



Regulatory Information report

Hilti Firestop Bandage CFS-B protecting insulated metal pipe penetrations in walls and concrete floors if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1-2005

Client: Hilti (New Zealand) Ltd

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1 INTRODUCTION

This report contains the minimum information sufficient for regulatory compliance and refers to the Assessment report EWFA 30726700.

The referenced assessment report presents an assessment of the fire resistance performance of Hilti Firestop Bandage CFS-B protecting insulated metal pipe penetrations in walls and concrete floors if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1-2005.

The tested prototypes described in Section 2 of this report, when subject to the proposed variations described in Section 3 and tested in accordance with the referenced test method described in Section 4. The conclusions of the report are summarised in Section 5.

The validity of the referenced assessment report is conditional on compliance with Sections 7, 8 and 9 of this report.

2 TESTED PROTOTYPES

The referenced assessment report is based on reference tests Nr. 8889-13-VI, Nr. 8890-13-VI, Nr. 8891-13-VI, Nr. 8920-13-VI, Nr. 8921-13-VI and Nr. 8922-13-VI describing tests on pipe penetrations protected with Hilti Firestop Bandage CFS-B penetrating walls and floors tested in accordance with EN 1366-3: 2009. The tests were sponsored by Hilti AG and were conducted by AFITI, Centre for Fire Testing and Research.

The assessment references to test reports No. 15862A, No. 15863A and No. 15864A describing tests on pipe penetrations protected with Hilti Firestop Bandage CFS-B penetrating walls and floors tested in accordance with EN 1366-3: 2009. The tests were sponsored by Hilti AG and were conducted by Warringtonfiregent.

The assessment also references to test reports No. 07-E-317 and SINTEF 103080.23 describing tests on pipe penetrations protected with Hilti Firestop Foam CFS F-FX penetrating floor and wall construction in accordance with EN 1366-3: 2009. This test was sponsored by Hilti AG and was conducted by Efectis.

Additional reports are referenced in the assessment can be found in the table below.

Refer to Appendix A for a full summary of the test data.

Test report	Test Sponsor	Testing authority	Testing standard
07-E-317-C	Hilti Pty Ltd	Efectis	EN 1366-3 : 2006
8920/13	Hilti AG	AFITI	EN 1366-3 : 2009
8921/13	Hilti AG	AFITI	EN 1366-3 : 2009
8922/13	Hilti AG	AFITI	EN 1366-3 : 2009
15862A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
15863A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
8891/13	Hilti AG	AFITI	EN 1366-3 : 2009
8889/13	Hilti AG	AFITI	EN 1366-3 : 2009
08-E-079A	Hilti Pty Ltd	Efectis	EN 1366-3 : 2006
8890/13	Hilti AG	AFITI	EN 1366-3 : 2009
17219C	Hilti AG	Warringtonfire	EN 1366-3 : 2009
16823A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
16825A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
16826A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
16906A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
17218A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
17219A	Hilti AG	Warringtonfire	EN 1366-3 : 2009

Test report	Test Sponsor	Testing authority	Testing standard
16821A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
16822A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
15864A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
18270A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
180271A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
180272A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
18269A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
17220A	Hilti AG	Warringtonfire	EN 1366-3 : 2009
179848	Hilti mbh	Bodycote	EN 1366-3 : 2004

3 VARIATION TO TESTED PROTOTYPES

The proposed construction for service penetrations protected with Hilti Firestop Bandage CFS-B in walls and floors shall be as tested in Nr. 8889-13-VI, Nr. 8890-13-VI, Nr. 8891-13-VI, Nr. 8920-13-VI, Nr. 8921-13-VI, Nr. 8922-13-VI, No. 15862A, No. 15863A and No. 15864A subjecting to the following variations:

- Confirm the performance of service penetrations in accordance with AS 1530.4:2014.
- Thickness of floor slab be a minimum of 120mm.
- For walls, the support construction shall optionally be aerated concrete, autoclaved aerated concrete, Hebel, Speedpanel panel, Speedwall/Korok panel, Dincel, concrete, plasterboard, solid or hollow masonry walls.
- The plasterboard lined wall shall comprise of timber or steel studs lined on both faces with a minimum of 2 layers of 13mm or 16mm thick fire grade plasterboard with or without cavity insulation and be otherwise tested or assessed to achieve an FRL of -/120/120 or 120/120/120.
- The metal pipes insulated with Armaflex AF insulation up to 42.5mm thick can be optionally wrapped with 40mm thick mineral wool insulation configuration continued sustained.
- Hilti Firestop Foam CFS-F FX can be used for gaps up to 50mm and is installed to the full depth in flexible walls, rigid walls and floors if is applicable.
- The assessed construction is summarised in below for walls and floors is summarised in section 3.1 to 3.5.

3.1 PENETRATION SEAL AND BANDAGE INSTALLATION

Pipes that are insulated with elastomeric combustible insulation – Armaflex AF or mineral wool and are fire-stopped by wrapping the Hilti Firestop Bandage CFS-B twice around the insulation material.

Steel wire is utilised to hold the Hilti Firestop Bandage CFS-B together, positioned approximately in the first quarter measured from the flank.

The Hilti Firestop Bandage CFS-B is mounted on both sides of the penetration. The Hilti Firestop Bandage CFS-B is then pushed into the penetration in line with the designated marking shown on midsize of the Hilti Firestop Bandage CFS-B or at the 100mm thick walls the Hilti Firestop Bandage CFS-B is placed with a distance of approximately 5mm from each other.

Single Penetration Seal

Single insulated pipes running through the penetration are sealed utilising two layers of Hilti Firestop Bandage CFS-B each side.

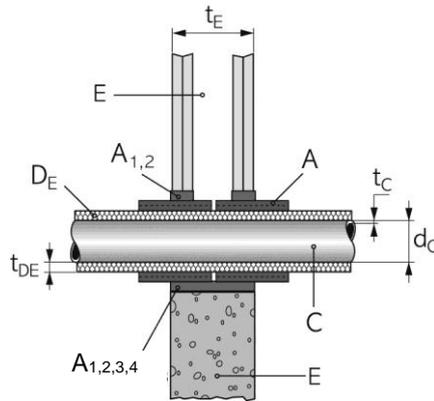


Figure 1 – Installation scheme of bandage (Side View)

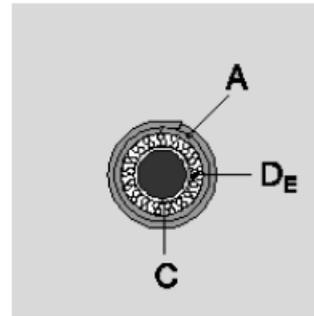


Figure 2 – Installation scheme of bandage (Front View)

Item	Description	Item	Description
A	Hilti Firestop Bandage CFS-B	C	Service (metal pipes)
A ₁	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR or CP 606	D _E	Pipe insulation, combustible, butyl based elastomeric foamed material – Armaflex AF or mineral wool insulation made from Rockwool RS 800
A ₂	Annular gap seal with gypsum plaster	E	Support construction element
A ₃	Annular gap seal with cementitious mortar	t _c	Pipe wall thickness
A ₄	Annular gap seal with Hilti Firestop Foam CFS-F FX	d _c	Pipe diameter (nominal outside diameter)
t _E	Thickness of the building element	t _{DE}	Insulation thickness

Pipe insulation with combustible and mineral wool insulation

Specific insulation thickness with corresponding classification class is shown at each section below.

Elastomeric combustible insulation

Pipes are insulated with elastomeric combustible insulation material – Elastomeric combustible insulation butyl rubber-based insulation material, varying in thickness from 7.7mm up to 45mm in configuration (CS) Continued Sustained.

