

## DECLARATION OF PERFORMANCE

No.: DoP 1/2019

1. Unique identification code of product-type:

**INTU FR WRAP**

2. Intended uses:

**Restoring the fire resistance of flexible walls, rigid walls, and rigid ceilings when they carry installation penetrations for plastic pipes (with or without insulation), insulated metal pipes, single or in bundles, with or without heating cable, cables, or cables in conduits**

3. Manufacturer:

**ALFASEAL GROUP Sp. z o.o.  
ul. Kineskopowa 1, 05-500 Piaseczno**

4. Authorized representative:

**Not applicable**

5. System or systems of Assessment and Verification of Constancy of Performance (AVCP):

**System 1**

6a. Harmonised standard:

**Not applicable**

Notified body or bodies:

**Not applicable**

6b. European Assessment Document:

**EAD 350454-00-1104**

European Technical Assessment:

**ETA-18/0593 of 30.09.2025**

Technical Assessment Body:

**ITB, ul. Filtrowa 1, 00-611 Warszawa**

Notified body or bodies:

**No. 1488**

7. Declared performance:

**Tabela 1.**

Basic requirements	Performance characteristics
<b>BWR 2 Safety in case to fire</b>	
Reaction to fire	Class E
Resistance to fire	Tables B1.1 ÷ 32.6



Table B1.1. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	$D \leq 32$	2.0 – 6.8	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		6.9 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	$32 < D \leq 50$	2.6 – 6.7	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.8	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		6.9 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.9 – 6.7	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	$50 < D \leq 63$	6.8	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		6.9 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.3 – 6.7	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.8	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	$63 < D \leq 75$	6.9 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.5 – 4.1	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		4.2	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
		4.2 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	$75 < D \leq 90$	4.2	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
		4.2 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		4.2	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
		4.2 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	$90 < D \leq 110$	4.2	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
		4.2 – 10.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		4.8 – 9.5	-	1 x 100.0 x 6.0	EI 120-U/C EI 120-C/C
		9.5	-	1 x 100.0 x 10.0	EI 180-U/C EI 180-C/C
	$110 < D \leq 125$	9.6 – 10.0	-	1 x 100.0 x 6.0	EI 120-U/C EI 120-C/C
		6.2 – 9.4	-	1 x 100.0 x 10.0	EI 120-U/C EI 120-C/C
		9.5	-	1 x 100.0 x 10.0	EI 180-U/C EI 180-C/C
		9.6 – 10.0	-	1 x 100.0 x 10.0	EI 120-U/C EI 120-C/C
	$125 < D \leq 160$	7.7	-	1 x 100.0 x 16.0	EI 90-U/C EI 90-C/C
		7.8 – 11.9	-	1 x 100.0 x 16.0	EI 60-U/C EI 60-C/C

Table B1.1, cont. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT	$D \leq 20$	2.0 – 7.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		2.5	-	1 x 60.0 x 2.0	
		4.0	-	1 x 60.0 x 2.0	
		6.3	-	1 x 60.0 x 2.0	
		7.5	-	1 x 60.0 x 2.0	
PE-X	$D \leq 20$	2.0	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		2.1 – 7.5	-	1 x 60.0 x 2.0	EI 180 / E 240-U/C EI 180 / E 240-C/C
	$20 < D \leq 25$	2.5	-	1 x 60.0 x 2.0	EI 180 / E 240-U/C EI 180 / E 240-C/C
		4.0	-	1 x 60.0 x 2.0	
		6.3	-	1 x 60.0 x 2.0	
		7.5	-	1 x 60.0 x 2.0	
		2.0 – 5.8	-	1 x 60.0 x 2.0	
3.0	-	1 x 60.0 x 2.0			
3.7	-	1 x 60.0 x 2.0			
4.6	-	1 x 60.0 x 2.0			
5.8	-	1 x 60.0 x 2.0			
PP-R	$D \leq 20$	2.3 – 3.3	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.4	-	1 x 60.0 x 2.0	
	$20 < D \leq 25$	3.2 – 4.1	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		4.2	-	1 x 60.0 x 2.0	
	$25 < D \leq 32$	3.8 – 5.3	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		5.4	-	1 x 60.0 x 2.0	
		4.4 – 6.6	-	1 x 60.0 x 2.0	
		6.7	-	1 x 60.0 x 2.0	

Table B1.1, cont. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R	$40 < D \leq 50$	5.2 – 8.2	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		8.3	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	$50 < D \leq 63$	6.1 – 10.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		10.5	-	1 x 60.0 x 2.0	
	$63 < D \leq 75$	6.8 – 12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	
	$63 < D \leq 75$	12.6 – 18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		8.2 – 18.3	-	1 x 60.0 x 4.0	
		10.0 – 18.3	-	1 x 60.0 x 4.0	
		1.8 – 12.5	-	1 x 60.0 x 2.0	
1.9 – 12.4	-	1 x 60.0 x 2.0			
12.5	-	1 x 60.0 x 2.0			
12.6 – 18.4	-	1 x 60.0 x 2.0			
PP	$50 < D \leq 75$	2.3 – 18.3	-	1 x 60.0 x 2.0	EI 120 / E 180-U/C EI 120 / E 180-C/C
		2.3 – 18.3	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
	18.4	-	1 x 60.0 x 2.0	EI 180-U/C EI 180-C/C	
	2.7 – 18.3	-	1 x 60.0 x 2.0	EI 120 / E 180-U/C EI 120 / E 180-C/C	
	2.7 – 18.3	-	1 x 60.0 x 4.0		
	18.4	-	1 x 60.0 x 2.0		
	18.4	-	1 x 60.0 x 2.0		
	$75 < D \leq 90$	2.7 – 18.3	-	1 x 60.0 x 2.0	EI 60-U/C EI 60-C/C
		2.7 – 18.3	-	1 x 60.0 x 4.0	
		18.4	-	1 x 60.0 x 2.0	
18.4		-	1 x 60.0 x 2.0		
3.8 – 16.7		-	1 x 100.0 x 6.0		
5.5 – 12.5		-	1 x 100.0 x 10.0		
6.1 – 11.3		-	1 x 100.0 x 12.0		
6.9 – 9.5		-	1 x 100.0 x 14.0		
7.7	-	1 x 100.0 x 16.0			

Table B1.1, cont. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
PVC-U/ PVC-C	$D \leq 25$	1.5 – 1.7	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C	
		1.8 – 3.6	-	1 x 60.0 x 2.0		
	$D \leq 25$	3.7 – 4.2	-	1 x 60.0 x 2.0	EI 180-U/C EI 180-C/C	
		1.8 – 3.6	-	1 x 60.0 x 2.0		
	$25 < D \leq 50$	3.7 – 4.2	-	1 x 60.0 x 2.0	EI 180-U/C EI 180-C/C	
		4.3 – 8.1	-	1 x 60.0 x 4.0		
		1.9 – 3.5	-	1 x 60.0 x 2.0		EI 120-U/C EI 120-C/C
		3.6	-	1 x 60.0 x 2.0		
	$50 < D \leq 75$	3.7 – 4.2	-	1 x 60.0 x 2.0	EI 180-U/C EI 180-C/C	
		4.3 – 8.1	-	1 x 60.0 x 4.0		
		2.2 – 3.5	-	1 x 60.0 x 2.0		EI 120-U/C EI 120-C/C
		3.6	-	1 x 60.0 x 2.0		
$75 < D \leq 110$	3.7 – 4.1	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C		
	3.7 – 4.1	-	1 x 60.0 x 4.0			
	4.2	-	1 x 60.0 x 2.0			
	4.2	-	1 x 60.0 x 2.0			
	4.3 – 8.1	-	1 x 60.0 x 4.0			
	4.3 – 8.1	-	1 x 60.0 x 4.0			

Table B1.1, cont. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PVC-U/ PVC-C	110 < D ≤ 125	3.4 – 6.1	-	1 x 100.0 x 8.0	EI 120-U/C EI 120-C/C
		6.2	-	1 x 100.0 x 8.0	EI 120-U/C EI 120-C/C
			-	1 x 100.0 x 10.0	EI 240-U/C EI 240-C/C
	125 < D ≤ 180	6.3 – 9.5	-	1 x 100.0 x 8.0	EI 180-U/C EI 180-C/C
		6.2	-	1 x 100.0 x 10.0	EI 240-U/C EI 240-C/C
			-	1 x 100.0 x 10.0	EI 180-U/C EI 180-C/C
180 < D ≤ 200	5.9	-	1 x 100.0 x 16.0	EI 180-U/C EI 180-C/C	
	6.0 – 7.7	-	1 x 100.0 x 16.0	EI 240-U/C EI 120-C/C	

Table B1.2. Resistance to fire classification of MLC pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	D ≤ 20	2.0	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	20 < D ≤ 25	2.5	-	1 x 60.0 x 2.0	
	25 < D ≤ 40	4.0	-	1 x 60.0 x 2.0	
	40 < D ≤ 63	6.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.3	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
20 < D ≤ 75	7.5	-	1 x 60.0 x 2.0	EI 240-C/C	
PE-X/AL/ PE-X	D ≤ 20	2.0 – 7.5	-	1 x 60.0 x 2.0	
	20 < D ≤ 25	2.5	-	1 x 60.0 x 2.0	
	25 < D ≤ 32	3.0	-	1 x 60.0 x 2.0	
	32 < D ≤ 40	4.0	-	1 x 60.0 x 2.0	
	40 < D ≤ 50	5.5	-	1 x 60.0 x 2.0	
	50 < D ≤ 63	6.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
PP-R/AL/ PP-R	D ≤ 20	3.2 – 3.4	-	1 x 60.0 x 2.0	
	20 < D ≤ 32	4.7 – 5.4	-	1 x 60.0 x 2.0	
	32 < D ≤ 40	5.7 – 6.7	-	1 x 60.0 x 2.0	
	40 < D ≤ 50	6.9 – 8.3	-	1 x 60.0 x 2.0	
	50 < D ≤ 63	8.5 – 10.5	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	63 < D ≤ 75	10.0 – 12.5	-	1 x 60.0 x 2.0	
	75 < D ≤ 90	12.3 – 15.0	-	1 x 60.0 x 4.0	
	90 < D ≤ 110	15.1 – 18.2	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C

Table B1.3. Resistance to fire classification of composite pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/ PP-R-GF/ PP-R	D ≤ 20	2.8 – 10.0	-	1 x 60.0 x 2.0	
		3.7 – 4.3	-	1 x 60.0 x 4.0	
	20 < D ≤ 32	4.4 – 5.4	-	1 x 60.0 x 2.0	
		4.4 – 5.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		5.5 – 6.7	-	1 x 60.0 x 2.0	
		5.2 – 6.8	-	1 x 60.0 x 4.0	
	20 < D ≤ 50	6.9 – 12.5	-	1 x 60.0 x 2.0	
		12.6 – 18.2	-	1 x 60.0 x 4.0	
		18.3	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
	50 < D ≤ 63	6.3 – 8.6	-	1 x 60.0 x 4.0	
		8.7 – 12.5	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.6 – 18.2	-	1 x 60.0 x 4.0	
		18.3	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
	63 < D ≤ 75	7.2 – 10.2	-	1 x 60.0 x 4.0	
		10.3 – 12.5	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.6 – 18.2	-	1 x 60.0 x 4.0	
	75 < D ≤ 90	18.3	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
		8.4 – 18.2	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		18.3	-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C
	90 < D ≤ 110	10.0 – 18.2	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
18.3		-	1 x 60.0 x 4.0	EI 180-U/C EI 180-C/C	

