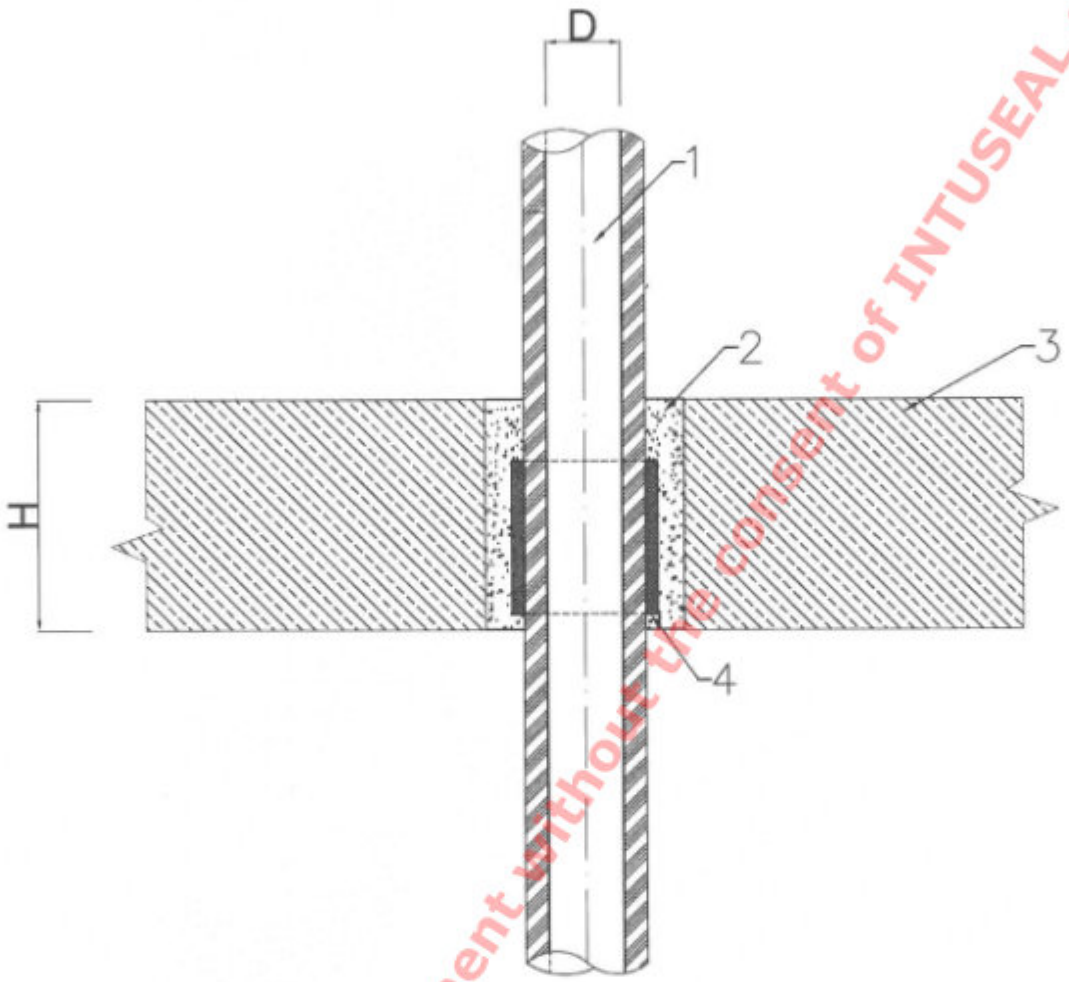
Insulated plastic or insulated metal pipe penetration seal in rigid floor, made with use of INTU FR WRAP L



1 Metal or plastic pipe, with diameter of D and pipe wall thickness t, in continuous flexible elastomeric foam (FEF) or PE foam insulation, with thickness of b
2 Space between the wrap and floor filled with cement mortar; ring with max. 110 mm width, on the whole depth of the floor
3 Rigid floor with thickness of H ≥ 150 mm
4 INTU FR WRAP L (one wrap placed in the distance of max. 10 mm from the bottom of the floor)

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INTU FR WRAP and INTU FR WRAP L	Annex B9
Penetration seals made with use of INTU FR WRAP L Insulated plastic or metal pipes penetration seals in rigid floor	of European Technical Assessment ETA-18/0593

Resistance to fire classification of plastic or metal pipes penetration seals, made in accordance with Annex A and Annex B9.