List of approved elastomeric butyl rubber-based foam insulations:

Producer	Approved Type of foamed elastomeric thermal isolation
Armacell GmbH	Armaflex AF, Armaflex SH, Armaflex Ultima, Armaflex HT
NMC Group	Insul-Tube (nmc), Insul-Tube H-Plus (nmc),
Kaimann GmbH	Kaiflex KK plus, Kaiflex KK,
L'Isolante K-Flex	l'Isolante K-Flex HT, l'Isolante K-Flex ECO, l'Isolante K-Flex ST, l'Isolante K-Flex H, l'Isolante K-Flex ST Plus

Results were displayed considering in Section 5.1, 5.2 and 5.3 allowing interpolation of wall thickness and diameter between tested specimens and insulation thickness, respectively,

Mineral wool/ Stone Wool insulation

Mineral Stone Wool Insulation, with melting point of > 1000 C° and has a minimum approx. density of 40kg/m³. (e.g. Rockwool Kilmarock, RS 800) or equivalent mineral / stone wool insulation tested to AS1530.1. Insulation thickness depends on pipe diameter, see tables in section 5.

Results were displayed considering in Section 5.4, 5.5 and 5.6 allowing interpolation of wall thickness and diameter between tested specimens and insulation thickness, respectively.

- Copper Pipes with pre-insulated Wicu Flex PE Insulation
- Copper Pipes with PUR insulation

Steel Pipes

Applying Annex E1.3.2 of DIN EN 1366-3:2009 the field of application given above for copper pipes is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steel, Ni alloys (NiCu, NiCr, NiMo alloys) and Ni.

Additional Protection

Additional insulation material (AP) is utilised for some applications and comprises of the following:

- **AP1:** Elastomeric combustible insulation butyl rubber based insulation material - i.e. Armaflex AF/K-flex FR
- **AP2:** Mineral Stone Wool, with melting point of >1000 C° and has a minimum approx. density of 40kg/m³, 40mm thick 250mm or 500mm in length; or equivalent Mineral Stone Wool tested to AS1530.1 (LI) Local Interrupted.
- **AP3:** Beading for flexible wall (100mm) is applied by adding boards on both sides in two layers of 13mm or 16mm thick fire rated plasterboard fixed with drywall screws. The plasterboard strips around the pipe are at least 50mm in width. Final penetration seal thickness is at least 150mm thick.

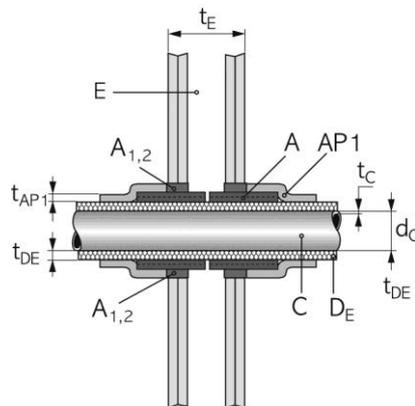


Figure 3 – Installation of Additional Protection AP 1

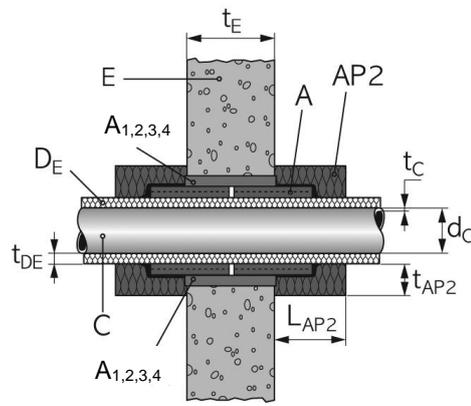


Figure 4 – Installation of Additional Protection AP 2

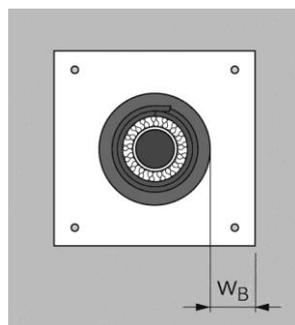


Figure 5 – Installation of Additional Protection AP 3

Item	Description	Item	Description
A	Hilti Firestop Bandage CFS-B	C	Service (metal pipes)
A ₁	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR or CP 606	D _E	Pipe insulation, combustible, butyl based elastomeric foamed material – Armaflex AF or mineral wool insulation made from Rockwool RS 800
A ₂	Annular gap seal with gypsum plaster	E	Support construction element
Item	Description	Item	Description
A ₃	Annular gap seal with cementious mortar	t _c	Pipe wall thickness
A ₄	Annular gap seal with Hilti Firestop Foam CFS-F FX	W _B	Width of additional protection AP3, minimum 50mm
t _E	Thickness of the building element	d _c	Pipe diameter (nominal outside diameter)
t _{DE}	Insulation thickness		

3.2 DISTANCE REQUIREMENTS

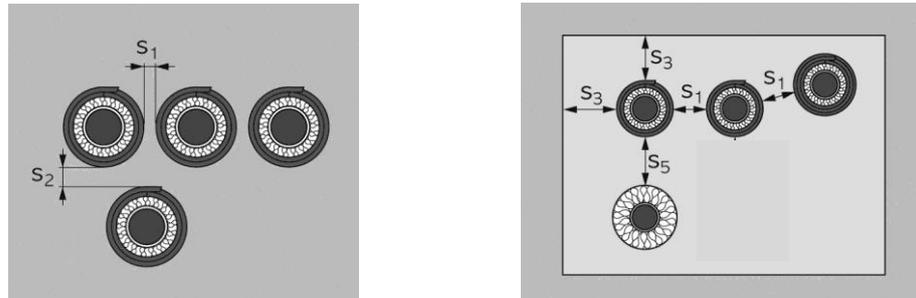


Figure 6 - Distance Requirements of Penetrations

Distance valid for installations of services in wall and floor unless specified otherwise in section 5	Minimum distance in mm
Distance to pipes fire stopped by bandage in linear configuration	S ₁ = 0
Distance to pipes fire stopped by bandage in cluster configuration	S ₂ = 0
Distance to seal edge	S ₃ = 0
Distance to additional protection (Conlit shell and Klimarock)	S ₅ = 0
Distance between pipes fire stopped with bandage and other services	S ₅ = 0

Annular Gap

- In flexible walls Hilti Acrylic Firestop sealant CFS-S ACR / CP 606 or gypsum is used to fill annular space.
- In rigid walls and floors Hilti Acrylic Firestop sealant CFS-S ACR / CP 606, gypsum or mortar is used to fill annular space.
- Hilti Acrylic Firestop sealant CFS-S ACR / CP 606 is used for gaps of 0mm – 15mm and is installed to a depth of wall linings for flexible walls and is installed to the full depth in rigid walls and floors.
- Mortar and gypsum can be used for gaps up to 50mm and is installed to a depth of wall linings for flexible walls and to the full depth in rigid walls and floors if is applicable. (Noted as A₄)
- Hilti Firestop Foam CFS-F FX can be used for gaps up to 50mm and is installed to full depth of flexible walls, rigid walls and floors if is applicable. For flexible walls, an aperture framing (E3) is used, perpendicular to wall surface, made of fire grade plasterboard board at least 13mm or 16mm thick.

Note: Figures 8, 10, 11 & 12 display all installation options for flexible walls.
Only one installation option should be used for each penetration.
Horizontal support (E3) for the annular gap seal is only required for option A4.
E3 is not required for options A1 & A2.

Pipe Support

Pipes are supported in wall applications at a distance of 400mm and in floor applications at a distance of 400mm.

Aperture Beading details for walls and floors

The supporting construction is required to be minimum 100mm thick for walls and minimum 150mm thick for floors. For walls or floors with a thickness of less than these values a beading shall be used.

Beading: 13mm or 16mm fire rated plasterboard strips at least 100 mm wide (W_A , figure 7) are installed around the opening with the necessary number of layers to form a frame on the top side of a floor, or two frames of the same height on both sides of a wall (figure 7, 8 and 9).