Table B1.4. Resistance to fire classification of bundle of max. 3 plastic pipes (max. 2 x PE-HD, D ≤ 32 mm x t = 2.0 mm + max. 1 x PVC-U, D ≤ 50 mm x t = 1.8 mm) penetration seal in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, length of 60.0 mm and thickness of 2.0 mm (separate tape/wrap for each pipe or one tape/wrap for whole bundle) in accordance with Annex A and Fig. B1:

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

Table B1.5. Resistance to fire classification of MLC pipes (without insulation) penetration seals in flexible or rigid wall thickness of:  $t \geq 100$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	D ≤ 20	2.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.1 – 7.5	-	1 x 60.0 x 2.0	
	20 < D ≤ 25	2.5	-	1 x 60.0 x 2.0	
	25 < D ≤ 40	4.0	-	1 x 60.0 x 2.0	EI 45 / E 90-U/C EI 45 / E 90-C/C
	40 < D ≤ 63	6.3	-	1 x 60.0 x 2.0	
63 < D ≤ 75	7.5	-	1 x 60.0 x 2.0		
PE-X/AL/ PE-X	D ≤ 20	2.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.1 – 7.5	-	1 x 60.0 x 2.0	
	20 < D ≤ 25	2.5	-	1 x 60.0 x 2.0	
	25 < D ≤ 40	4.0	-	1 x 60.0 x 2.0	EI 45 / E 120-U/C EI 45 / E 120-C/C
	40 < D ≤ 63	6.3	-	1 x 60.0 x 2.0	
63 < D ≤ 75	7.5	-	1 x 60.0 x 2.0		
PP-R/AL/ PP-R	D ≤ 20	3.4	-	1 x 60.0 x 2.0	
		3.5 – 10.0	-	1 x 60.0 x 4.0	
	20 < D ≤ 50	8.3	-	1 x 60.0 x 4.0	
	50 < D ≤ 63	10.5	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
	63 < D ≤ 75	12.5	-	1 x 60.0 x 4.0	
	75 < D ≤ 90	15.0	-	1 x 60.0 x 4.0	
90 < D ≤ 110	18.3	-	1 x 60.0 x 4.0		

Table B1.6. Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of:  $t \geq 100$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-M (Magnaplast Ultra dB)	D ≤ 110	3.4	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C

Table B1.7. Resistance to fire classification of composite pipes (without insulation) penetration seals in flexible or rigid wall thickness of:  $t \geq 100$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B1:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/PP-R-GF/ PP-R	D ≤ 20	2.8 – 3.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		4.1 – 4.8	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	20 < D ≤ 32	4.9 – 5.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		5.0 – 6.1	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	32 < D ≤ 40	6.2 – 6.7	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		6.0 – 7.9	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	40 < D ≤ 50	8.0 – 8.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		8.7 – 12.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	50 < D ≤ 75	12.3 – 12.5	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		10.3 – 14.8	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	75 < D ≤ 90	14.9 – 15.0	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		12.5 – 18.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	90 < D ≤ 110	18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C

**Table B2.1.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of:  $t \geq 100$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B2:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 32	2.0	-	1 x 60.0 x 2.0	EI 60-U/C EI 60-C/C	
		2.1-9.9	-	1 x 60.0 x 4.0	EI 90-U/C EI 90-C/C	
		10.0	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
	32 < D ≤ 50	2.5-9.9	-	1 x 60.0 x 4.0	EI 90-U/C EI 90-C/C	
		10.0	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
	50 < D ≤ 75	3.2-9.9	-	1 x 60.0 x 4.0	EI 90-U/C EI 90-C/C	
		10.0	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
	75 < D ≤ 110	4.2-9.9	-	1 x 60.0 x 4.0	EI 90-U/C EI 90-C/C	
		10.0	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		10.0	-	1 x 60.0 x 4.0	EI 90-U/C EI 90-C/C	
	PP	D ≤ 32	1.8	-	1 x 60.0 x 2.0	EI 90 / E 120-U/C EI 90 / E 120-C/C
			1.9-2.7	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
2.8-18.0			-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
32 < D ≤ 50		2.0-2.7	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		2.8-18.3	-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
50 < D ≤ 75		2.3-2.7	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		2.8-18.3	-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
75 < D ≤ 110		2.7	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		2.8-18.3	-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
		2.8-18.3	-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
PVC-U/ PVC-C		D ≤ 32	1.8	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-U/C
			1.9-4.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C
	1.9-4.1		-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
	32 < D ≤ 50	4.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		2.0-4.1	-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
	50 < D ≤ 75	4.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		2.2-4.1	-	1 x 60.0 x 4.0	EI 45-U/C EI 45-C/C	
	75 < D ≤ 110	4.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	
		4.2	-	1 x 60.0 x 4.0	EI 60-U/C EI 60-C/C	

**Table B3.1.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B3:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 110	4.2	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
PP	D ≤ 110	2.7	-	1 x 60.0 x 4.0	EI 90-U/C EI 90-C/C
PP-R	D ≤ 110	18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
PVC-U/ PVC-C	D ≤ 110	4.0	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C

**Table B4.1.** Resistance to fire classification of plastic pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>s</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B4:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 110	10.0	9	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
PP	D ≤ 110	2.7	9	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
PP-R	D ≤ 110	18.3	9	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C

**Table B4.2.** Resistance to fire classification of plastic pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>s</sub>-s2,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B4:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 110	4.2-10.0	13	1 x 60.0 x 8.0	EI 120-U/C EI 120-C/C
		4.8-14.5	13	1 x 100.0 x 8.0	EI 60-U/C EI 60-C/C
	110 < D ≤ 125	14.6	13	1 x 100.0 x 8.0	EI 90-U/C EI 90-C/C
		6.2-14.5	13	1 x 100.0 x 12.0	EI 60-U/C EI 60-C/C
	125 < D ≤ 160	14.6	13	1 x 100.0 x 12.0	EI 90-U/C EI 90-C/C
		14.6	13	1 x 100.0 x 12.0	EI 90-U/C EI 90-C/C
PP	D ≤ 110	2.7-18.3	13	1 x 60.0 x 8.0	EI 120-U/C EI 120-C/C

**Table B4.3.** Resistance to fire classification of composite pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>s</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B4:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/ PP-R-GF/ PP-R	D ≤ 110	18.3	9	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C

**Table B5.1.** Resistance to fire classification of plastic pipes with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B5:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP	D ≤ 75	2.7	9	1 x 60.0 x 2.0	EI 60-U/C EI 60-C/C
		12.5	13	1 x 60.0 x 4.0	
	75 < D ≤ 110	12.5	13	1 x 60.0 x 4.0	
PVC-U/ PVC-C	D ≤ 32	2.0	9	1 x 60.0 x 4.0	EI 120 / E 180-U/C EI 120 / E 180-C/C

**Table B5.2.** Resistance to fire classification of MLC pipes with polyethylene foam (PE), with reaction to fire class E<sub>1</sub>, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B5:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-X/AL/ PE-X	D ≤ 32	3.0	9	1 x 60.0 x 2.0	EI 120-U/C

**Table B5.3.** Resistance to fire classification of MLC pipes with polyethylene foam (PE), with reaction to fire class B<sub>s</sub>-s1,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B5:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	D ≤ 20	2.0-3.0	9	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.5	9	1 x 60.0 x 2.0	
	20 < D ≤ 25	3.0	9	1 x 60.0 x 2.0	
PE-X/AL/ PE-X	D ≤ 20	2.0	9	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.0	9	1 x 60.0 x 2.0	



**Table B5.4.** Resistance to fire classification of composite pipes with polyethylene foam (PE), with reaction to fire class E<sub>L</sub>, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B5:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/PP-R-GF/PP-R	D ≤ 50	6.9 – 8.3	9	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C

**Table B5.5.** Resistance to fire classification of composite pipes with polyethylene foam (PE), with reaction to fire class B<sub>1</sub>-s1,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B5:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/PP-R-GF/PP-R	D ≤ 20	2.8 – 3.4	9	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C

**Table B6.1.** Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
copper	D ≤ 15.0	1.0 – 1.4	9	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 180-C/U EI 180-C/C	
			23 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C		
		≥ 1.5	9		1 x 60.0 x 2.0	EI 180-C/U EI 180-C/C
			10 – 22		1 x 60.0 x 4.0	
	23 – 36		1 x 60.0 x 6.0			
	15.0 < D ≤ 22.0	1.1 – 1.4	9	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
			23 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C		
		≥ 1.5	9		1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10 – 22		1 x 60.0 x 4.0	
	23 – 36		1 x 60.0 x 6.0			
	22.0 < D ≤ 28.0	1.2 – 1.4	9	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
			23 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C		
		≥ 1.5	9		1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10 – 22		1 x 60.0 x 4.0	
	23 – 36		1 x 60.0 x 6.0			
	28.0 < D ≤ 42.0	1.3 – 1.4	9	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
			23 – 36	1 x 60.0 x 6.0		
37 – 50		1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C			
≥ 1.5		9		1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
		10 – 22		1 x 60.0 x 4.0		
	23 – 36	1 x 60.0 x 6.0				

**Table B6.1, cont.** Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
copper	28.0 < D ≤ 42.0	≥ 1.5	9	1 x 60.0 x 2.0	EI 240-C/U EI 240-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
			23 – 36	1 x 60.0 x 6.0		
	37 – 50	1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C			
	42.0 < D ≤ 54.0	≥ 1.5		9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
				10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0		
	37 – 50	1 x 60.0 x 8.0	EI 30 / E 240-C/U EI 30 / E 240-C/C			
	54.0 < D ≤ 64.0	≥ 1.6		9	1 x 60.0 x 2.0	EI 60-C/U EI 60-C/C
				10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0		
	37 – 49	1 x 60.0 x 8.0	EI 30 / E 60-C/U EI 30 / E 60-C/C			
	64.0 < D ≤ 76.1	≥ 1.7		9	1 x 60.0 x 2.0	EI 60-C/U EI 60-C/C
				10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0		
	37 – 49	1 x 60.0 x 8.0	EI 30 / E 240-C/U EI 30 / E 240-C/C			
	76.1 < D ≤ 88.9	≥ 1.8		9	1 x 60.0 x 2.0	EI 30 / E 60-C/U EI 30 / E 60-C/C
				10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0		
	37 – 49	1 x 60.0 x 8.0	EI 60-C/U EI 60-C/C			
	88.9 < D ≤ 108.0	≥ 2.0		9	1 x 60.0 x 2.0	EI 30 / E 240-C/U EI 30 / E 240-C/C
				10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0		
	37 – 49	1 x 60.0 x 8.0	EI 30 / E 60-C/U EI 30 / E 60-C/C			
≥ 2.0	9	1 x 60.0 x 2.0		EI 60-C/U EI 60-C/C		
	10 – 22	1 x 60.0 x 4.0				
	23 – 36	1 x 60.0 x 6.0				
37 – 49	1 x 60.0 x 8.0	EI 60-C/U EI 60-C/C				