Table B9.1 PE-HD, PE, ABS or SAN+PVC pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	D ≤ 110,0	10,0	9 – 13	60 x 8,0	EI 120 – U/C EI 120 – C/C

Table B9.2 PP pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP	D ≤ 110,0	2,7	9	60 x 8,0	EI 120 – U/C EI 120 – C/C

Table B9.3 PP-R pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R	D ≤ 110,0	18,3	9	60 x 8,0	EI 120 – U/C EI 120 – C/C

Table B9.4 PP-R/PP-R-GF/PP-R pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP-R/PP-R-GF/PP-R	D ≤ 110,0	15,1	9	60 x 8,0	EI 120 – U/C EI 120 – C/C

Table B9.5 Copper pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	D ≤ 15,0	≥ 1,0	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 22	60 x 4,0	EI 240 – C/U EI 240 – C/C
			23 – 36	60 x 6,0	EI 240 – C/U EI 240 – C/C
			37 – 38	60 x 8,0	EI 240 – C/U EI 240 – C/C
			39 – 40	60 x 8,0	EI 240 – C/U EI 240 – C/C
			41 – 49	60 x 8,0	EI 240 – C/U EI 240 – C/C
			50	60 x 8,0	EI 240 – C/U EI 240 – C/C

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Table B9.5 Copper pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	15,0 < D ≤ 42,4	1,4 – 14,4	9	60 x 2,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			10 – 22	60 x 4,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			23 – 36	60 x 6,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			37 – 38	60 x 8,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			39 – 40	60 x 8,0	EI 180 – C/U EI 180 – C/C
			41 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	42,4 < D ≤ 44,5	1,4 – 14,4	9	60 x 2,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			10 – 22	60 x 4,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			23 – 36	60 x 6,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			37 – 38	60 x 8,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			39 – 40	60 x 8,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			41 – 49	60 x 8,0	EI 180 – C/U EI 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C
	44,5 < D ≤ 54,0	1,5 – 14,4	9	60 x 2,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			10 – 22	60 x 4,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			23 – 36	60 x 6,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			37 – 38	60 x 8,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			39 – 40	60 x 8,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			41 – 49	60 x 8,0	EI 120 / E 180 – C/U EI 120 / E 180 – C/C
			50	60 x 8,0	EI 180 – C/U EI 180 – C/C

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Table B9.6 Steel pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	D ≤ 42,4	2,0 – 14,2	9	60 x 2,0	EI 240 – C/U EI 240 – C/C
			10 – 22	60 x 4,0	EI 240 – C/U EI 240 – C/C
	D ≤ 42,4	2,0 – 14,2	23 – 36	60 x 6,0	EI 240 – C/U EI 240 – C/C
			37 – 49	60 x 8,0	EI 240 – C/U EI 240 – C/C
			50	60 x 8,0	EI 240 – C/U EI 240 – C/C
	42,4 < D ≤ 44,5	2,1 – 2,5	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	44,5 < D ≤ 54,0	2,2 – 2,5	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C

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B9.6 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	44,5 < D ≤ 54,0	2,6 – 14,2	24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	54,0 < D ≤ 57,0	2,3 – 2,5	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	57,0 < D ≤ 63,5	2,4 – 2,5	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	57,0 < D ≤ 63,5	2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C

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B9.6 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	57,0 < D ≤ 63,5	2,6 – 14,2	50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	63,5 < D ≤ 70,0	2,5	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
		2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	70,0 < D ≤ 76,1	2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	76,1 < D ≤ 82,5	2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C

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B9.6 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	76,1 < D ≤ 82,5	2,6 – 14,2	50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	82,5 < D ≤ 88,9	2,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 12	60 x 2,0	EI 120 – C/U EI 120 – C/C
			13	60 x 2,0	EI 180 / E 240 – C/U EI 180 / E 240 – C/C
			14 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			24 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	88,9 < D ≤ 101,6	3,1 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
	88,9 < D ≤ 101,6	3,1 – 14,2	50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	101,6 < D ≤ 108	3,2 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	108 < D ≤ 114,3	3,3 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	114,3 < D ≤ 127	3,5 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C