Walls: Beading is applied to one or both sides

Floors: Beading is applied to top only

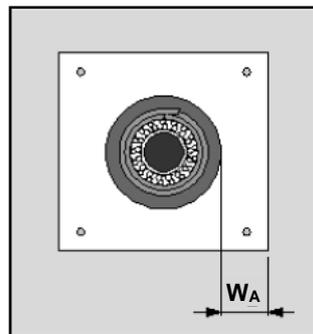


Figure 7 – Aperture beading and position of the seal in walls / floors

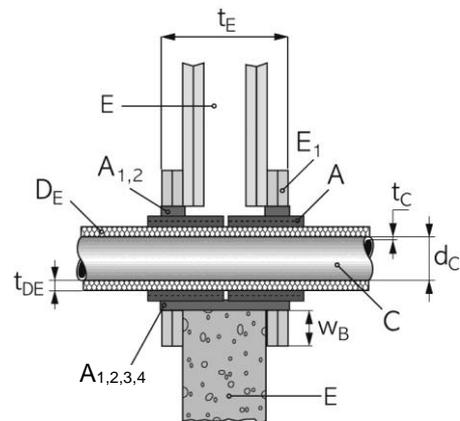


Figure 8 – Aperture beading and position of the seal in walls

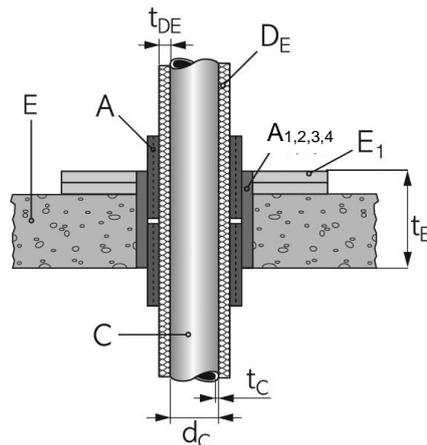


Figure 9 – Aperture beading and position of the seal in floors

Item	Description	Item	Description
A	Hilti Firestop Bandage CFS-B	C	Service (metal pipes)
A1	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR or CP 606	DE	Pipe Insulation (sustained), combustible butyl based elastomeric insulation or mineral stone wool

			insulation with melting point of >1000 C° and has a minimum approx. density of 40kg/m ³ , insulation thickness determined by tables in section 5.
A ₂	Annular gap seal with gypsum plaster	t _c	Pipe wall thickness
A ₃	Annular gap seal with cementious mortar i.e. Hilti CP636 Fire Mortar, to full depth of t _E	E	Support construction element
A ₄	Annular gap seal with Hilti Firestop Foam CFS-F FX to minimum depth of 150mm.	E ₁	Beading, 13mm or 16mm thick fire rated plasterboard
W _A	Width of beading, minimum 100mm	E ₂	Wall cavity insulation
t _E	Thickness of the building element	d _c	Pipe diameter (nominal outside diameter)
t _{DE}	Insulation thickness		

Note: Annular Gap seal should be filled using one of the methods listed i.e. A₁ or A₂ or A₃ or A₄ appropriate for the construction method.

3.3 PENETRATIONS IN FLEXIBLE WALLS

Flexible wall (E)

The wall must have a minimum thickness of 100 mm (t_E) and comprise of timber or steel studs lined on both faces with a minimum of two layers of 13mm or 16 mm thick fire grade plasterboard and be tested or otherwise assessed to achieve an FRL of -/120/120 or 120/120/120 with or without cavity insulation (E₂).

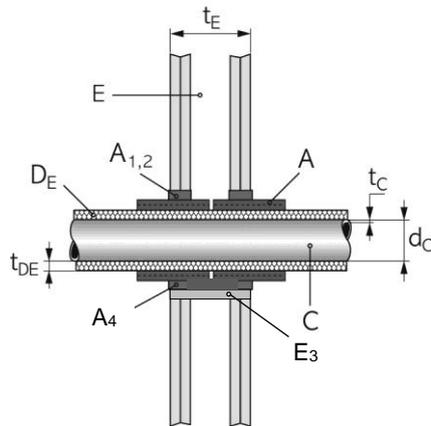


Figure 10 - Standard installation in flexible wall

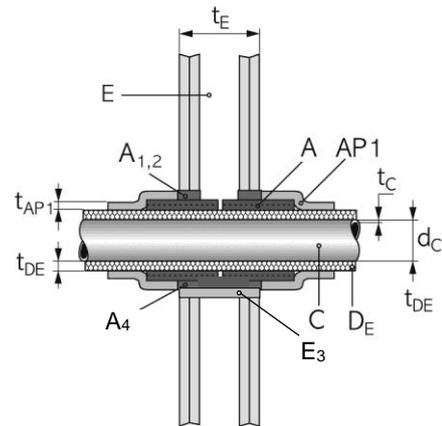


Figure 11 - Installation with additional protection AP1

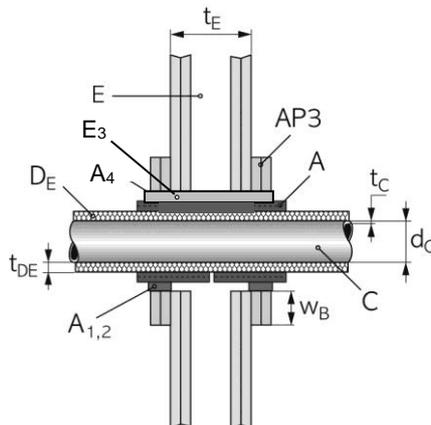


Figure 12 - Installation with additional protection AP3

Item	Description	Item	Description
A	Hilti Firestop Bandage CFS-B	C	Service (metal pipes)
A ₁	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR or CP606, applied to minimum depth of 20mm on both sides of wall.	D _E	Pipe Insulation (sustained), combustible butyl based elastomeric insulation or mineral stone wool insulation with melting point of > 1000 C° and has a minimum approx. density of 40kg/m ³ , insulation thickness determined by tables in section 5.
A ₂	Annular gap seal with gypsum plaster	t _c	Pipe wall thickness
A ₄	Annular gap seal with Hilti Firestop Foam CFS-F FX, filled to minimum depth of 150mm.	d _c	Pipe diameter (nominal outside diameter)
E	Support construction element	W _A	Width of beading, minimum 100mm
E ₂	Wall cavity insulation	AP 1	19mm(t _{AP1}) thick Armaflex AF, 250mm long
E ₃	Aperture framing, 13mm or 16mm fire grade plasterboard	AP 3	13mm or 16mm thick fire grade plasterboard
t _E	Thickness of the building element	t _{DE}	Insulation thickness

Note: Annular Gap seal should be filled using one of the methods listed i.e. A₁ or A₂ or A₄ appropriate for the construction method.

Note₂: E₃ is not required for annular gap seal options A₁ & A₂.

3.4 PENETRATIONS IN RIGID WALLS

The walls must be tested or otherwise assessed in accordance with AS 1530.4:2014 for the required fire resistance period.

Rigid wall (E)

The bare wall must have a minimum thickness of 75 mm and comprise of concrete, aerated concrete, Speedpanel panel, Speedwall/Korok panel or solid or hollow masonry with a minimum density of 550 kg/m³. If the bare wall is less than 100mm thick build-up shall be applied such that t_E ≥ 100mm.

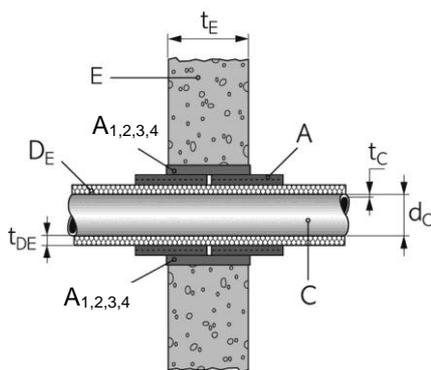


Figure 13 - Standard installation in rigid wall

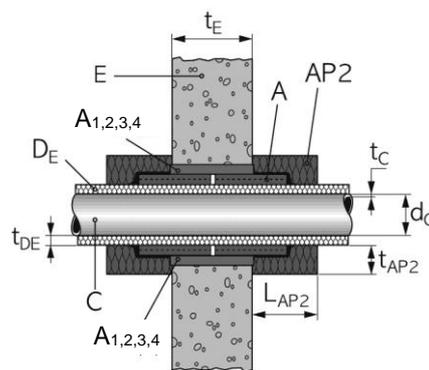


Figure 14 - Installation with additional protection AP2

Item	Description	Item	Description
A	Hilti Firestop Bandage CFS-B	C	Service (metal pipes)
A ₁	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR or CP606, applied to minimum depth of 20mm on both sides of wall.	D _E	Pipe Insulation (sustained), combustible butyl based elastomeric insulation or mineral stone wool insulation with melting point of > 1000

Item	Description	Item	Description
			C° and has a minimum approx. density of 40kg/m ³ , insulation thickness determined by tables in section 5.
A ₂	Annular gap seal with gypsum plaster	t _C	Pipe wall thickness
A ₃	Annular gap seal with cementitious mortar i.e. Hilti CP636 Fire Mortar, to full depth of t _E	E	Support construction element
A ₄	Annular gap seal with Hilti Firestop Foam CFS-F FX to minimum depth of 150mm.	W _A	Width of beading, minimum 100mm
t _E	Thickness of the building element	AP 2	40mm(t _{AP2}) thick Mineral wool, 250mm long or 500mm long (L _{AP2})
t _{DE}	Insulation thickness	AP 2	See result tables in Section 5 for AP2 length options
d _C	Pipe diameter (nominal outside diameter)		

Note: Annular Gap seal should be filled using one of the methods listed i.e. A₁ or A₂ or A₃ or A₄ appropriate for the construction method.