**Table B6.1, cont.** Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
steel	D ≤ 42.4	2.0 – 2.5	9	1 x 60.0 x 2.0	EI 180-C/U EI 180-C/C	
			10 – 22	1 x 60.0 x 4.0		
			23 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C		
		≥ 2.6	9		1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
			10 – 22		1 x 60.0 x 4.0	
	23 – 36		1 x 60.0 x 6.0			
	42.4 < D ≤ 48.3	2.1 – 2.5	9	1 x 60.0 x 2.0	EI 180-C/U EI 180-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 240-C/U EI 240-C/C	
			23 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0	EI 180 / E 240-C/U EI 180 / E 240-C/C		
		≥ 2.6	9		1 x 60.0 x 2.0	EI 180-C/U EI 180-C/C
			10 – 22		1 x 60.0 x 4.0	
	23 – 36		1 x 60.0 x 6.0			
	48.3 < D ≤ 60.3	2.2 – 2.5	9	1 x 60.0 x 2.0	EI 180-C/U EI 180-C/C	
			10 – 22	1 x 60.0 x 4.0	EI 240-C/U EI 240-C/C	
			23 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0	EI 240-C/U EI 240-C/C		
		≥ 2.6	9		1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
			10 – 22		1 x 60.0 x 4.0	
	23 – 36		1 x 60.0 x 6.0			
	37 – 50	1 x 60.0 x 8.0	EI 180 / E 240-C/U EI 180 / E 240-C/C			

Table B6.1, cont. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L-s3,d0</sub>, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	80.3 < D ≤ 76.1	2.4 – 2.5	9	1 x 60.0 x 2.0	EI 180-C/U EI 180-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
		37 – 50	1 x 60.0 x 8.0		
		≥ 2.6	9	1 x 60.0 x 2.0	EI 240-C/U EI 240-C/C
			10 – 22	1 x 60.0 x 4.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
	23 – 36		1 x 60.0 x 6.0		
	76.1 < D ≤ 88.9	≥ 2.6	9	1 x 60.0 x 2.0	EI 240-C/U EI 240-C/C
			10 – 22	1 x 60.0 x 4.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
			23 – 36	1 x 60.0 x 6.0	
		≥ 3.1	9	1 x 60.0 x 2.0	EI 90 / E 240-C/U EI 90 / E 240-C/C
			10 – 23	1 x 60.0 x 4.0	EI 90 / E 180-C/U EI 90 / E 180-C/C
			24 – 36	1 x 60.0 x 6.0	
	88.9 < D ≤ 114.3	≥ 3.1	37 – 49	1 x 60.0 x 8.0	EI 180-C/U EI 180-C/C
			50	1 x 60.0 x 8.0	EI 180-C/U EI 180-C/C
			9	1 x 60.0 x 2.0	EI 90 / E 240-C/U EI 90 / E 240-C/C
		≥ 3.6	10 – 23	1 x 60.0 x 4.0	EI 90 / E 180-C/U EI 90 / E 180-C/C
			24 – 36	1 x 60.0 x 6.0	
			37 – 49	1 x 60.0 x 8.0	
	114.3 < D ≤ 139.7	≥ 3.6	50	1 x 60.0 x 8.0	EI 180-C/U EI 180-C/C
			9	1 x 60.0 x 2.0	EI 90 / E 240-C/U EI 90 / E 240-C/C
			10 – 23	1 x 60.0 x 4.0	EI 90 / E 180-C/U EI 90 / E 180-C/C
		≥ 4.0	24 – 36	1 x 60.0 x 6.0	EI 90 / E 180-C/U EI 90 / E 180-C/C
			37 – 49	1 x 60.0 x 8.0	
50			1 x 60.0 x 8.0		
159.0 < D ≤ 188.3	≥ 4.0	50	1 x 60.0 x 2.0	EI 90-C/U EI 90-C/C	
		9	1 x 60.0 x 2.0		
188.3 < D ≤ 219.0	≥ 4.0	50	1 x 60.0 x 2.0	EI 90-C/U EI 90-C/C	
		9	1 x 60.0 x 2.0		

Table B6.2. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>L-s2,d0</sub>, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
copper	D ≤ 12.7	≥ 0.8	9	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
	12.7 < D ≤ 15.0	≥ 0.9	9	1 x 60.0 x 4.0		
	15.0 < D ≤ 22.23	≥ 1.0	9	1 x 60.0 x 4.0		
steel	D ≤ 18.0	1.2 – 1.4	9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
		≥ 1.5	9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
	18.0 < D ≤ 28.0	1.3 – 1.4	9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
		≥ 1.5	38 – 50	1 x 60.0 x 8.0		
			9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
	28.0 < D ≤ 48.3	1.4	9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
		≥ 1.5	38 – 50	1 x 60.0 x 8.0		
			9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
	48.3 < D ≤ 66.7	≥ 1.5	26 – 37	1 x 60.0 x 6.0	EI 120-C/U EI 120-C/C	
			38 – 50	1 x 60.0 x 8.0		
			25	1 x 60.0 x 4.0		
		≥ 1.8	26 – 37	1 x 60.0 x 6.0		
			38 – 50	1 x 60.0 x 8.0		
			25	1 x 60.0 x 4.0		
66.7 < D ≤ 76.1	≥ 1.8	26 – 37	1 x 60.0 x 6.0	EI 120-C/U EI 120-C/C		
		38 – 50	1 x 60.0 x 8.0			
		25	1 x 60.0 x 4.0			
76.1 < D ≤ 88.9	≥ 1.8	26 – 37	1 x 60.0 x 6.0	EI 120-C/U EI 120-C/C		
		38 – 50	1 x 60.0 x 8.0			
		25	1 x 60.0 x 4.0			

Table B6.2, cont. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>L-s2,d0</sub>, continuous insulation (case CS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	88.9 < D ≤ 108.0	≥ 2.0	25	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
			26 – 37	1 x 60.0 x 6.0	
			38 – 50	1 x 60.0 x 8.0	
	108.0 < D ≤ 114.3	≥ 2.2	50	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C
			114.3 < D ≤ 139.7	≥ 3.1	
	139.7 < D ≤ 188.3	≥ 4.0	50	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C
			188.3 < D ≤ 219.1	≥ 4.0	
	219.1 < D ≤ 273.0	≥ 4.6	50 <sup>2)</sup>	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C
			273.0 < D ≤ 323.9	≥ 5.2	
	323.9 < D ≤ 355.6	≥ 5.6	50 <sup>2)</sup>	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C
			355.6 < D ≤ 388.3	≥ 6.2	

<sup>1)</sup> Pipe additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 40 x 500 mm (thickness x length)

<sup>2)</sup> Pipe additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 50 x 500 mm (thickness x length)

Table B6.3. Resistance to fire classification of steel pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L-s3,d0</sub>, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	D ≤ 42.4	2.0 – 2.8	9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
		≥ 2.9	37 – 50	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C
			9	1 x 60.0 x 2.0	
			10 – 22	1 x 60.0 x 4.0	
	42.4 < D ≤ 48.3	≥ 2.1	23 – 36	1 x 60.0 x 6.0	EI 60 / E 120-C/U EI 60 / E 120-C/C
			37 – 49	1 x 60.0 x 8.0	
			50	1 x 60.0 x 8.0	
		≥ 2.3	9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
	48.3 < D ≤ 60.3	≥ 2.3	37 – 49	1 x 60.0 x 8.0	EI 60 / E 120-C/U EI 60 / E 120-C/C
			50	1 x 60.0 x 8.0	
			9	1 x 60.0 x 2.0	
		≥ 2.7	10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
			23 – 36	1 x 60.0 x 6.0	
			37 – 49	1 x 60.0 x 8.0	

Table B6.3, cont. Resistance to fire classification of steel pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L-s3,d0</sub>, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of: t ≥ 100 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B6a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
steel	60.3 < D ≤ 76.1	≥ 2.7	23 – 36	1 x 60.0 x 6.0	EI 60 / E 120-C/U	
			37 – 49	1 x 60.0 x 8.0	EI 60 / E 120-C/C	
			50	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C	
	76.1 < D ≤ 88.9	≥ 2.9	9	1 x 60.0 x 2.0	EI 60 / E 120-C/U EI 60 / E 120-C/C	
			10 – 22	1 x 60.0 x 4.0		
			23 – 36	1 x 60.0 x 6.0		
	88.9 < D ≤ 114.3	≥ 3.3	37 – 49	1 x 60.0 x 8.0	EI 45 / E 90-C/U EI 45 / E 90-C/C	
			50	1 x 60.0 x 8.0		
			9	1 x 60.0 x 2.0		
	114.3 < D ≤ 139.7	≥ 3.8	10 – 22	1 x 60.0 x 4.0	EI 45 / E 120-C/U EI 45 / E 120-C/C	
			23 – 36	1 x 60.0 x 6.0		
			37 – 49	1 x 60.0 x 8.0		
	139.7 < D ≤ 168.3	≥ 4.0	50	1 x 60.0 x 8.0	EI 90-C/U EI 90-C/C	
			9	1 x 60.0 x 2.0		
			10 – 22	1 x 60.0 x 4.0		
				23 – 36	1 x 60.0 x 6.0	EI 45 / E 90-C/U EI 45 / E 90-C/C
				37 – 49	1 x 60.0 x 8.0	
				50	1 x 60.0 x 8.0	

Table B7.1. Resistance to fire classification of copper pipes with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS) penetration seal in rigid wall thickness of: t ≥ 150 mm made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B7:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 6.35	≥ 0.8	9	1 x 60.0 x 4.0	EI 240-C/U EI 240-C/C
	6.35 < D ≤ 15.88	≥ 1.0	9	1 x 60.0 x 4.0	EI 180 / E 240-C/U EI 180 / E 240-C/C

Table B7.2. Resistance to fire classification of copper pipes with polyethylene foam (PE), with reaction to fire class B<sub>L-s1,d0</sub>, continuous insulation (case CS) penetration seal in rigid wall thickness of: t ≥ 150 mm made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B7:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 12.7	≥ 0.8	9	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
	12.7 < D ≤ 22.23	≥ 1.0	9	1 x 60.0 x 4.0	

Table B7.3. Resistance to fire classification of bundle of max. 3 copper pipes (max. 2 x D ≤ 6.35 mm x t = 0.8 mm + max. 1 x D ≤ 15.88 mm x t = 1.0 mm) with continuous PE foam insulation, with reaction to fire class E, (thickness of 9 mm) penetration seal in rigid wall thickness of: t ≥ 150 mm made with use of single row of INTU FR WRAP or INTU FR WRAP L, length of 60 mm and thickness of 4.0 mm (separate tape / wrap for each pipe or one wrap for whole bundle) in accordance with Annex A and Fig. B7:

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

Table B8.1. Resistance to fire classification of steel pipes with mineral wool mat local sustained insulation (case LS) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B8:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
steel	D ≤ 42.4	≥ 1.5	20 x 300	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
			(21 – 30) x 500	1 x 60.0 x 2.0		
			≥ 2.0	(21 – 40) x 600		1 x 60.0 x 2.0
	42.4 < D ≤ 66.7	≥ 1.5	30 x 500	1 x 60.0 x 2.0		
			≥ 2.0	(31 – 40) x 600		1 x 60.0 x 2.0
			≥ 2.0	40 x 600		1 x 60.0 x 2.0

Table B9.1. Resistance to fire classification of single F cable (A-2Y(L)2Y 20X2X0,6) penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, length of 60.0 mm and thickness of 2.0 mm and INTU FR MASTIC gap filling in accordance with Annex A and Fig. B9:

Fire resistance class:  
EI 120

Table B10.1. Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with flexible elastomeric foam (FEF), with reaction to fire class B<sub>L-s2,d0</sub>, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 25 mm and pipe wall thickness of: t<sub>p</sub> = 1.5 mm penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, in accordance with Annex A and Fig. B10:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
single copper pipe	D ≤ 12.7	≥ 0.8	9	1 x 60.0 x 4.0	EI 120
	12.7 < D ≤ 22.23	≥ 1.0	9	1 x 60.0 x 4.0	