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B9.6 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	114,3 < D ≤ 127	3,5 – 14,2	37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	127< D ≤ 133	3,6 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	133< D ≤ 139,7	3,7 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	139,7< D ≤ 152,4	3,9 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	152,4< D ≤ 159	4,0 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 36	60 x 6,0	EI 120 – C/U EI 120 – C/C
			37 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	159 < D ≤ 169	4,1 – 14,2	16 – 23	60 x 4,0	EI 45 – C/U EI 45 – C/C
			24 – 36	60 x 6,0	EI 45 – C/U EI 45 – C/C
			37 – 49	60 x 8,0	EI 45 – C/U EI 45 – C/C
			50	60 x 8,0	EI 45 – C/U EI 45 – C/C

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B9.6 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	169 < D ≤ 180	4,2 – 14,2	24 – 36	60 x 6,0	EI 45 – C/U EI 45 – C/C
			37 – 49	60 x 8,0	EI 45 – C/U EI 45 – C/C
			50	60 x 8,0	EI 45 – C/U EI 45 – C/C
	180 < D ≤ 200	4,4 – 14,2	38 – 49	60 x 8,0	EI 45 – C/U EI 45 – C/C
	180 < D ≤ 200	4,4 – 14,2	50	60 x 8,0	EI 45 – C/U EI 45 – C/C
	200 < D ≤ 219	4,5 – 14,2	50	60 x 8,0	EI 45 – C/U EI 45 – C/C

B9.7 Copper pipes with PE foam insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Copper	D ≤ 6,35	≥ 0,8	9	60 x 4,0	EI 240 – C/U EI 240 – C/C
	6,35 < D ≤ 15,88	≥ 1,0	9	60 x 4,0	EI 240 – C/U EI 240 – C/C

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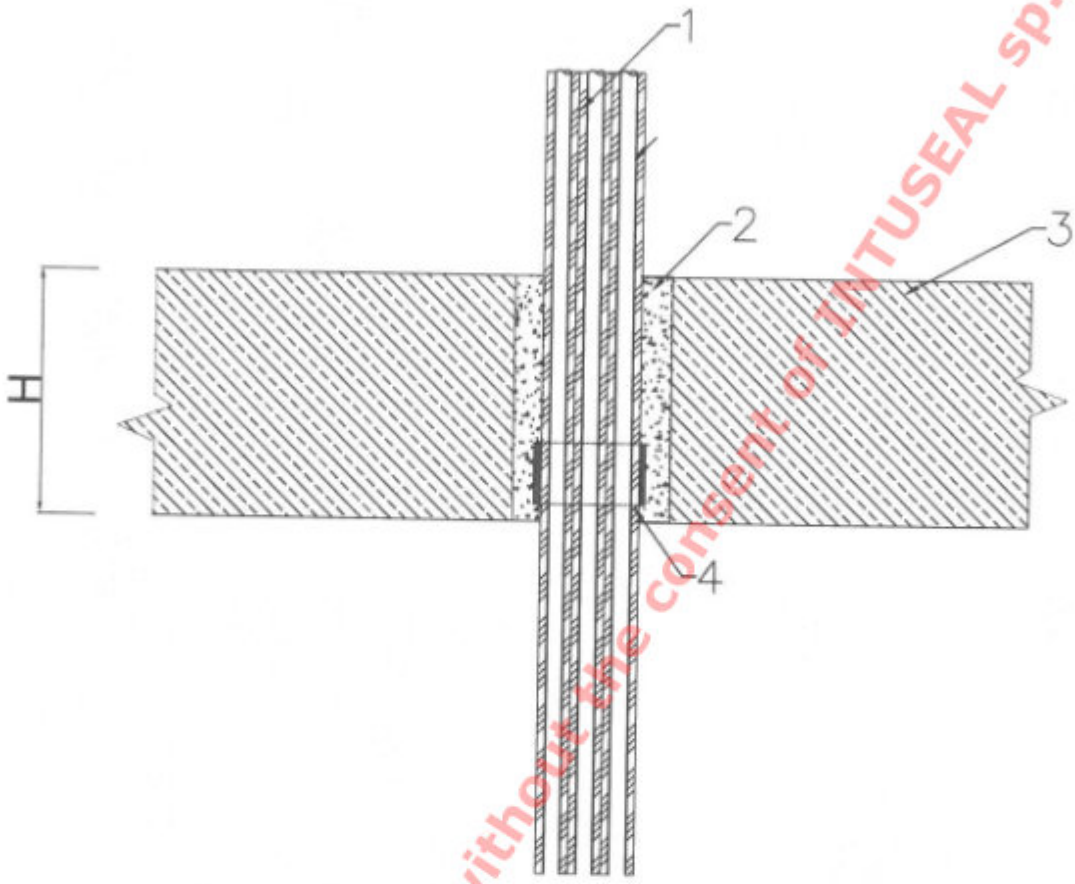
Insulated metal pipes bundle penetration seal in rigid floor, made with use of INTU FR WRAP L