3.5 PENETRATIONS IN RIGID FLOORS

The floors must be tested or otherwise assessed in accordance with AS 1530.4:2014 for the required fire resistance period.

Rigid floor (E)

The floor must have a minimum thickness of 120 mm (t_E) and comprise of aerated concrete or concrete with a minimum density of 550 kg/m³. If the concrete floor is less than 150mm thick build-up shall be applied such that t_E ≥ 150mm.

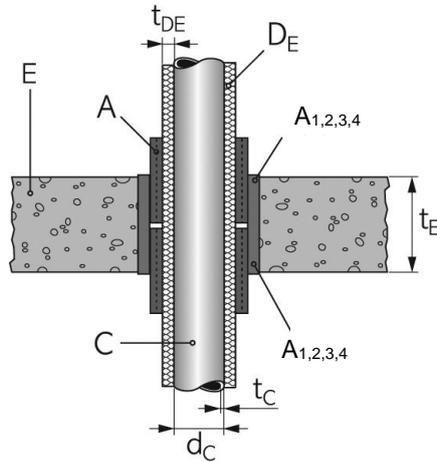


Figure 15 - Standard Installation in Floor

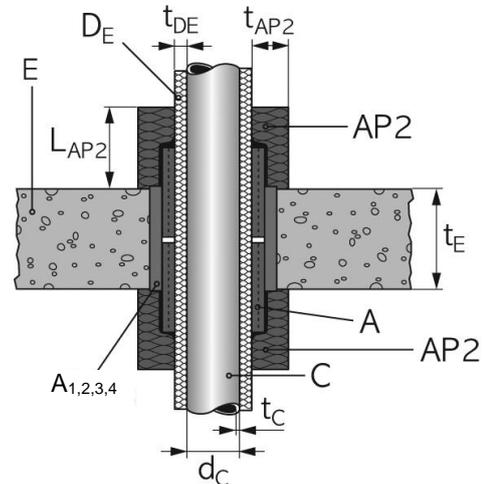


Figure 16 - Installation with additional protection AP 2

Item	Description	Item	Description
A	Hilti Firestop Bandage CFS-B	C	Service (metal pipes)
A ₁	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR or CP606, applied to minimum depth of 20mm on the top and bottom sides of the floor	D _E	Pipe Insulation (sustained), combustible butyl based elastomeric insulation or mineral stone wool insulation with melting point of > 1000 C° and has a minimum approx.

Item	Description	Item	Description
			density of 40kg/m ³ , insulation thickness determined by tables in section 5.
A ₂	Annular gap seal with gypsum plaster	t _C	Pipe wall thickness
A ₃	Annular gap seal with cementious mortar i.e. Hilti CP636 Fire Mortar, to full depth of t _E	W _A	Width of beading, minimum 100mm
A ₄	Annular gap seal with Hilti Firestop Foam CFS-F FX to minimum depth of 150mm.	E	Support construction element
t _E	Thickness of the building element	AP 2	40mm(t _{AP2}) thick Mineral wool, 250mm long (L _{AP2})
t _{DE}	Insulation thickness	AP 2	See result tables in Section 5 for AP2 length options
d _C	Pipe diameter (nominal outside diameter)		

Note: Annular Gap seal should be filled using one of the methods listed i.e. A₁ or A₂ or A₃ or A₄ appropriate for the construction method.

4 REFERENCED TEST PROCEDURES

The referenced assessment report is prepared with reference to the requirements of AS 1530.4:2014 and AS 4072.1-2005.

5 FORMAL ASSESSMENT SUMMARY

Based on the discussion presented in the referenced assessment report, it is the opinion of this testing authority that if the specimen described in section 1 had been modified within the scope of section 3, it will achieve the performance as stated below if tested in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7:

5.1 PIPE PENETRATIONS IN FLEXIBLE WALLS AND RIGID WALLS 100MM THICK SPECIFIED IN SECTION 3.3 AND 3.4 WITH ARMAFLEX AF

Table 1 – Copper pipes are insulated with elastomeric butyl rubber based insulation ranging in thickness [mm] from 7.5mm till up to 36.5mm.

Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL		
					Additional Protection		
			from	to	-	AP 1	AP 3
Copper	10 to 18	1 – 14.2	7.5	32.0	-/90/90	-	-
Copper	18 to 42	1 – 14.2	8.0	36.5	-/60/60	-/90/90	-
Copper	18 to 42	1 – 14.2	14.0	36.5	-/90/90		-
Copper	18 to 42	1 – 14.2	8.0	36.5			-/90/90
Copper	10 to 35	1 – 14.2	7.5	35.0			-/120/120
^{1a,2} Copper	10 to 54	1 – 14.2	30	30	-/90/90		
^{1a,1,2} Copper	28 to 88.9	1/2 – 14.2	10/30	100		-/90/90	
² Copper	88.9	2 – 14.2	100	100		-/120/120	

^{1a} Zero separation distance between insulated pipes with insulation greater than 30mm. 100mm separation required for all other services

¹ Minimum separation distance between insulated pipes and all other services 100mm