Table B10.2. Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with flexible elastomeric foam (FEF), with reaction to fire class B<sub>L-s2,d0</sub>, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 25 mm and pipe wall thickness of: t<sub>p</sub> = 1.5 mm penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, in accordance with Annex A and Fig. B10:

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
double copper pipe	12.7 x 0.8	12.7 x 0.8	9	1 x 60.0 x 4.0	EI 120
	12.7 x 0.8	22.23 x 1.0	9	1 x 60.0 x 4.0	

Table B11.1. Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS), with additional single A1 cable (E-YY-J 5x1,5; RE NYY-J 5x1,5 RE; VV 5x1,5) and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 32 mm and pipe wall thickness of: t<sub>p</sub> = 2.0 mm penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, in accordance with Annex A and Fig. B11:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
single copper pipe	D ≤ 6.35	≥ 0.8	9	1 x 60.0 x 4.0	EI 240 EI 180 / E 240
	6.35 < D ≤ 15.88	≥ 1.0	9	1 x 60.0 x 4.0	

Table B11.2. Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS), with additional single A1 cable (E-YY-J 5x1,5; RE NYY-J 5x1,5 RE; VV 5x1,5) and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 32 mm and pipe wall thickness of: t<sub>p</sub> = 2.0 mm penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, in accordance with Annex A and Fig. B11:

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
double copper pipe	6.0 x 0.8	6.0 x 0.8	9	1 x 60.0 x 4.0	EI 120 / E 180
	6.0 x 0.8	15.0 x 1.0	9	1 x 60.0 x 4.0	

**Table B11.3. Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with polyethylene foam (PE) with reaction to fire class B<sub>1-s1,d0</sub>, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 25 mm and pipe wall thickness of: t<sub>p</sub> = 1.5 mm penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, in accordance with Annex A and Fig. B11:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
single copper pipe	D ≤ 12.7	≥ 0.8	9	1 x 60.0 x 4.0	EI 120
	12.7 < D ≤ 22.23	≥ 1.0	9	1 x 60.0 x 4.0	

**Table B11.4. Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class B<sub>1-s1,d0</sub>, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 25 mm and pipe wall thickness of: t<sub>p</sub> = 1.5 mm penetration seal in rigid wall thickness of: t ≥ 150 mm, made with use of single row of INTU FR WRAP or INTU FR WRAP L, in accordance with Annex A and Fig. B11:**

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
double copper pipe	12.7 x 0.8	12.7 x 0.8	9	1 x 60.0 x 4.0	EI 120
	12.7 x 0.8	22.23 x 1.0	9	1 x 60.0 x 4.0	

**Table B12.1. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid wall thickness of: t ≥ 150 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B12:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
PP	D ≤ 50	1.8	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C	
		1.9	-	2 x 60.0 x 2.0	EI 120 / E 180-U/C EI 120 / E 180-C/C	
		2.0 – 12.5	-	2 x 60.0 x 2.0	EI 120-U/C	
		12.6 – 18.4	-	2 x 60.0 x 4.0	EI 120 / E 180-U/C EI 120 / E 180-C/C	
		1.9	-	2 x 60.0 x 2.0	EI 120-U/C	
		2.0 – 12.5	-	2 x 60.0 x 2.0	EI 120 / E 180-U/C EI 120 / E 180-C/C	
	50 < D ≤ 75	12.6 – 18.4	-	2 x 60.0 x 4.0	EI 120-U/C	
		75 < D ≤ 90	2.2 – 18.4	-	2 x 60.0 x 4.0	EI 120-C/C
		90 < D ≤ 110	2.7 – 18.4	-	2 x 60.0 x 4.0	EI 120-C/C
	110 < D ≤ 125	3.4 – 14.5	-	2 x 60.0 x 6.0	EI 60-U/C EI 60-C/C	
		14.6	-	2 x 60.0 x 6.0	EI 120-U/C EI 120-C/C	
	125 < D ≤ 160	4.9 – 14.5	-	2 x 60.0 x 10.0	EI 60-U/C EI 60-C/C	
		14.6	-	2 x 60.0 x 10.0	EI 120-U/C EI 120-C/C	

**Table B12.2. Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B12:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 32	2.0 – 6.8	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.9 – 10.0	-	2 x 60.0 x 4.0	
	32 < D ≤ 50	2.4 – 6.8	-	2 x 60.0 x 2.0	
		6.9 – 10.0	-	2 x 60.0 x 4.0	
	50 < D ≤ 75	3.0 – 6.8	-	2 x 60.0 x 2.0	
		6.9 – 10.0	-	2 x 60.0 x 4.0	
75 < D ≤ 90		3.5 – 10.0	-	2 x 60.0 x 4.0	
90 < D ≤ 110	4.2 – 10.0	-	2 x 60.0 x 4.0		
PE-Xa	D ≤ 20	2.0 – 5.8	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	20 < D ≤ 32	3.0	-	2 x 60.0 x 2.0	
	32 < D ≤ 40	3.7	-	2 x 60.0 x 2.0	
	40 < D ≤ 50	4.6	-	2 x 60.0 x 2.0	
	50 < D ≤ 63	5.8	-	2 x 60.0 x 2.0	
PP-R	D ≤ 20	2.3 – 10.0	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.3 – 12.5	-	2 x 60.0 x 2.0	
		12.6 – 16.0	-	2 x 60.0 x 4.0	
	20 < D ≤ 32	4.8 – 12.5	-	2 x 60.0 x 2.0	
		12.6 – 18.3	-	2 x 60.0 x 4.0	
	32 < D ≤ 50	5.8 – 12.5	-	2 x 60.0 x 2.0	
		12.6 – 18.3	-	2 x 60.0 x 4.0	
	50 < D ≤ 63	6.8 – 12.5	-	2 x 60.0 x 2.0	
		12.6 – 18.3	-	2 x 60.0 x 4.0	
75 < D ≤ 90		8.2 – 18.3	-	2 x 60.0 x 4.0	
90 < D ≤ 110	10.0 – 18.3	-	2 x 60.0 x 4.0		
PVC-U/ PVC-C	D ≤ 50	1.8 – 3.6	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.7 – 4.2	-	2 x 60.0 x 4.0	
	50 < D ≤ 75	1.9 – 3.6	-	2 x 60.0 x 2.0	
		3.7 – 4.2	-	2 x 60.0 x 4.0	
	75 < D ≤ 90	2.0 – 4.2	-	2 x 60.0 x 4.0	
90 < D ≤ 110	2.2 – 4.2	-	2 x 60.0 x 4.0		

**Table B12.2, cont. Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B12:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP	D ≤ 50	1.8	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		1.9	-	2 x 60.0 x 2.0	EI 120 / E 180-U/C EI 120 / E 180-C/C
		2.0 – 12.5	-	2 x 60.0 x 2.0	EI 120-U/C
		12.6 – 18.4	-	2 x 60.0 x 4.0	EI 120 / E 180-U/C EI 120 / E 180-C/C
	50 < D ≤ 75	1.9	-	2 x 60.0 x 2.0	EI 120-U/C
		2.0 – 12.5	-	2 x 60.0 x 2.0	EI 120 / E 180-U/C EI 120 / E 180-C/C
		12.6 – 18.4	-	2 x 60.0 x 4.0	EI 120-U/C
		75 < D ≤ 90	2.2 – 18.4	-	2 x 60.0 x 4.0
	90 < D ≤ 110	2.7 – 18.4	-	2 x 60.0 x 4.0	EI 120-C/C

**Table B12.3. Resistance to fire classification of MLC pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B12:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT/ AL/PE-RT	D ≤ 20	2.0 – 3.0	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.5	-	2 x 60.0 x 2.0	
	20 < D ≤ 25	3.0	-	2 x 60.0 x 2.0	
	25 < D ≤ 32	4.0	-	2 x 60.0 x 2.0	
PE-X/AL/ PE-X	D ≤ 32	3.0 – 6.0	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.8	-	2 x 60.0 x 2.0	
PP-R/AL/ PP-R	D ≤ 20	2.8 – 10.0	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		4.4 – 12.5	-	2 x 60.0 x 2.0	
	20 < D ≤ 32	12.6 – 16.0	-	2 x 60.0 x 4.0	
		6.9 – 12.5	-	2 x 60.0 x 2.0	
	32 < D ≤ 50	12.6 – 18.3	-	2 x 60.0 x 4.0	
		8.7 – 12.5	-	2 x 60.0 x 2.0	
	50 < D ≤ 63	12.6 – 18.3	-	2 x 60.0 x 4.0	
		10.3 – 12.5	-	2 x 60.0 x 2.0	
	63 < D ≤ 75	12.6 – 18.3	-	2 x 60.0 x 4.0	
		12.4 – 18.3	-	2 x 60.0 x 4.0	
	75 < D ≤ 90	12.4 – 18.3	-	2 x 60.0 x 4.0	
	90 < D ≤ 110	15.1 – 18.3	-	2 x 60.0 x 4.0	

**Table B12.4. Resistance to fire classification of composite pipes (without insulation) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B12:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/ PP-R- GF/PP-R	D ≤ 20	2.8 – 10.0	-	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		4.4 – 12.5	-	2 x 60.0 x 2.0	
	20 < D ≤ 32	12.6 – 15.1	-	2 x 60.0 x 4.0	
		6.7 – 12.5	-	2 x 60.0 x 2.0	
	32 < D ≤ 50	12.6 – 15.1	-	2 x 60.0 x 4.0	
		8.4 – 12.5	-	2 x 60.0 x 2.0	
	50 < D ≤ 63	12.6 – 15.1	-	2 x 60.0 x 4.0	
		10.0 – 12.5	-	2 x 60.0 x 2.0	
	63 < D ≤ 75	12.6 – 15.1	-	2 x 60.0 x 4.0	
		15.1	-	2 x 60.0 x 4.0	

**Table B13.1.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B13:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	$D \leq 110$	4.2	-	2 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
PP	$D \leq 110$	2.7	-	2 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
PP-R	$D \leq 110$	18.3	-	2 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
PVC-U/ PVC-C	$D \leq 110$	3.2	-	2 x 60.0 x 4.0	EI 120-U/C EI 120-C/C

**Table B14.1.** Resistance to fire classification of MLC pipes with polyethylene foam (PE), with reaction to fire class E<sub>L</sub>, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B14:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	$D \leq 32$	3.0	9	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
PE-X/AL/ PE-X	$D \leq 32$	3.0	9	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C

**Table B14.2.** Resistance to fire classification of MLC pipes with polyethylene foam (PE), with reaction to fire class B<sub>L</sub>-s1,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B14:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	$D \leq 20$	2.0	9	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
PE-X/AL/ PE-X	$D \leq 20$	2.0	9	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C

**Table B14.3.** Resistance to fire classification of composite pipes with polyethylene foam (PE), with reaction to fire class E<sub>L</sub>, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B14:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PP-R/PP-R- GF/PP-R	$D \leq 50$	5.9 – 8.9	9	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C

**Table B14.4.** Resistance to fire classification of composite pipes with polyethylene foam (PE), with reaction to fire class B<sub>L</sub>-s1,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B14:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PP-R/PP-R- GF/PP-R	$D \leq 20$	2.8 – 3.4	9	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C