1 Metal pipes bundle (max. 3 pipes with diameter of D and pipe wall thickness t, in continuous PE foam insulation)
2 Space between the wrap and floor filled with cement mortar; ring with max. 110 mm width, on the whole depth of the floor
3 Rigid floor with thickness of H ≥ 150 mm
4 INTU FR WRAP L (one wrap placed in the distance of max. 10 mm from the bottom of the floor); all pipes wrapped with one wrap or each pipe wrapped individually

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Resistance to fire classification of metal pipes bundles penetration seals, made in accordance with Annex A and Annex B11.

Table B12.1 Copper pipes bundle with PE foam:

- bundle of max. 2 pipes with diameter of D ≤ 6,35 mm and pipe wall thickness of t = 0,8 mm and max. 1 pipe with diameter of D ≤ 15,88 mm and pipe wall thickness of t = 1,0 mm,
- PE foam insulation thickness of 9 mm,
- intumescent material of INTU FR WRAP L (width x thickness): 60 x 4,0 mm

Fire resistance class: EI 180 / E 240 – C/U **Fire resistance class: EI 180 / E 240 – C/C**

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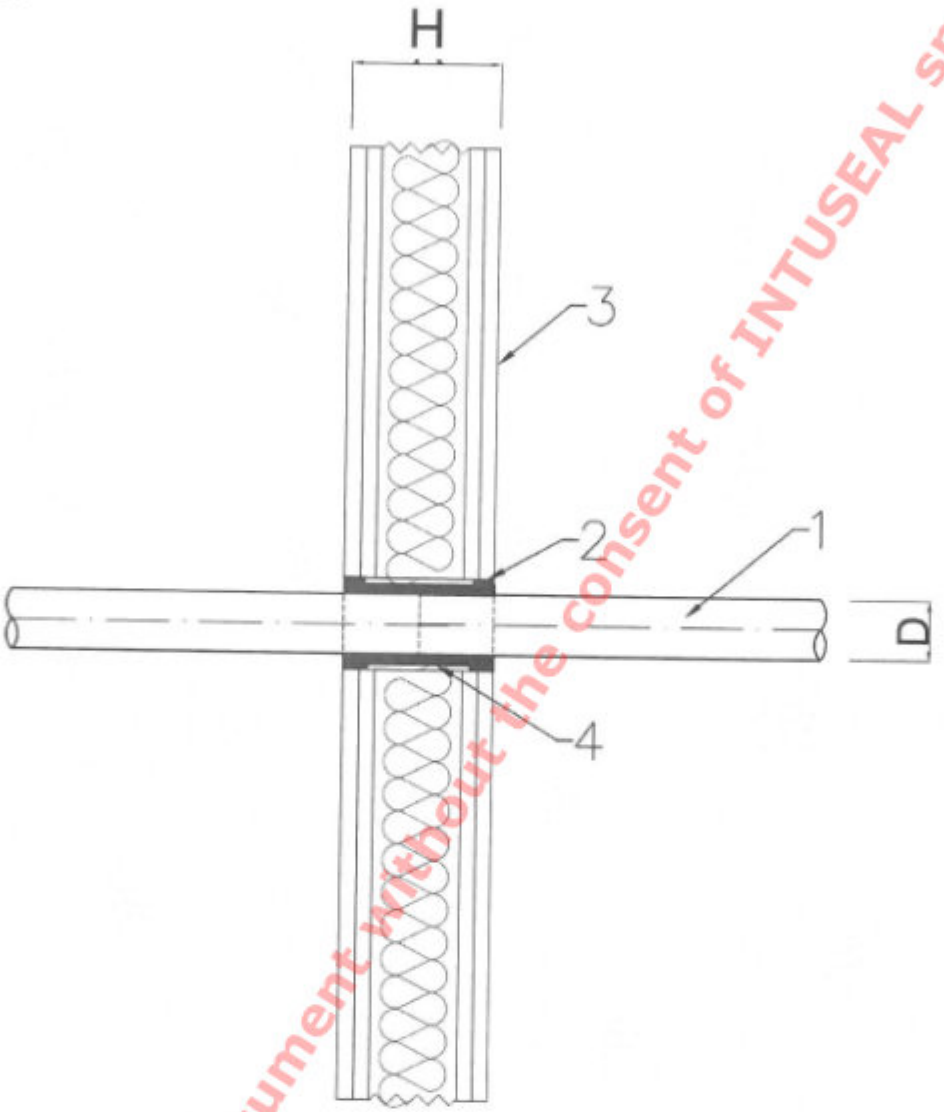
Plastic pipe penetration seal in flexible or rigid wall, made with use of INTU FR WRAP or INTU FR WRAP L