² alternative glass fibre wool insulation according section 3

Pipe Diameter Vs. Pipe Wall Thickness

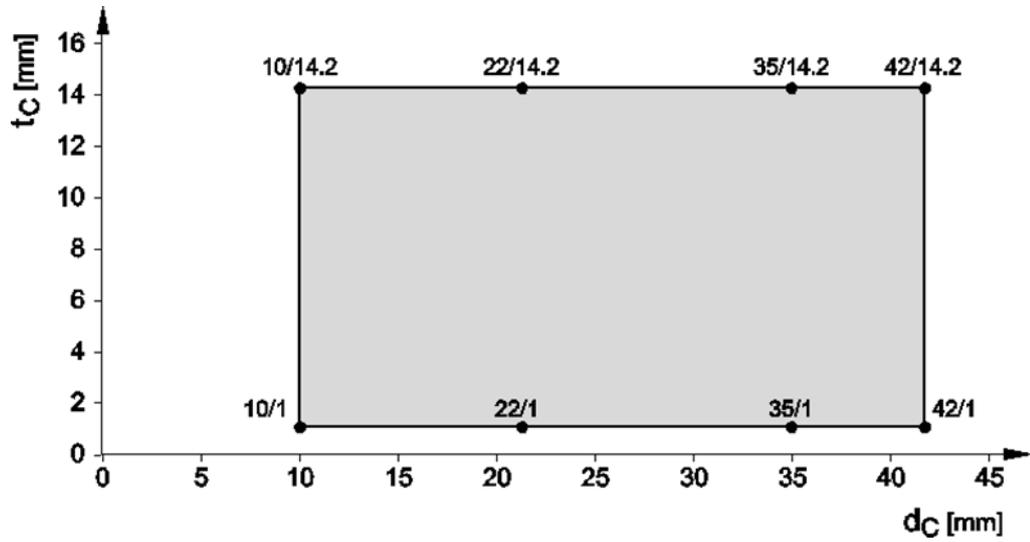


Figure 17 - Copper pipes

Pipe Diameter Vs. Pipe Insulation Thickness

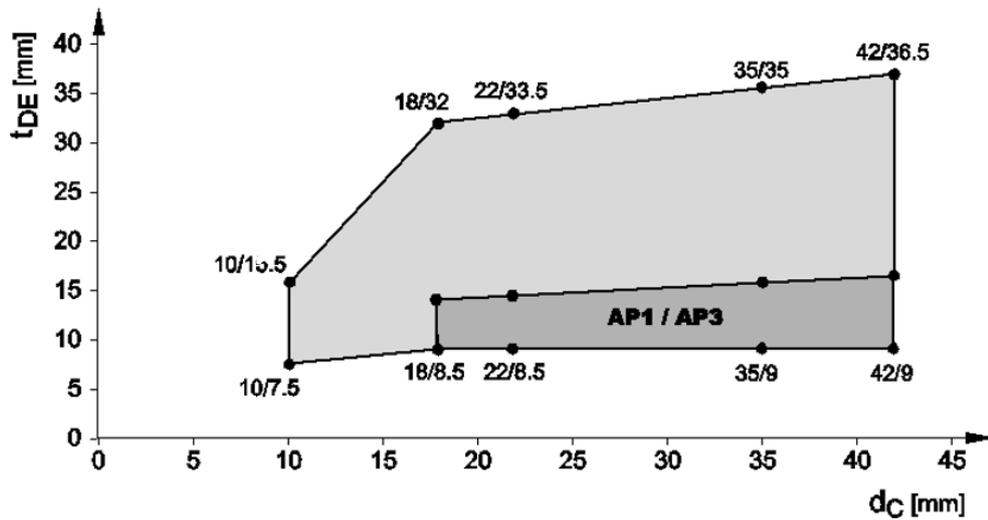


Figure 18 - Copper pipes for FRL -/90/90 (plus AP1 or AP3)

Pipe Diameter Vs. Pipe Insulation Thickness

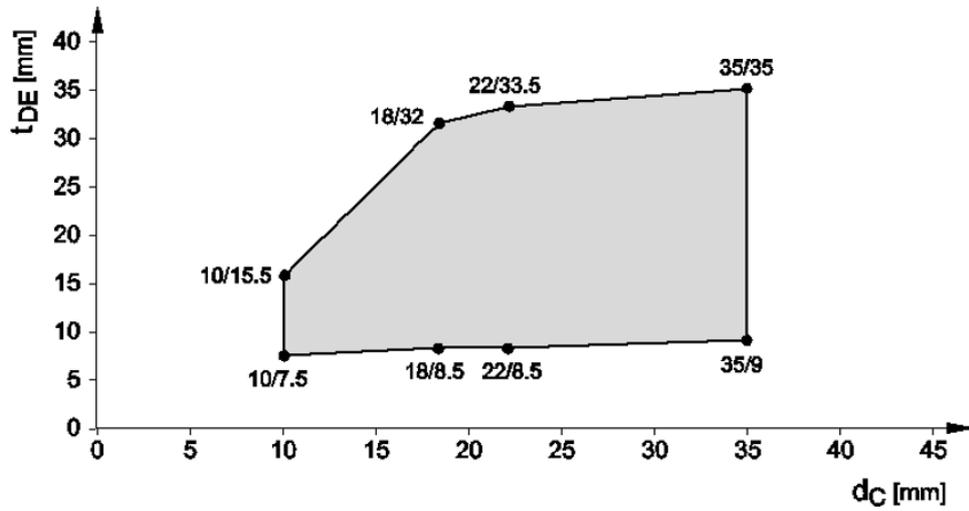


Figure 19 - Copper pipes for FRL of -/120/120 with addition protection AP3

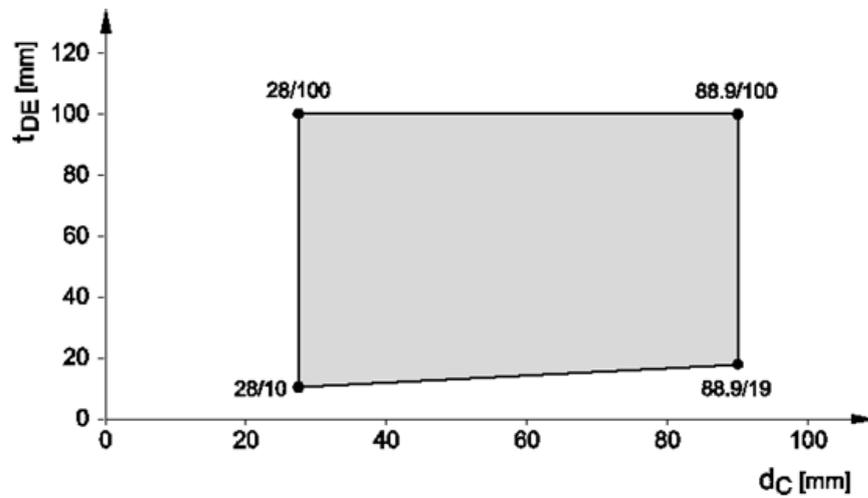


Figure 19A - Copper pipes for FRL of -/90/90 with Butyl rubber based flexible foam insulation

COPPER PIPES WITH PREINSTALLED WICU FLEX PE INSULATION

Copper pipes are pre-insulated with PE insulation (CS) ranging in thickness [mm] from 12 mm till up 22 mm.

Copper Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL	
			from	to	-	AP 3
PE Insulation Wicu flex	12 to 22	1.0/1.5 to 14.2	6	6	-/60/60	-/120/120

COPPER PIPES WITH PUR INSULATION

Copper pipes are insulated with PUR insulation of density 39,4kg/m³ ranging in thickness [mm] from 12 mm till up 54 mm (CS).

Copper Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL	
			from	to	-	AP 3
PUR Insulation	12 to 54	1.0/1.5 to 14.2	10	50	-/60/60	-/90/90

Steel pipes:

The field of application given above for copper pipes is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steel, Ni alloys (NiCu, NiCr, NiMo alloys) and Ni.

Table 2 – Steel pipes in flexible and rigid walls, minimum 100mm thick

Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL		
			from	to	-	AP 1	AP 3
Steel	10.2 to 18	1 - 14.2	7.5	33.5	-/90/90		
Steel	10.2 - 60	1 - 14.2	7.5	39			-/120/120
Steel	18 to 42	1 - 14.2	8.5	36.5	-/60/60	-/90/90	
Steel	18 to 42	1 - 14.2	14.0	36.5	-/90/90		
Steel	42.4 to 76	1.4 - 14.2	16.5	40.5	-/90/90		
Steel	42.4 to 76	1.4 - 14.2	9.0	40.5		-/90/90	
Steel	10.2 to 76	1 - 14.2	7.5	40.5		-/90/90	
Steel	76 to 159	1.8/2.6 - 14.2	40.5	45	-/90/90		
Steel 1a,1,2	28 to 88.9	1/2 - 14.2	10/30	100		-/90/90	
Steel ^{1,2}	88.9 to 114.3	2.0 - 14.2	40	40		-/90/90	

^{1a} Zero separation distance between insulated pipes with insulation greater than 30mm. 100mm separation required for all other services

¹ Minimum separation distance between insulated pipes and all other services 100mm