**Table B15.1.** Resistance to fire classification of plastic pipes with mineral wool mat continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L placed on the pipe, under the insulation in accordance with Annex A and Fig. B15a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PP-R	$D \leq 20$	2.3	20	2 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.8 – 12.5	30	2 x 60.0 x 2.0	
	$20 < D \leq 75$	6.8 – 12.5	30	2 x 60.0 x 2.0	

**Table B15.2.** Resistance to fire classification of plastic pipes with mineral wool mat continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L placed on the insulation in accordance with Annex A and Fig. B15b:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
PP-R	$D \leq 20$	2.3	20	2 x 60.0 x 2.0	EI 120-U/C EI 120-U/C
		6.8 – 12.5	30	2 x 60.0 x 6.0	
	$20 < D \leq 75$	6.8 – 12.5	30	2 x 60.0 x 6.0	

**Table B16.1.** Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>s</sub>-s3,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B16:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class	
copper	$D \leq 15.0$	$\geq 1.0$	9	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
	$15.0 < D \leq 22.0$	$\geq 1.1$	9	2 x 60.0 x 2.0	EI 30-C/U EI 30-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
			37 – 49	2 x 60.0 x 8.0		
			50	2 x 60.0 x 8.0		
			90 / E 120-C/U EI 90 / E 120-C/C			
	$22.0 < D \leq 28.0$	$\geq 1.2$	9	2 x 60.0 x 2.0	EI 30-C/U EI 30-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
			37 – 49	2 x 60.0 x 8.0		
			50	2 x 60.0 x 8.0		
			90 / E 120-C/U EI 90 / E 120-C/C			
	$28.0 < D \leq 42.0$	$\geq 1.3$	9	2 x 60.0 x 2.0	EI 30-C/U EI 30-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
			37 – 49	2 x 60.0 x 8.0		
			50	2 x 60.0 x 8.0		
			90 / E 120-C/U EI 90 / E 120-C/C			
	$42.0 < D \leq 54.0$	$\geq 1.5$	9	2 x 60.0 x 2.0	EI 30-C/U EI 30-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
37 – 49			2 x 60.0 x 8.0			
50			2 x 60.0 x 8.0			
90 / E 120-C/U EI 90 / E 120-C/C						
steel	$D \leq 42.4$	$\geq 2.0$	9	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
	$42.4 < D \leq 48.3$	$\geq 2.1$	9	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		
			37 – 49	2 x 60.0 x 8.0		
			50	2 x 60.0 x 8.0		
			90 / E 120-C/U EI 90 / E 120-C/C			
			9	2 x 60.0 x 2.0		EI 120-C/U EI 120-C/C
			10 – 22	2 x 60.0 x 4.0		
			23 – 36	2 x 60.0 x 6.0		

**Table B16.1. cont. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>1</sub>-s3,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B16:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	48.3 < D ≤ 60.3	≥ 2.2	9	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			10-22	2 x 60.0 x 4.0	
			23-36	2 x 60.0 x 6.0	
			37-49	2 x 60.0 x 8.0	EI 120-C/U EI 120-C/C
			50	2 x 60.0 x 8.0	
			9	2 x 60.0 x 2.0	
	10-22	2 x 60.0 x 4.0			
	23-36	2 x 60.0 x 6.0			
	37-49	2 x 60.0 x 8.0	EI 120-C/U EI 120-C/C		
	50	2 x 60.0 x 8.0			
	9	2 x 60.0 x 2.0		EI 90 / E 120-C/U EI 90 / E 120-C/C	
	10-22	2 x 60.0 x 4.0			
	23-36	2 x 60.0 x 6.0			
	37-49	2 x 60.0 x 8.0	EI 120-C/U EI 120-C/C		
	50	2 x 60.0 x 8.0			
	9	2 x 60.0 x 2.0		EI 60 / E 120-C/U EI 60 / E 120-C/C	
	10-22	2 x 60.0 x 4.0			
	23-36	2 x 60.0 x 6.0			
	37-49	2 x 60.0 x 8.0	EI 30-C/U EI 30-C/C		
	50	2 x 60.0 x 8.0			
	9	2 x 60.0 x 2.0		EI 60 / E 120-C/U EI 60 / E 120-C/C	
	10-22	2 x 60.0 x 4.0			
	23-36	2 x 60.0 x 6.0			
	37-49	2 x 60.0 x 8.0	EI 30-C/U EI 30-C/C		
50	2 x 60.0 x 8.0				

**Table B16.2. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1</sub>-s2,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B16:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 12.7	≥ 0.8	9	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			9 <sup>1)</sup>	2 x 60.0 x 4.0	
	12.7 < D ≤ 15.0	≥ 0.9	9	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			9 <sup>1)</sup>	2 x 60.0 x 4.0	
	15.0 < D ≤ 22.23	≥ 1.0	9	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			9 <sup>1)</sup>	2 x 60.0 x 4.0	
steel	D ≤ 18.0	1.2-1.4	9	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10-25	2 x 60.0 x 4.0	
			9	2 x 60.0 x 2.0	
		≥ 1.5	10-25	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			26-37	2 x 60.0 x 6.0	
			38-50	2 x 60.0 x 8.0	
	18.0 < D ≤ 28.0	1.3-1.4	13	2 x 60.0 x 2.0	EI 60 / E 120-C/U EI 60 / E 120-C/C
			14-24	2 x 60.0 x 4.0	
			25	2 x 60.0 x 4.0	
		≥ 1.5	26-37	2 x 60.0 x 6.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			38-50	2 x 60.0 x 8.0	
			9	2 x 60.0 x 2.0	
10-25	2 x 60.0 x 4.0				
26-37	2 x 60.0 x 6.0				
38-50	2 x 60.0 x 8.0				

**Table B16.2. cont. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1</sub>-s2,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B16:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
steel	28.0 < D ≤ 48.3	≥ 1.4	13	2 x 60.0 x 2.0	EI 60 / E 120-C/U EI 60 / E 120-C/C	
			14-24	2 x 60.0 x 4.0		
			25	2 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
			26-37	2 x 60.0 x 6.0		
			38-50	2 x 60.0 x 8.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	
			13	2 x 60.0 x 2.0		EI 120-C/U EI 120-C/C
	14-24	2 x 60.0 x 4.0				
	48.3 < D ≤ 66.7	≥ 1.5	25	2 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
			26-37	2 x 60.0 x 6.0		
			38-50	2 x 60.0 x 8.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	
			13	2 x 60.0 x 2.0		EI 45 / E 120-C/U EI 45 / E 120-C/C
			14-24	2 x 60.0 x 4.0		
			25	2 x 60.0 x 4.0	EI 60 / E 120-C/U EI 60 / E 120-C/C	
	26-37	2 x 60.0 x 6.0				
	38-49	2 x 60.0 x 8.0	EI 90 / E 120-C/U EI 90 / E 120-C/C			
	50	2 x 60.0 x 8.0				
	steel	76.1 < D ≤ 88.9	≥ 1.8	13	2 x 60.0 x 2.0	EI 45 / E 120-C/U EI 45 / E 120-C/C
				14-24	2 x 60.0 x 4.0	
25				2 x 60.0 x 4.0	EI 60 / E 120-C/U EI 60 / E 120-C/C	
26-37				2 x 60.0 x 6.0		
38-49				2 x 60.0 x 8.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	
50				2 x 60.0 x 8.0		
88.9 < D ≤ 108.0		≥ 2.0	13	2 x 60.0 x 2.0	EI 45 / E 120-C/U EI 45 / E 120-C/C	
			14-24	2 x 60.0 x 4.0		
			25	2 x 60.0 x 4.0	EI 60 / E 120-C/U EI 60 / E 120-C/C	
			26-37	2 x 60.0 x 6.0		
			38-49	2 x 60.0 x 8.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	
			50	2 x 60.0 x 8.0		

<sup>1)</sup> Pipe additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 20 x 200 mm (thickness x length)

**Table B17.1. Resistance to fire classification of copper pipes with polyethylene foam (PE), with reaction to fire class B<sub>1</sub>-s1,d0, continuous insulation (case CS) penetration seals in flexible or rigid wall thickness of: t ≥ 125 mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B17:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 12.7	≥ 0.8	9	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			9 <sup>1)</sup>	2 x 60.0 x 4.0	
	12.7 < D ≤ 15.0	≥ 0.9	9	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			9 <sup>1)</sup>	2 x 60.0 x 4.0	
	15.0 < D ≤ 22.23	≥ 1.0	9	2 x 60.0 x 4.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
			9 <sup>1)</sup>	2 x 60.0 x 4.0	

<sup>1)</sup> Pipe additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 20 x 200 mm (thickness x length)

**Table B18.1. Resistance to fire classification of steel pipes with mineral wool mat local sustained insulation (case LS) penetration seals in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B18:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	$D \leq 42.4$	$\geq 1.5$	20 x 300 (21 - 30) x 500	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 2.0$	(21 - 40) x 500	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 4.0$	(41 - 50) x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
		$\geq 5.6$	(41 - 50) x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
	$42.4 < D \leq 66.7$	$\geq 1.5$	30 x 500	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 2.0$	(31 - 40) x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
		$\geq 4.0$	(41 - 50) x 600	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 5.6$	(41 - 50) x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
	$66.7 < D \leq 108.0$	$\geq 2.0$	40 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
		$\geq 4.0$	(41 - 50) x 600	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 5.6$	(41 - 50) x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
	$108.0 < D \leq 114.3$	$\geq 3.6$	40 x 600 (41 - 50) x 600 (41 - 50) x 750	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C EI 120-C/U EI 120-C/C
		$\geq 4.0$	50 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
	$114.3 < D \leq 168.3$	$\geq 5.6$	50 x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 4.0$	50 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
	$168.3 < D \leq 219.1$	$\geq 5.6$	50 x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 4.0$	50 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
	$219.1 < D \leq 273.0$	$\geq 5.6$	50 x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 4.0$	50 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C
	$273.0 < D \leq 323.9$	$\geq 5.6$	50 x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
$\geq 4.0$		50 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	
$323.9 < D \leq 356.6$	$\geq 5.6$	50 x 750	2 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	
	$\geq 4.0$	50 x 600	2 x 60.0 x 2.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	

**Table B19.1. Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1</sub>-s2,d0, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 25$  mm and pipe wall thickness of:  $t_p = 1.5$  mm penetration seal in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B19:**

Pipe material	Copper pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	Figure in Annex B
single copper pipe	$D \leq 12.7$	$\geq 0.8$	9	2 x 60.0 x 4.0	EI 60 / E 120 <sup>1)</sup>	B19b
			9 <sup>2)</sup>	2 x 60.0 x 4.0	EI 120	B19a,b, c,d
	$12.7 < D \leq 22.23$	$\geq 1.0$	9	2 x 60.0 x 4.0	EI 60 / E 120 <sup>1)</sup>	B19b
			9 <sup>2)</sup>	2 x 60.0 x 4.0	EI 120	B19a,b, c,d

<sup>1)</sup> Fire resistance class in case of penetration seals placed in 0 mm distance between the adjacent wraps.  
<sup>2)</sup> Mixed bundle additionally insulated with wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 20 x 200 mm (thickness x length).