1 Plastic pipe, with diameter of D and pipe wall thickness t
2 Space between the wrap and wall filled with cement mortar:
– in case of flexible walls: ring with max. 10 mm width, on the depth of at least 15 mm on both sides of the wall
– in case of rigid walls: ring with max. 110 mm width, on the whole depth of the wall
3 Flexible or rigid wall with thickness of H ≥ 125 mm
4 INTU FR WRAP or INTU FR WRAP L (two wraps placed on both sides of the wall; there shall be no gap between the wrap and the surface of the penetration seal)

INTU FR WRAP and INTU FR WRAP L	**Annex B13**
Penetration seals made with use of INTU FR WRAP or INTU FR WRAP L Plastic pipes penetration seals in flexible or rigid wall	of European Technical Assessment ETA-18/0593

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Resistance to fire classification of plastic pipes penetration seals, made in accordance with Annex A and Annex B13.

Table B14.1 PVC-U or PVC-C pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PVC-U or PVC-C	D ≤ 32	1,8 – 3,6	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,7 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	32 < D ≤ 40	1,8 – 3,6	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,7 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	40 < D ≤ 50	1,8 – 3,6	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,7 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	50 < D ≤ 55	1,9 – 3,6	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,7 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	55 < D ≤ 63	1,9 – 3,6	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,7 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	63 < D ≤ 75	1,9 – 3,6	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,7 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	75 < D ≤ 90	2,1 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C
	90 < D ≤ 110	2,2 – 4,2	60 x 4,0	EI 120 – U/C EI 120 – C/C

Table B14.2 PE-HD, PE, ABS or SAN+PVC pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	D ≤ 32	2,0 – 3,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,1 – 6,8	60 x 2,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
		3,1 – 6,8	60 x 4,0	EI 120 – U/C EI 120 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	32 < D ≤ 40	2,2 – 3,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,1 – 6,8	60 x 2,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
		3,1 – 6,8	60 x 4,0	EI 120 – U/C EI 120 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C

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Table B14.2 PE-HD, PE, ABS or SAN+PVC pipes (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PE-HD, PE, ABS or SAN+PVC	40 < D ≤ 50	2,5 – 3,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,1 – 6,8	60 x 2,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
		3,1 – 6,8	60 x 4,0	EI 120 – U/C EI 120 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	50 < D ≤ 55	2,6 – 3,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,1 – 6,8	60 x 2,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
		3,1 – 6,8	60 x 4,0	EI 120 – U/C EI 120 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	55 < D ≤ 63	2,8 – 3,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,1 – 6,8	60 x 2,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
		3,1 – 6,8	60 x 4,0	EI 120 – U/C EI 120 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	63 < D ≤ 75	3,0	60 x 2,0	EI 120 – U/C EI 120 – C/C
		3,1 – 6,8	60 x 2,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
		3,1 – 6,8	60 x 4,0	EI 120 – U/C EI 120 – C/C
		6,9 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	75 < D ≤ 90	3,6 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C
	90 < D ≤ 110	4,2 – 10,0	60 x 4,0	EI 120 – U/C EI 120 – C/C

Table B14.3 PP pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP	D ≤ 32	1,8 – 12,5	60 x 2,0	EI 120 – U/C EI 120 – C/C
		12,6 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
	32 < D ≤ 40	1,8 – 12,5	60 x 2,0	EI 120 – U/C EI 120 – C/C
		12,6 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
	40 < D ≤ 50	1,8 – 12,5	60 x 2,0	EI 120 – U/C EI 120 – C/C
		12,6 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C