² alternative glass fibre wool insulation according section 3

Pipe Diameter Vs. Pipe Wall Thickness

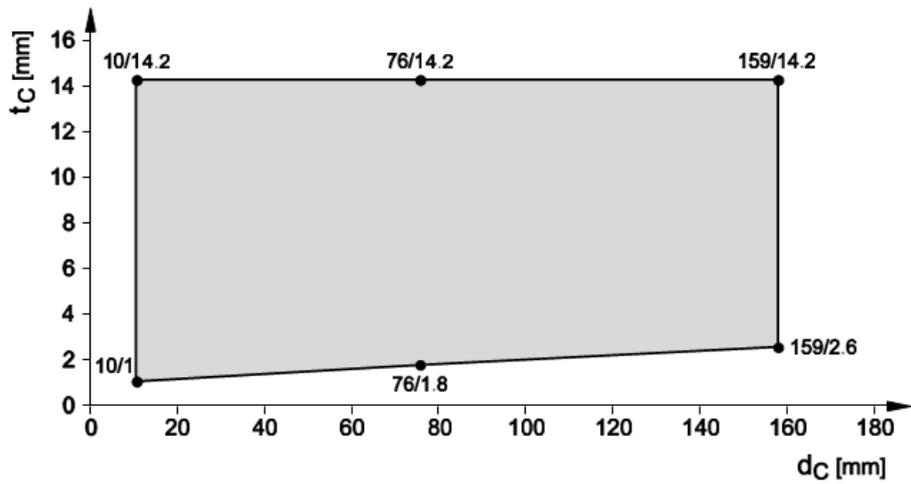


Figure 20 - Steel pipes

Pipe Diameter Vs. Pipe Insulation Thickness

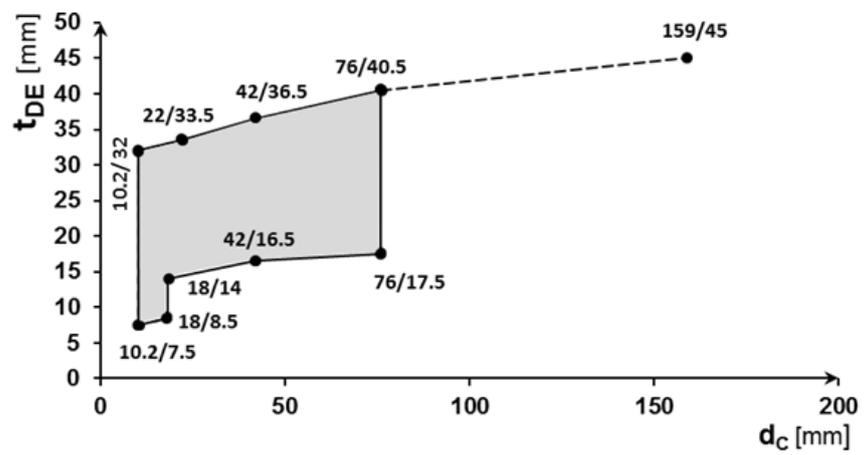


Figure 21 - Steel pipes for FRL of -/90/90 and -/120/120 (dotted line)

Pipe Diameter Vs. Pipe Insulation Thickness

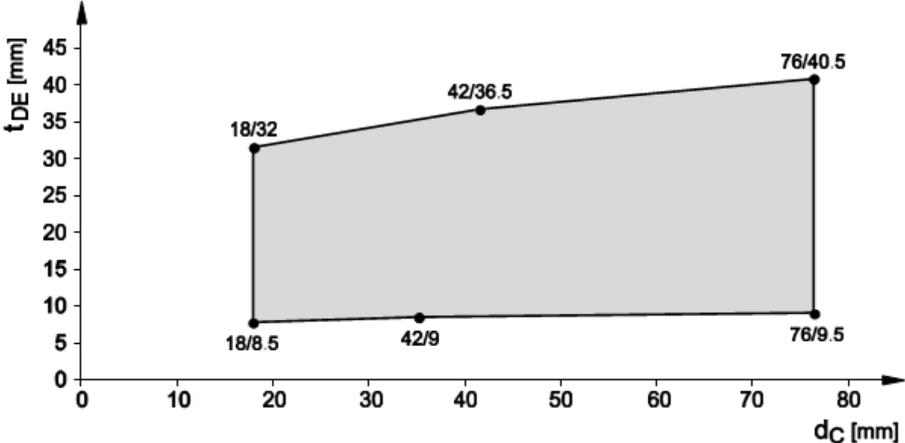


Figure 22 - Steel pipes for FRL of -/90/90 with addition protection AP1

Pipe Diameter Vs. Pipe Insulation Thickness

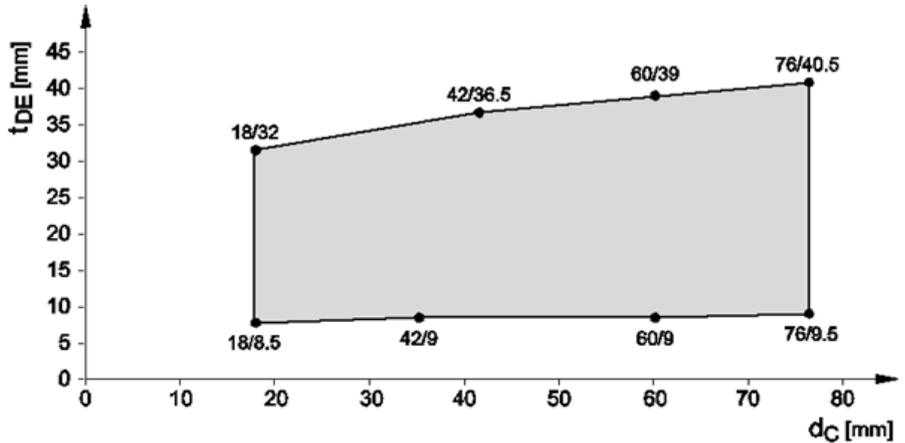


Figure 23 - Steel pipes for FRL of -/60/60

Pipe Diameter Vs. Pipe Insulation Thickness

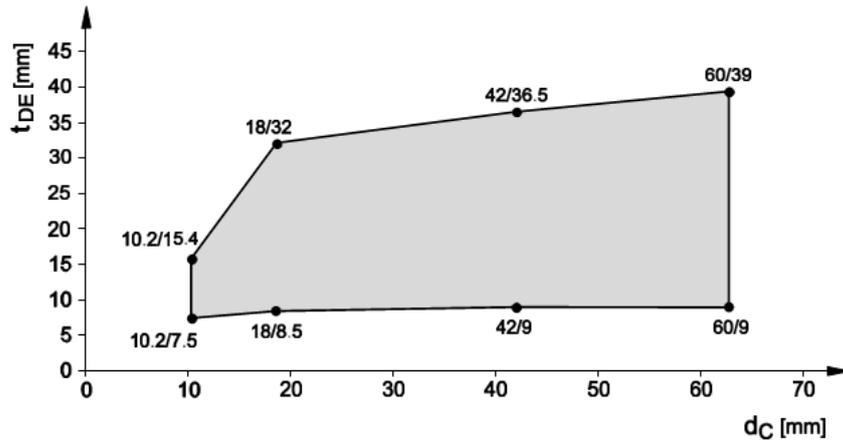


Figure 23A - Steel pipes for FRL of -/120/120 plus beading (AP3)

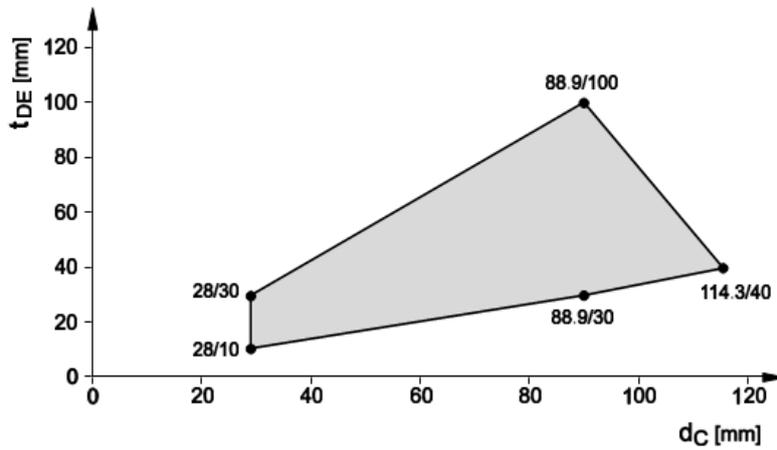


Figure 23B - Steel pipes for FRL of -/90/90 plus beading (AP1)

ALUMINIUM COMPOSITE PIPES

Aluminium composite pipes were available only at one pipe thickness for each diameter.