**Table B19.2. Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1</sub>-s2,d0, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 25$  mm and pipe wall thickness of:  $t_p = 1.5$  mm penetration seal in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B19:**

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	Figure in Annex B
double copper pipe	12.7 x 0.8	12.7 x 0.8	9	2 x 60.0 x 4.0	EI 60 / E 120 <sup>1)</sup>	B19b
			9	2 x 60.0 x 4.0	EI 90 / E 120	B19a,b, c,d
			9 <sup>2)</sup>	2 x 60.0 x 4.0	EI 120	B19a,b, c,d
	12.7 x 0.8	22.23 x 1.0	9	2 x 60.0 x 4.0	EI 60 / E 120 <sup>1)</sup>	B19b
			9	2 x 60.0 x 4.0	EI 90 / E 120	B19a,b, c,d
			9 <sup>2)</sup>	2 x 60.0 x 4.0	EI 120	B19a,b, c,d

<sup>1)</sup> Fire resistance class in case of penetration seals placed in 0 mm distance between the adjacent wraps.  
<sup>2)</sup> Mixed bundle additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 20 x 200 mm (thickness x length).

**Table B20.1. Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class B<sub>1</sub>-s1,d0, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 25$  mm and pipe wall thickness of:  $t_p = 1.5$  mm penetration seal in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B20:**

Pipe material	Copper pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
single copper pipe	$D \leq 12.7$	$\geq 0.8$	9	2 x 60.0 x 4.0	EI 90 / E 120
			9 <sup>1)</sup>	2 x 60.0 x 4.0	EI 120
	$12.7 < D \leq 22.23$	$\geq 1.0$	9	2 x 60.0 x 4.0	EI 90 / E 120
			9 <sup>1)</sup>	2 x 60.0 x 4.0	EI 120

<sup>1)</sup> Mixed bundle additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 20 x 200 mm (thickness x length).

**Table B20.2. Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class B<sub>1</sub>-s1,d0, continuous insulation (case CS), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 25$  mm and pipe wall thickness of:  $t_p = 1.5$  mm penetration seal in flexible or rigid wall thickness of:  $t \geq 125$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B20:**

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
double copper pipe	12.7 x 0.8	12.7 x 0.8	9	2 x 60.0 x 4.0	EI 90 / E 120
			9 <sup>1)</sup>	2 x 60.0 x 4.0	EI 120
	12.7 x 0.8	22.23 x 1.0	9	2 x 60.0 x 4.0	EI 90 / E 120
			9 <sup>1)</sup>	2 x 60.0 x 4.0	EI 120

<sup>1)</sup> Mixed bundle additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 20 x 200 mm (thickness x length).

**Table B21.1. Resistance to fire classification of plastic pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1</sub>-s2,d0, continuous insulation (case CS) penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B21:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP	$D \leq 160$	4.9 - 14.5	13	2 x 60.0 x 12.0	EI 30-U/C EI 30-C/C
		14.6	13	2 x 60.0 x 12.0	EI 120-U/C EI 120-C/C

**Table B22.1. Resistance to fire classification of AROT DVK conduit penetration seals in rigid wall thickness of:  $t \geq 150$  mm, made with use of double row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B22:**

Conduit material	Conduit diameter [mm]	Conduit wave height [mm]	Services inside	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
AROT DVK	$D \leq 110$	3.0	empty	2 x 60.0 x 4.0	EI 120-U/U EI 120-U/C EI 120-C/U EI 120-C/C
			Small cable: $\varnothing_{\text{cable}} \leq 21$ mm	2 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
			Cable bundle: $\varnothing_{\text{bundle}} \leq 100$ mm $\varnothing_{\text{cable}} \leq 21$ mm	2 x 60.0 x 4.0	EI 120-U/C EI 120-C/C



**Table B23.1.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 550$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-HT	D ≤ 50	1.8 – 1.9	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		2.0 – 2.7	-	1 x 60.0 x 4.0	
		2.8 – 3.9	-	1 x 100.0 x 10.0	
	50 < D ≤ 75	1.9	-	1 x 60.0 x 2.0	
		2.0 – 2.7	-	1 x 60.0 x 4.0	
		2.8 – 3.9	-	1 x 100.0 x 10.0	
		2.7	-	1 x 60.0 x 4.0	
	75 < D ≤ 110	2.8 – 3.9	-	1 x 100.0 x 10.0	
		3.9	-	1 x 100.0 x 10.0	
		3.9	-	1 x 100.0 x 10.0	
PP-M Magnaplast Ultra dB	D ≤ 50	2.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C EI 60-U/C EI 60-C/C EI 120-U/C EI 120-C/C EI 60-U/C EI 60-C/C EI 120-U/C EI 120-C/C EI 60-U/C EI 60-C/C
		2.1 – 3.4	-	1 x 60.0 x 4.0	
		3.5 – 4.9	-	1 x 100.0 x 10.0	
	50 < D ≤ 75	2.6	-	1 x 60.0 x 4.0	
		2.7 – 4.9	-	1 x 100.0 x 10.0	
	75 < D ≤ 110	3.4	-	1 x 60.0 x 4.0	
		3.5 – 4.9	-	1 x 100.0 x 10.0	
		3.5 – 4.9	-	1 x 100.0 x 10.0	
		4.9	-	1 x 100.0 x 10.0	

**Table B23.2.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 32	2.0 – 6.8	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C	
		6.9 – 10.0	-	1 x 60.0 x 4.0		
	32 < D ≤ 50	2.5 – 6.8	-	1 x 60.0 x 2.0		
		6.9 – 10.0	-	1 x 60.0 x 4.0		
	50 < D ≤ 63	2.8 – 6.8	-	1 x 60.0 x 2.0		
		6.9 – 10.0	-	1 x 60.0 x 4.0		
	63 < D ≤ 75	3.0 – 6.8	-	1 x 60.0 x 2.0		
		6.9 – 10.0	-	1 x 60.0 x 4.0		
	75 < D ≤ 90	6.9 – 10.0	3.5 – 4.1	-		1 x 60.0 x 4.0
			4.2	-		1 x 60.0 x 4.0
		4.3 – 9.5	-	1 x 60.0 x 4.0		
			4.3 – 9.5	-		1 x 100.0 x 10.0
		9.6 – 10.0	-	1 x 60.0 x 4.0		
			4.2	-		1 x 60.0 x 4.0
	90 < D ≤ 110	4.3 – 9.5	-	1 x 60.0 x 4.0		
			4.3 – 9.5	-		1 x 100.0 x 10.0
		9.6 – 10.0	-	1 x 60.0 x 4.0		
			4.8 – 5.8	-		1 x 100.0 x 6.0
	110 < D ≤ 125	5.9 – 6.2	-	1 x 100.0 x 6.0		
			5.9 – 6.2	-		1 x 100.0 x 10.0
		6.3 – 9.5	-	1 x 100.0 x 6.0		
			6.3 – 9.5	-		1 x 100.0 x 10.0
		9.6 – 9.9	-	1 x 100.0 x 6.0		
			9.6 – 9.9	-		1 x 100.0 x 10.0

**Table B23.2, cont.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	125 < D ≤ 160	6.2 – 9.5	-	1 x 100.0 x 10.0	EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C	
	160 < D ≤ 200	6.3 – 11.9	-	1 x 100.0 x 16.0		
PE-Xa	D ≤ 20	2.0 – 5.8	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C	
		20 < D ≤ 32	3.0	-		1 x 60.0 x 2.0
		32 < D ≤ 40	3.7	-		1 x 60.0 x 2.0
		40 < D ≤ 50	4.6	-		1 x 60.0 x 2.0
		50 < D ≤ 63	5.8	-		1 x 60.0 x 2.0
PP	D ≤ 50	1.5 – 12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C EI 180-U/C EI 180-C/C EI 120-U/C EI 120-C/C EI 45-U/C EI 45-C/C	
		12.6 – 18.4	-	1 x 60.0 x 4.0		
	50 < D ≤ 75	1.9 – 12.5	-	1 x 60.0 x 2.0		
		12.6 – 18.4	-	1 x 60.0 x 4.0		
	75 < D ≤ 90	2.3 – 18.4	-	1 x 60.0 x 4.0		
		90 < D ≤ 110	2.7 – 18.4	-		1 x 60.0 x 4.0
	110 < D ≤ 125	3.1 – 15.2	-	1 x 100.0 x 6.0		
		125 < D ≤ 160	4.0 – 7.7	-		1 x 100.0 x 10.0
	160 < D ≤ 200	7.7	-	1 x 100.0 x 16.0		
		PP-R	D ≤ 20	2.3 – 4.1		-
4.2	-			1 x 60.0 x 2.0		
4.3 – 10.0	-			1 x 60.0 x 2.0		
2.7 – 4.1	-			1 x 60.0 x 2.0		
20 < D ≤ 32	4.2		-	1 x 60.0 x 2.0		
	4.3 – 12.5		-	1 x 60.0 x 2.0		
32 < D ≤ 40	3.0 – 4.1		-	1 x 60.0 x 2.0		
	4.2		-	1 x 60.0 x 2.0		
40 < D ≤ 50	4.3 – 12.5		-	1 x 60.0 x 2.0		
	3.3 – 4.1		-	1 x 60.0 x 2.0		
50 < D ≤ 63	4.2		-	1 x 60.0 x 2.0		
	4.3 – 12.5		-	1 x 60.0 x 2.0		
	3.8 – 4.1	-	1 x 60.0 x 2.0			
	4.2	-	1 x 60.0 x 2.0			
12.4 – 18.3	-	1 x 60.0 x 2.0				
	4.3 – 12.5	-	1 x 60.0 x 2.0			
12.4 – 18.3	-	1 x 60.0 x 4.0				

**Table B23.2, cont.** Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class			
PP-R	63 < D ≤ 75	4.2	-	1 x 60.0 x 2.0	EI 180-U/C EI 180-C/C EI 120-U/C EI 120-C/C EI 180-U/C EI 180-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C			
		4.3 – 12.5	-	1 x 60.0 x 2.0				
		6.7 – 7.6	-	1 x 60.0 x 4.0				
	75 < D ≤ 90	7.7 – 12.2	-	1 x 60.0 x 4.0				
		12.3	-	1 x 60.0 x 4.0				
		12.4 – 18.3	-	1 x 60.0 x 4.0				
	90 < D ≤ 110	10.0 – 12.2	-	1 x 60.0 x 4.0				
		12.3	-	1 x 60.0 x 4.0				
		12.4 – 18.3	-	1 x 60.0 x 4.0				
	PCV-U/ PVC-C	D ≤ 25	1.5	-		1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 180-U/C EI 180-C/C EI 240-U/C EI 240-C/C EI 180-U/C EI 180-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C EI 120-U/C EI 120-C/C EI 240-U/C EI 240-C/C	
			1.5 – 4.2	-		1 x 60.0 x 2.0		
			25 < D ≤ 32	1.5 – 4.2		-		1 x 60.0 x 2.0
			32 < D ≤ 50	1.8 – 4.2		-		1 x 60.0 x 2.0
			50 < D ≤ 75	1.9 – 4.2		-		1 x 60.0 x 2.0
		75 < D ≤ 90	2.1 – 3.4	-		1 x 60.0 x 4.0		
			3.5 – 4.2	-		1 x 60.0 x 4.0		
		90 < D ≤ 110	2.2	-		1 x 60.0 x 4.0		
			2.3 – 4.2	-		1 x 60.0 x 4.0		
110 < D ≤ 125		2.5 – 3.9	-	1 x 100.0 x 6.0				
		4.0 – 5.3	-	1 x 100.0 x 6.0				
		5.4 – 7.7	-	1 x 100.0 x 10.0				
125 < D ≤ 160		3.2 – 7.6	-	1 x 100.0 x 10.0				
		7.7	-	1 x 100.0 x 10.0				
160 < D ≤ 170		4.4 – 7.6	-	1 x 100.0 x 12.0				
		7.7	-	1 x 100.0 x 12.0				
170 < D ≤ 185		6.1 – 7.6	-	1 x 100.0 x 14.0				
		7.7	-	1 x 100.0 x 14.0				
185 < D ≤ 200		7.7	-	1 x 100.0 x 16.0				