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Table B14.3 PP pipes

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Intumescent material width x thickness [mm]	Fire resistance class
PP	50 < D ≤ 55	1,9 – 12,5	60 x 2,0	EI 120 – U/C EI 120 – C/C
		12,6 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
	55 < D ≤ 63	1,9 – 12,5	60 x 2,0	EI 120 – U/C EI 120 – C/C
		12,6 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
	63 < D ≤ 75	1,9 – 12,5	60 x 2,0	EI 120 – U/C EI 120 – C/C
		12,6 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
	75 < D ≤ 90	2,3 – 8,3	60 x 4,0	EI 120 – U/C EI 120 – C/C
		8,4 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C
	90 < D ≤ 110	2,7	60 x 4,0	EI 120 – U/C EI 120 – C/C
		2,8 – 18,4	60 x 4,0	EI 90 / E 120 – U/C EI 90 / E 120 – C/C

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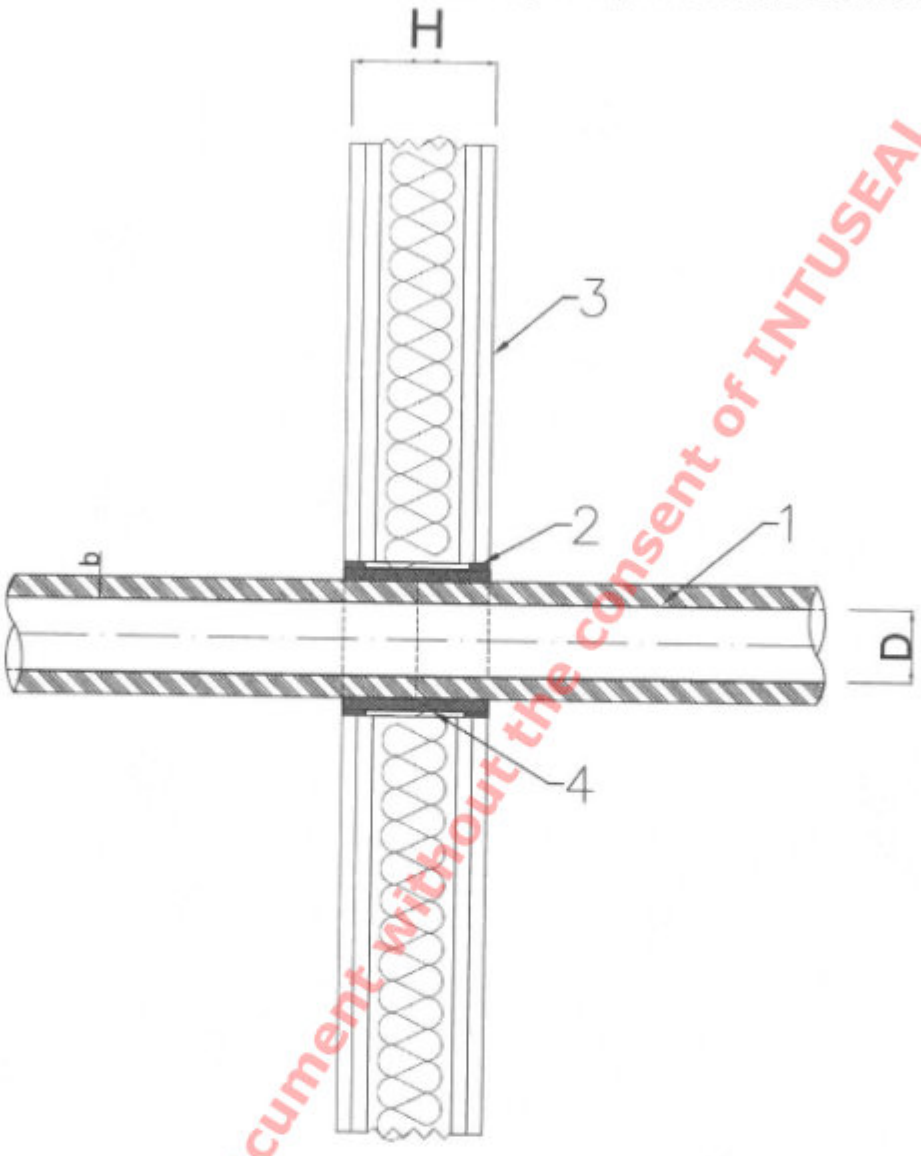
Insulated metal pipe penetration seal in flexible or rigid wall, made with use of INTU FR WRAP L