Aluminium Composite Pipes insulated with butyl rubber based flexible foam

Manu- facturer	Product name	Pipe diameter dc (mm)	Insulation thickness(mm)		FRL – U/C		
			From	To			AP3
Fränkische Rohrwerke	Alpex F50 Profi	16 to 32	8.0	35.0	-/90/90		
		32 to 40	9.0	36.5	-/60/60		
		32 to 50	9.0	37.5			-/120/120
		50 to 75	9.0	40.5	-/60/60		
		50 to 75	37.5	40.5	-/120/120		
Geberit*	Mepla	16 to 32	0	0	-/90/90		
		16 to 32	8.0	35.0	-/90/90		
		32 to 40	9.0	36.5	-/60/60		
		32 to 50	9.0	37.5			-/120/120
		50 to 75	9.0	40.5	-/60/60		
		50 to 75	37.5	40.5	-/120/120		
Georg Fischer	Sanipex	16 to 32	8.0	35.0	-/90/90		
		32 to 40	9.0	36.5	-/60/60		
		32 to 50	9.0	37.5			-/120/120
		50 to 63	9.0	39.5	-/60/60		
IVT	PRINETO Stabilrohr	17 to 52	8.0	37.5	-/90/90		
		52 to 63	9.0	39.5	-/60/60		
		17 to 63	32	39.5	-/120/120		
KeKelit	KELOX KM 110	16 to 75	8.0	40.5	-/90/90		
		16 to 75	32	40.5	-/120/120		
Rehau	Rautitan stabil	16 to 40	8.0	36.5	-/90/90		
		16 to 40	32,0	36.5	-/120/120		
TECE	TECEflex Verbundrohr	16 to 50	8.0	37.5	-/90/90		
		63	9.0	39.5	-/60/60		
		16 to 63	32	40.5	-/120/120		
Uponor	Unipipe plus	16 to 32	8.0	32.0	-/120/120 ¹		
	Unipipe MLC	40 to 63	9.0	39.5			-/90/90 ²
Viega	SANIFIX Fosta-Rohr	16 to 32	8.0	33.0	/120/120 ¹		
		32 to 63	9.0	39.5	-/60/60		
		32 to 50	9.0	37.5			-/120/120
		16 to 63	32	39.5	-/120/120		
	Raxofix	16 to 40	8.0	35.0	-/120/120 ¹		
		40 to 63	9.0	39.5	-/60/60		-/120/120

¹ FRL -/90/90 for zero spacing distance, first support maximum distance from wall 400mm.

² Minimum distance between surround services 100mm. First support maximum distance from wall 250mm
Small pipes ($\leq \varnothing 16$ mm) can be wrapped in a twin manner with bandage and performance of -/120/120

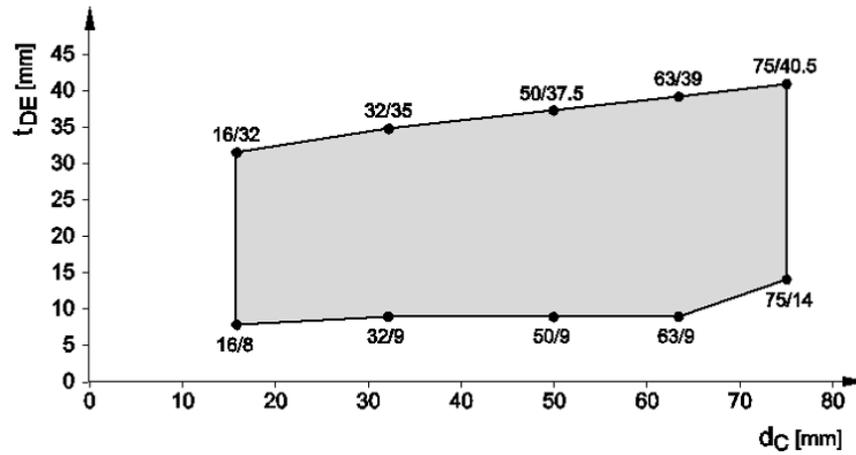


Figure 23C – Group 1 Aluminium Composite Pipes for FRL of -/60/60

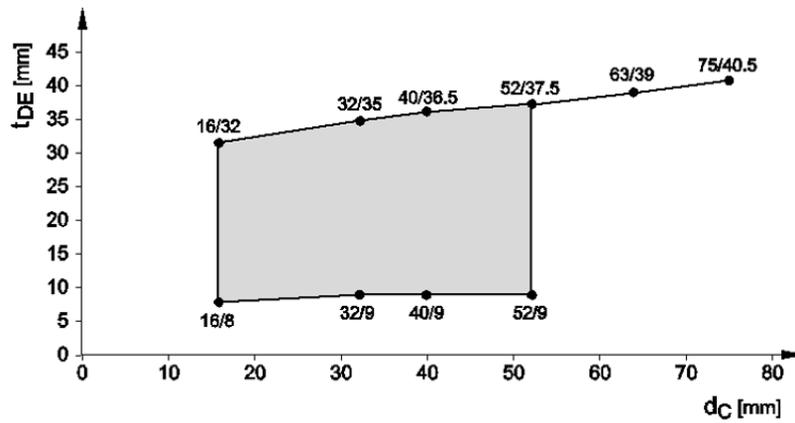


Figure 23D - Group 1 Aluminium Composite Pipes for FRL of -/90/90

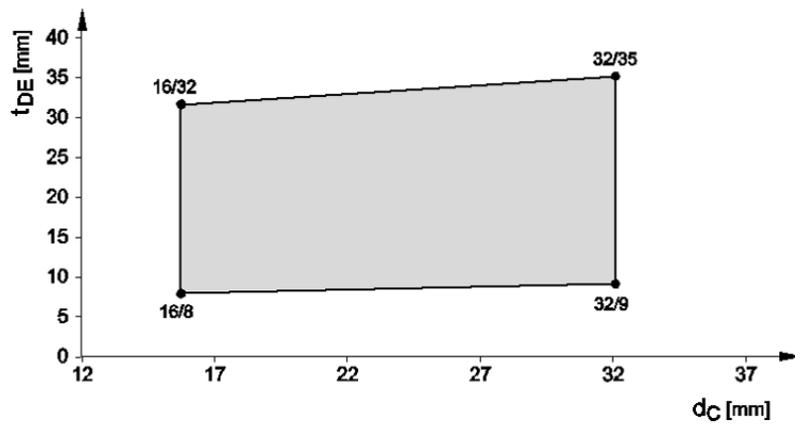


Figure 23E - Group 2 Aluminium Composite Pipes for FRL of -/90/90

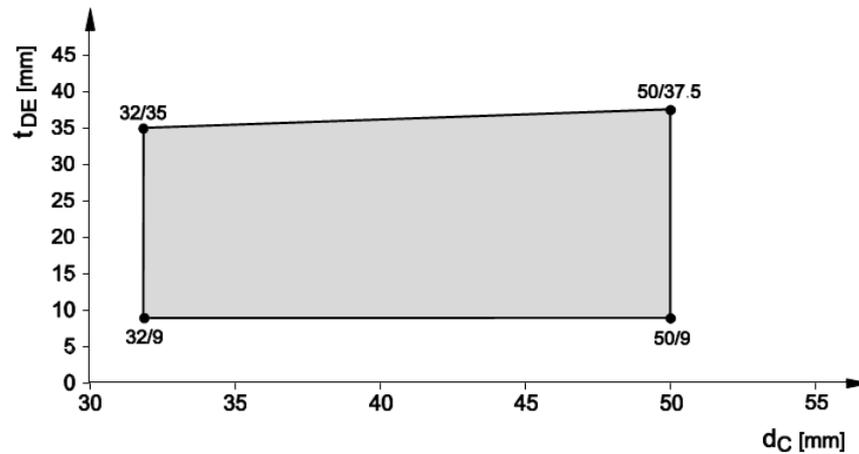


Figure 23E - Group 2 Aluminium Composite Pipes for FRL of -/120/120

Aluminium Composite Pipes with protection pipe and or pre-insulated closed-cell PE foam

Manufacturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)		FRL - U/C
			From	To	
Geberit	Mepla pre-insulated	16 to 26	6.0	13.0	-120/120
KeKelit Kelox ¹	Pro KM 130	14 to 32	9.0	9.0	-120/120
	Plus KM 134	14 to 32	4.0	9.0	-120/120
	Pro KM 140	16 to 20	PE HD	tube	-120/120
	Plus KM 144	16 to 20	4+ PE	HDtube	-120/120
Uponor	Unipipe plus	16 to 25	4.0	10.0	-120/120
	Unipipe MLC	16 to 20	PE HD	tube	-120/120