**Table B23.3. Resistance to fire classification of MLC pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	D ≤ 20	2.0	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		2.1 – 7.5	-	1 x 60.0 x 2.0	
	20 < D ≤ 25	2.5	-	1 x 60.0 x 2.0	EI 180 / E 240-U/C
		25 < D ≤ 32	3.2	-	1 x 60.0 x 2.0
	32 < D ≤ 40	4.0	-	1 x 60.0 x 2.0	
		6.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
40 < D ≤ 63	6.3	-	1 x 60.0 x 2.0	EI 180 / E 240-U/C	
	63 < D ≤ 75	7.5	-	1 x 60.0 x 2.0	EI 180 / E 240-C/C
PE-X/AL/ PE-X	D ≤ 20	2.0–7.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		3.0–7.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	20 < D ≤ 32	7.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		4.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	32 < D ≤ 40	4.0	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.0–7.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	40 < D ≤ 63	7.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		63 < D ≤ 75	7.5	-	1 x 60.0 x 2.0

**Table B23.3, cont. Resistance to fire classification of MLC pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/AL/ PP-R	D ≤ 20	2.8–3.3	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		3.4–10.0	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	20 < D ≤ 32	4.4–12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		12.6–18.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
	32 < D ≤ 50	6.9–12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	50 < D ≤ 63	12.6–18.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		8.7–12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	63 < D ≤ 75	12.6–18.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		10.3–12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
	75 < D ≤ 90	12.6–18.4	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
	90 < D ≤ 110	15.1–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C

**Table B23.5. Resistance to fire classification of bundle of max. 3 plastic pipes (max. 3 x PE-HD, D ≤ 32 mm x t = 2.0 mm) penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L, length of 60.0 mm and thickness of 4.0 mm in accordance with Annex A and Fig. B23:**

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

**Table B24.1. Resistance to fire classification of plastic pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 550$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B24:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PVC-U PVC-C	D ≤ 110	4.2	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C

**Table B23.4. Resistance to fire classification of composite pipes (without insulation) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B23:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/ PP-R-GF/ PP-R	D ≤ 20	2.8–10.0	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		4.4–12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	20 < D ≤ 32	12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		12.6–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
	20 < D ≤ 32	18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
		6.9–12.4	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
	32 < D ≤ 50	12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		12.6–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
	50 < D ≤ 63	8.7–12.5	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		12.6–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
	63 < D ≤ 75	10.3–12.5	-	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		12.5	-	1 x 60.0 x 2.0	EI 240-U/C EI 240-C/C
		12.6–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
	75 < D ≤ 90	18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
		11.2–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
	90 < D ≤ 110	12.3–18.3	-	1 x 60.0 x 4.0	EI 120-U/C EI 120-C/C
		18.4	-	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C

**Table B25.1. Resistance to fire classification of plastic pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>1</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B25:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 110	6.2	23	1 x 60.0 x 16.0	EI 120-U/C EI 120-C/C
		10.0	9–13	1 x 60.0 x 8.0	
PP	110 < D ≤ 160	6.2	23	1 x 60.0 x 16.0	EI 120-U/C EI 120-C/C
		2.7	9	1 x 60.0 x 8.0	
PP-R	D ≤ 110	18.3	9	1 x 60.0 x 8.0	EI 120-U/C EI 120-C/C

**Table B25.2. Resistance to fire classification of composite pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>1</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B25:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/ PP-R-GF/ PP-R	D ≤ 110	15.1	9	1 x 60.0 x 8.0	EI 120-U/C EI 120-C/C

**Table B25.3.** Resistance to fire classification of plastic pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1</sub>-s2,d0, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B25:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-HD/ PE/PE-X/ ABS/ SAN+PVC	D ≤ 110	4.2	13	1 x 60.0 x 6.0	EI 120-U/C EI 120-C/C
		4.3 – 10.0	13	1 x 60.0 x 6.0	EI 90-U/C EI 90-C/C
	110 < D ≤ 125	4.8 – 14.5	13	1 x 100.0 x 8.0	EI 45-U/C EI 45-C/C
		14.6	13	1 x 100.0 x 8.0	EI 90-U/C EI 90-C/C
	125 < D ≤ 160	6.2 – 14.5	13	1 x 100.0 x 12.0	EI 45-U/C EI 45-C/C
		14.6	13	1 x 100.0 x 12.0	EI 90-U/C EI 90-C/C
PP	D ≤ 160	4.0 – 14.5	13	1 x 100.0 x 12.0	EI 30-U/C EI 30-C/C
		14.6	13	1 x 100.0 x 12.0	EI 60-U/C EI 60-C/C

**Table B26.1.** Resistance to fire classification of plastic pipes with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS) type penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B26:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP	D ≤ 75	12.5	9	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C
PVC-U/ PVC-C	D ≤ 32	2.0	9	1 x 60.0 x 4.0	EI 240-U/C EI 240-C/C

**Table B26.2.** Resistance to fire classification of MLC pipes with polyethylene foam (PE), with reaction to fire class E<sub>L</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B26:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PE-RT/AL/ PE-RT	D ≤ 20	2.0 – 3.0	9	1 x 60.0 x 2.0	EI 120-U/C
	20 < D ≤ 32	3.0	9	1 x 60.0 x 2.0	EI 120-C/C
PE-X/AL/ PE-X	D ≤ 20	2.0 – 3.0	9	1 x 60.0 x 2.0	EI 120-U/C
	20 < D ≤ 32	3.0	9	1 x 60.0 x 2.0	EI 120-C/C

**Table B26.3.** Resistance to fire classification of composite pipes with polyethylene foam (PE), with reaction to fire class E<sub>L</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B26:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R/ PP-R-GF/ PP-R	D ≤ 20	2.8	9	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.9 – 8.3	13	1 x 60.0 x 2.0	
	20 < D ≤ 50	6.9 – 8.3	13	1 x 60.0 x 2.0	

**Table B27.1.** Resistance to fire classification of plastic pipes with mineral wool mat continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L placed on the insulation in accordance with Annex A and Fig. B27:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
PP-R	D ≤ 20	2.3 – 3.4	20	1 x 60.0 x 2.0	EI 120-U/C EI 120-C/C
		6.8 – 12.5	30	1 x 60.0 x 6.0	
	20 < D ≤ 75	6.8 – 12.5	30	1 x 60.0 x 6.0	

**Table B28.1.** Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 15.0	≥ 1.0	9	1 x 60.0 x 2.0	EI 240-C/U EI 240-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
	15.0 < D ≤ 22.0	≥ 1.1	9	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
			37 – 49	1 x 60.0 x 8.0	
			50	1 x 60.0 x 8.0	EI 180-C/U EI 180-C/C
			22.0 < D ≤ 28.0	≥ 1.2	9
	10 – 22	1 x 60.0 x 4.0			
	23 – 36	1 x 60.0 x 6.0			
	37 – 49	1 x 60.0 x 8.0			
	50	1 x 60.0 x 8.0	EI 180-C/U EI 180-C/C		
	28.0 < D ≤ 42.0	≥ 1.3	9		1 x 60.0 x 2.0
	10 – 22		1 x 60.0 x 4.0		
	23 – 36		1 x 60.0 x 6.0		
	37 – 49		1 x 60.0 x 8.0		
	50		1 x 60.0 x 8.0	EI 180-C/U EI 180-C/C	
	42.0 < D ≤ 54.0		≥ 1.5	9	1 x 60.0 x 2.0
	10 – 22	1 x 60.0 x 4.0			
	23 – 36	1 x 60.0 x 6.0			
	37 – 49	1 x 60.0 x 8.0			
	50	1 x 60.0 x 8.0		EI 180-C/U EI 180-C/C	
steel	D ≤ 42.4	≥ 2.0		9	1 x 60.0 x 2.0
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	

**Table B28.1, cont.** Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>L</sub>-s3,d0, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28a:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	42.4 < D ≤ 48.3	2.1 – 2.5	9	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
			9 – 12	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			13	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
	48.3 < D ≤ 60.3	≥ 2.6	14 – 22	1 x 60.0 x 4.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
			24 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
			9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
	48.3 < D ≤ 60.3	2.3 – 2.5	37 – 50	1 x 60.0 x 8.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
			9 – 12	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			10 – 22	1 x 60.0 x 4.0	
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
			9 – 12	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
	60.3 < D ≤ 76.1	≥ 2.6	13	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
			14 – 22	1 x 60.0 x 4.0	
			24 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
			9 – 12	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
			13	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
60.3 < D ≤ 76.1	≥ 2.6	14 – 22	1 x 60.0 x 4.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
		24 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0		
		9 – 12	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	



**Table B28.1. cont. Resistance to fire classification of metal pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>1-s3,d0</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28a:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	76.1 < D ≤ 88.9	2.6 – 2.7	13	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
					≥ 2.8
		13	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C	
		14 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C	
		24 – 36	1 x 60.0 x 6.0		
		37 – 50	1 x 60.0 x 8.0		
	88.9 < D ≤ 114.3	≥ 3.2	9	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
	114.3 < D ≤ 139.7	≥ 3.7	9	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
	139.7 < D ≤ 159.0	≥ 4.0	9	1 x 60.0 x 2.0	EI 120 / E 240-C/U EI 120 / E 240-C/C
			10 – 22	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
			23 – 36	1 x 60.0 x 6.0	
			37 – 50	1 x 60.0 x 8.0	
	159.0 < D ≤ 168.3	≥ 4.1	9	1 x 60.0 x 2.0	EI 90-C/U EI 90-C/C
			10 – 22	1 x 60.0 x 4.0	EI 60 / E 90-C/U EI 60 / E 90-C/C
			23 – 36	1 x 60.0 x 6.0	
			37 – 49	1 x 60.0 x 8.0	
	50	1 x 60.0 x 8.0	EI 60 / E 120-C/U EI 60 / E 120-C/C		
	168.3 < D ≤ 219.0	≥ 4.5	9	1 x 60.0 x 2.0	EI 90-C/U EI 90-C/C
10 – 22			1 x 60.0 x 4.0	EI 60 / E 90-C/U EI 60 / E 90-C/C	
23 – 36			1 x 60.0 x 6.0		
37 – 49			1 x 60.0 x 8.0		
50	1 x 60.0 x 8.0	EI 60 / E 120-C/U EI 60 / E 120-C/C			

**Table B28.2. Resistance to fire classification of steel pipes with flexible elastomeric foam (FEF), with reaction to fire class D<sub>1-s3,d0</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 550 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28a:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	D ≤ 168.3	≥ 4.0	23	1 x 60.0 x 4.0	EI 60-C/U EI 60-C/C

**Table B28.3. Resistance to fire classification of copper pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1-s2,d0</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28a:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 12.7	≥ 0.8	9	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
	12.7 < D ≤ 15.0	≥ 0.9	9	1 x 60.0 x 4.0	
	15.0 < D ≤ 22.23	≥ 1.0	9	1 x 60.0 x 4.0	