1 Metal pipe, with diameter of D and pipe wall thickness t, in continuous flexible elastomeric foam (FEF) insulation, with thickness of b
2 Space between the wrap and wall filled with cement mortar:
– in case of flexible walls: ring with max. 10 mm width, on the depth of at least 15 mm on both sides of the wall
– in case of rigid walls: ring with max. 110 mm width, on the whole depth of the wall
3 Flexible or rigid wall with thickness of H ≥ 125 mm
4 INTU FR WRAP L (two wraps placed on both sides of the wall; there shall be no gap between the wrap and the surface of the penetration seal)

INTU FR WRAP and INTU FR WRAP L	**Annex B15**
Penetration seals made with use of INTU FR WRAP L Metal pipes penetration seals in flexible or rigid wall	of European Technical Assessment ETA-18/0593

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Resistance to fire classification of metal pipes penetration seals, made in accordance with Annex A and Annex B15.

Table B16.1 Steel pipes with flexible elastomeric foam (FEF) insulation

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	D ≤ 42,4	2,0 – 14,2	9	60 x 2,0	EI 120 – C/U EI 120 – C/C
			10 – 11	60 x 4,0	EI 120 – C/U EI 120 – C/C
			12 – 20	60 x 4,0	EI 120 – C/U EI 120 – C/C
			21 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 28	60 x 6,0	EI 120 – C/U EI 120 – C/C
			29 – 34	60 x 6,0	EI 120 – C/U EI 120 – C/C
			35 – 39	60 x 8,0	EI 120 – C/U EI 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	42,4 < D ≤ 44,5	2,1 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 120 – C/U EI 120 – C/C
			21 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C
			23 – 28	60 x 6,0	EI 120 – C/U EI 120 – C/C
			29 – 34	60 x 6,0	EI 120 – C/U EI 120 – C/C
			35 – 39	60 x 8,0	EI 120 – C/U EI 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	44,5 < D ≤ 54,0	2,2 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 120 – C/U EI 120 – C/C

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Table B16.1 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	44,5 < D ≤ 54,0	2,2 – 14,2	23 – 28	60 x 6,0	EI 120 – C/U EI 120 – C/C
			29 – 34	60 x 6,0	EI 120 – C/U EI 120 – C/C
			35 – 39	60 x 8,0	EI 120 – C/U EI 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	54,0 < D ≤ 57,0	2,2 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			23 – 28	60 x 6,0	EI 120 – C/U EI 120 – C/C
			29 – 34	60 x 6,0	EI 120 – C/U EI 120 – C/C
			35 – 39	60 x 8,0	EI 120 – C/U EI 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	57,0 < D ≤ 63,5	2,3 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			23 – 28	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			29 – 34	60 x 6,0	EI 120 – C/U EI 120 – C/C
			35 – 39	60 x 8,0	EI 120 – C/U EI 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C

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Table B16.1 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	63,5 < D ≤ 70,0	2,4 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			23 – 28	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			29 – 34	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			35 – 39	60 x 8,0	EI 120 – C/U EI 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	70,0 < D ≤ 76,1	2,5 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			23 – 28	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			29 – 34	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			35 – 39	60 x 8,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			40 – 45	60 x 8,0	EI 120 – C/U EI 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	76,1 < D ≤ 82,5	2,6 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			23 – 28	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			29 – 34	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C

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Table B16.1 Steel pipes with flexible elastomeric foam (FEF) insulation (continued)

Pipe material	Pipe diameter, D [mm]	Pipe wall thickness, t [mm]	Insulation material thickness, b [mm]	Intumescent material width x thickness [mm]	Fire resistance class
Steel	76,1 < D ≤ 82,5	2,6 – 14,2	35 – 39	60 x 8,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			40 – 45	60 x 8,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			46 – 49	60 x 8,0	EI 120 – C/U EI 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C
	82,5 < D ≤ 88,9	2,6 – 14,2	9	60 x 2,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			10 – 11	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			12 – 20	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			21 – 22	60 x 4,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			23 – 28	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			29 – 34	60 x 6,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			35 – 39	60 x 8,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			40 – 45	60 x 8,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			46 – 49	60 x 8,0	EI 90 / E 120 – C/U EI 90 / E 120 – C/C
			50	60 x 8,0	EI 120 – C/U EI 120 – C/C

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