**Table B28.4. Resistance to fire classification of steel pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1-s2,d0</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	Figure in Annex B
steel	D ≤ 18.0	1.2 – 1.4	9	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C	B28a
				10 – 25		
	D ≤ 18.0	≥ 1.5	9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
			38 – 50	1 x 60.0 x 8.0		
			9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
	18.0 < D ≤ 28.0	1.3 – 1.4	9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
		≥ 1.5	10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
	28.0 < D ≤ 48.3	1.4	9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
		≥ 1.5	9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
	48.3 < D ≤ 66.7	≥ 1.5	9	1 x 60.0 x 2.0		
			10 – 25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
			38 – 50	1 x 60.0 x 8.0		
	66.7 < D ≤ 76.1	≥ 1.6	25	1 x 60.0 x 4.0		
			26 – 37	1 x 60.0 x 6.0		
38 – 50			1 x 60.0 x 8.0			
76.1 < D ≤ 88.9	≥ 1.8	25	1 x 60.0 x 4.0			
		26 – 37	1 x 60.0 x 6.0			
		38 – 50	1 x 60.0 x 8.0			
88.9 < D ≤ 108.0	≥ 2.0	25	1 x 60.0 x 4.0			
		26 – 37	1 x 60.0 x 6.0			
		38 – 50	1 x 60.0 x 8.0			

**Table B28.4. cont. Resistance to fire classification of steel pipes with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1-s2,d0</sub>, continuous insulation (case CS) penetration seals in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B28:**

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class	Figure in Annex B
steel	108.0 < D ≤ 114.3	≥ 2.2	50	1 x 60.0 x 8.0	EI 120-C/U EI 120-C/C	B28a
	114.3 < D ≤ 139.7	≥ 3.1	50	1 x 60.0 x 8.0		
	139.7 < D ≤ 168.3	≥ 4.0	50	1 x 60.0 x 8.0		
	168.3 < D ≤ 219.1	≥ 4.4	50 <sup>1)</sup>	1 x 60.0 x 8.0	EI 90 / E 120-C/U EI 90 / E 120-C/C	B28b
	219.1 < D ≤ 273.0	≥ 4.9	50 <sup>1)</sup>	1 x 60.0 x 8.0		
	273.0 < D ≤ 323.9	≥ 5.3	50 <sup>1)</sup>	1 x 60.0 x 8.0		
323.9 < D ≤ 355.6	≥ 5.6	50 <sup>1)</sup>	1 x 60.0 x 8.0			

<sup>1)</sup> Pipe additionally insulated with mineral wool density of 35 kg/m<sup>3</sup>, local insulation (case LI) dimensions of: 50 x 700 mm (thickness x length)

**Table B29.1.** Resistance to fire classification of metal pipes with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS) penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B29:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$D \leq 6.0$	$\geq 0.8$	9	1 x 60.0 x 2.0	EI 240-C/U EI 240-C/C
	$6.0 < D \leq 15.88$	$\geq 1.0$	9	1 x 60.0 x 2.0	
steel	$D \leq 42.4$	$2.1 - 2.8$	20	1 x 60.0 x 2.0	EI 180 / E 240-C/U EI 180 / E 240-C/C
		$\geq 2.9$	21-25	1 x 60.0 x 4.0	
	$42.4 < D \leq 48.3$	$\geq 2.1$	25	1 x 60.0 x 4.0	
	$48.3 < D \leq 60.3$	$\geq 2.3$	25	1 x 60.0 x 4.0	
	$60.3 < D \leq 76.1$	$\geq 2.7$	25	1 x 60.0 x 4.0	
	$76.1 < D \leq 88.9$	$\geq 2.9$	25	1 x 60.0 x 4.0	
EI 60-C/U EI 60-C/C	$88.9 < D \leq 108.0$	$\geq 4.0$	25	1 x 60.0 x 4.0	

**Table B29.2.** Resistance to fire classification of bundle of max. 3 copper pipes (max.  $2 \times D \leq 6.35$  mm x  $t = 0.8$  mm + max.  $1 \times D \leq 15.88$  mm x  $t = 1.0$  mm) with continuous PE foam insulation, with reaction to fire class E, (thickness of 9 mm) penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L length of 60.0 mm and thickness of 4.0 mm in accordance with Annex A and Fig. B29:

Fire resistance class:  
EI 180 / E 240-C/U  
EI 180 / E 240-C/C

**Table B29.3.** Resistance to fire classification of copper pipes with polyethylene foam (PE), with reaction to fire class B<sub>1-s1,d0</sub>, local sustained insulation (case LS) penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B29:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$D \leq 12.7$	$\geq 0.8$	9 x 400	1 x 60.0 x 4.0	EI 120-C/U EI 120-C/C
	$12.7 < D \leq 22.23$	$\geq 1.0$	9 x 400	1 x 60.0 x 4.0	

**Table B30.1.** Resistance to fire classification of steel pipes with mineral wool mat local sustained insulation (case LS) penetration seals in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B30:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
steel	$D \leq 42.4$	$\geq 1.5$	20 x 300	1 x 60.0 x 2.0	EI 120-C/U EI 120-C/C
		$\geq 2.0$	(21-30) x 400	1 x 60.0 x 2.0	
		$\geq 2.0$	(21-40) x 600	1 x 60.0 x 2.0	
		$\geq 4.0$	(21-50) x 600	1 x 60.0 x 2.0	
		$\geq 1.5$	30 x 500	1 x 60.0 x 2.0	
		$\geq 2.0$	(31-40) x 600	1 x 60.0 x 2.0	
	$42.4 < D \leq 66.7$	$\geq 2.0$	40 x 600	1 x 60.0 x 2.0	
		$\geq 4.0$	(31-50) x 600	1 x 60.0 x 2.0	
		$\geq 4.0$	(41-50) x 600	1 x 60.0 x 2.0	
	$66.7 < D \leq 108.0$	$\geq 2.0$	40 x 600	1 x 60.0 x 2.0	
	$\geq 4.0$	(41-50) x 600	1 x 60.0 x 2.0		
	$108.0 < D \leq 114.3$	$\geq 4.0$	50 x 600	1 x 60.0 x 2.0	
$114.3 < D \leq 139.7$	$\geq 4.0$	50 x 600	1 x 60.0 x 2.0		
$139.7 < D \leq 168.3$	$\geq 4.0$	50 x 600	1 x 60.0 x 2.0		

**Table B31.1.** Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1-s2,d0</sub>, continuous insulation (case CS), with additional single cable  $4 \times 1.5$  mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 25$  mm and pipe wall thickness of:  $t_p = 1.5$  mm penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B31:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$D \leq 12.7$	$\geq 0.8$	9	1 x 60.0 x 4.0	EI 120
	$12.7 < D \leq 22.23$	$\geq 1.0$	9	1 x 60.0 x 4.0	

**Table B31.2.** Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with flexible elastomeric foam (FEF), with reaction to fire class B<sub>1-s2,d0</sub>, continuous insulation (case CS), with additional single cable  $4 \times 1.5$  mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 25$  mm and pipe wall thickness of:  $t_p = 1.5$  mm penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B31:

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$12.7 \times 0.8$	$12.7 \times 0.8$	9	1 x 60.0 x 4.0	EI 120
	$12.7 \times 0.8$	$22.23 \times 1.0$	9	1 x 60.0 x 4.0	

**Table B32.1.** Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS), with additional single A1 cable (E-YY-J 5x1,5; RE NYY-J 5x1,5 RE; VV 5x1,5) penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B32:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$D \leq 6.0$	$\geq 0.8$	9	1 x 60.0 x 2.0	EI 240
	$6.4 < D \leq 15.6$	$\geq 1.0$	9	1 x 60.0 x 2.0	

**Table B32.2.** Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS), with additional single A1 cable (E-YY-J 5x1,5; RE NYY-J 5x1,5 RE; VV 5x1,5) penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B32:

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$6.0 \times 0.8$	$6.0 \times 0.8$	9	1 x 60.0 x 2.0	EI 240
	$6.0 \times 0.8$	$15.6 \times 1.0$	9	1 x 60.0 x 2.0	

**Table B32.3.** Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS), with additional single A1 cable (E-YY-J 5x1,5; RE NYY-J 5x1,5 RE; VV 5x1,5) and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 32$  mm and pipe wall thickness of:  $t_p = 2.0$  mm penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B32:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$D \leq 6.0$	$\geq 0.8$	9	1 x 60.0 x 4.0	EI 240
	$6.0 < D \leq 15.9$	$\geq 1.0$	9	1 x 60.0 x 4.0	

**Table B32.4.** Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class E, continuous insulation (case CS) type, with additional single cable type A1 (E-YY-J 5x1,5; RE NYY-J 5x1,5 RE; VV 5x1,5) and single PVC-U pipe (U/C end configuration) diameter of:  $D \leq 32$  mm and pipe wall thickness of:  $t_p = 2.0$  mm penetration seal in rigid floor thickness of:  $t \geq 150$  mm and density of:  $\rho \geq 1700$  kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B32:

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	$6.0 \times 0.8$	$6.0 \times 0.8$	9	1 x 60.0 x 4.0	EI 240
	$6.0 \times 0.8$	$15.9 \times 1.0$	9	1 x 60.0 x 4.0	



Table B32.5. Resistance to fire classification of mixed bundle of single copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class B<sub>L</sub>-s1,d0, local insulation (case LS, insulation length of 400 mm) type, with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 25 mm and pipe wall thickness of: t<sub>p</sub> = 1.5 mm penetration seal in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B32:

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x intumescent material length x thickness [mm]	Fire resistance class
copper	D ≤ 12.7	≥ 0.8	9 x 400	1 x 60.0 x 4.0	EI 120
	12.7 < D ≤ 22.23	≥ 1.0	9 x 400	1 x 60.0 x 4.0	

Table B32.6. Resistance to fire classification of mixed bundle of double copper pipe (C/U end configuration) with polyethylene foam (PE), with reaction to fire class B<sub>L</sub>-s1,d0, local insulation (case LS, insulation length of 400 mm), with additional single cable 4 x 1.5 mm<sup>2</sup> and single PVC-U pipe (U/C end configuration) diameter of: D ≤ 25 mm and pipe wall thickness of: t<sub>p</sub> = 1.5 mm penetration seal in rigid floor thickness of: t ≥ 150 mm and density of: ρ ≥ 1700 kg/m<sup>3</sup>, made with use of single row of INTU FR WRAP or INTU FR WRAP L in accordance with Annex A and Fig. B32:

Pipe material	Copper pipe No. 1 max. diameter x min. wall thickness [mm]	Copper pipe No. 2 max. diameter x min. wall thickness [mm]	Insulation thickness [mm]	Rows [pcs] x Intumescent material length x thickness [mm]	Fire resistance class
copper	12.7 x 0.8	12.7 x 0.8	9 x 400	1 x 60.0 x 4.0	EI 120
	12.7 x 0.8	22.23 x 1.0	9 x 400	1 x 60.0 x 4.0	

BWR 3 Hygiene, health and the environment	
Air permeability	NPD
Water permeability	NPD
Content, emission, release of dangerous substances	NPD
BWR 4 Safety and accessibility in use	
Mechanical resistance and stability	NPD
Resistance to impact/movement	NPD
Adhesion	NPD
Durability	Z <sub>2</sub>
BWR 5 Protection against noise	
Aireborne sound insulation	NPD
BWR 6 Energy economy and heat retention	
Thermal properties	NPD
Water vapour permeability	NPD

8. Appropriate technical documentation or special technical documentation:

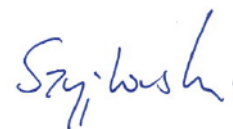
**Not applicable**

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Name: Michał Szykowski

Position: President of the Management Board



Piaseczno, 27.10.2025

Place, date

.....  
Signature

Edition 2