Plastic pipes

Plastic pipes made of PE-Xa (EN ISO 15875) and PE (EN 12201-2)

Pipe insulation was butyl rubber based flexible foam

Service	Pipe diameter d_c [mm]	Pipe wall thickness t_c [mm]	Insulation thickness t_{DE}		FRL- U/C
			from	to	
PE-Xa Rautitan Flex	16 to 63	2.2 to 8.6	8.0	39.0	-/120/120
PE / XSC 50 Wavin TS PE 100	50 to 110	4,6 to 10	9.0	42.5	-/120/120

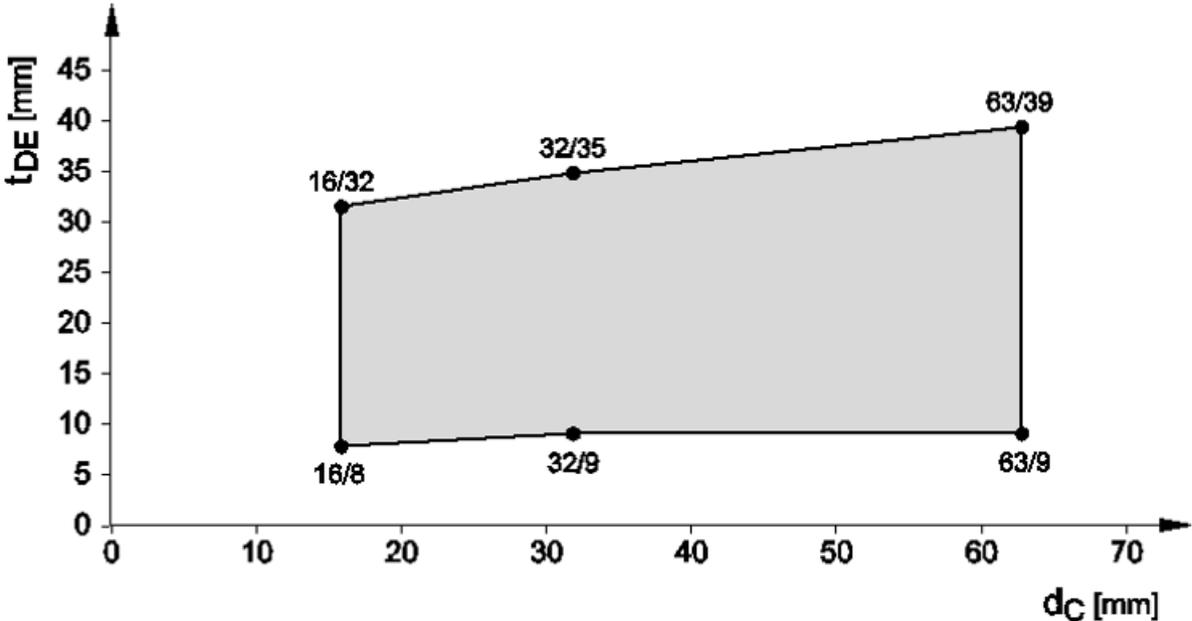


Figure 23F - Plastic Pipes PE-X for FRL of -/120/120

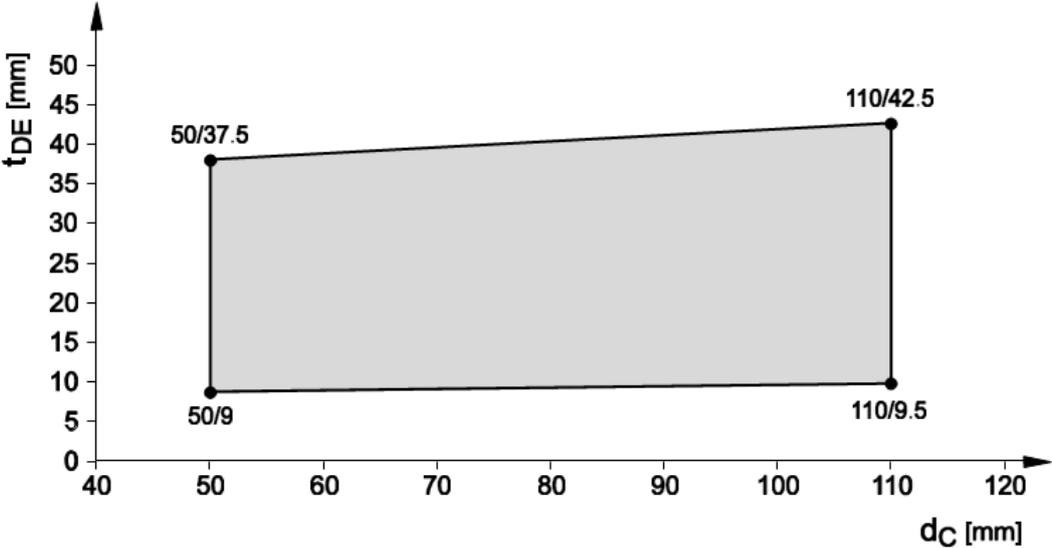


Figure 23G - Plastic Pipes PE-HD for FRL of -/120/120

PLASTIC PIPES MADE OF PP-R

Plastic pipes are insulated with butyl rubber based flexible foam

Manu- facturer	Product name	Pipe diameter d _c (mm)	Wall thickness (mm)	Insulation thickness (mm)		FRL- U/C
				From	To	
Aquatarm	Green1,3	20 to 110	1.9 to 10	8.0	40.5	-/120/120
	Blue1,3	20 to 110	1.9 to 10	8.0	40.5	-/120/120
Poloplast	Polo-Polymutan ML52	20 to 75	2.8 to 10.3	8.5	40.5	-/120/120
	Polo-Polymutan3	20 to 75	1.9 to 6.8	8.0	40.5	-/90/90
	Polo-Tersia3	20 to 75	1.9 to 12.5	8.0	40.5	-/90/90
KekelitKetrix	Cryolen Polyolefinblend1	20 to 75	1.9 to 6.8	8.0	40.5	-/90/90

5.2 PIPE PENETRATIONS IN RIGID WALLS MINIMUM 200MM THICK SPECIFIED IN SECTION 3.4 WITH ARMAFLEX AF

Table 3 – Copper pipes in rigid walls, minimum 200mm thick

Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL
			from	to	
			Ø small	Ø big	
Copper	10 to 42	1 – 14.2	7.5	36.5	-/90/90
Copper	10 to 35	1 – 14.2	7.5	35.0	- /120/120
^{1,2} Copper	28 to 88.9	1/2 – 14.2	10/19	100	-/90/90

¹Minimum separation distance between insulated pipes and all other services 100mm

² alternative glass fibre wool insulation according to section 3

Pipe Diameter Vs. Pipe Wall Thickness

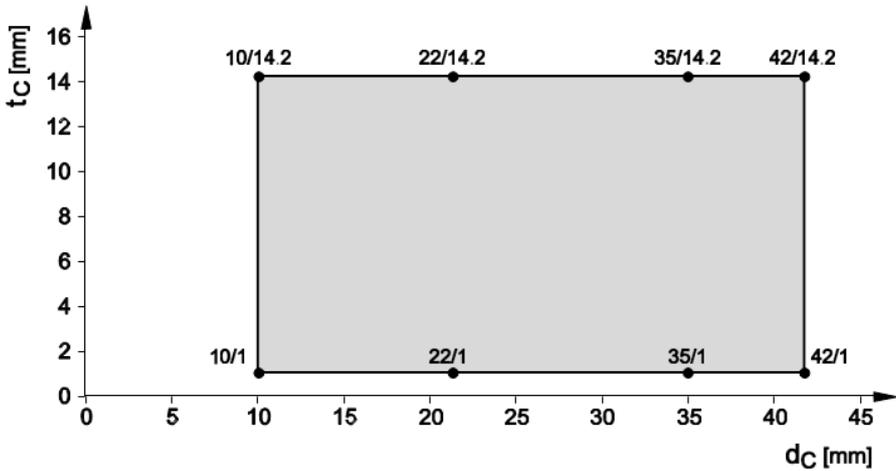


Figure 24 – Copper pipes

Pipe Diameter Vs. Pipe Insulation Thickness

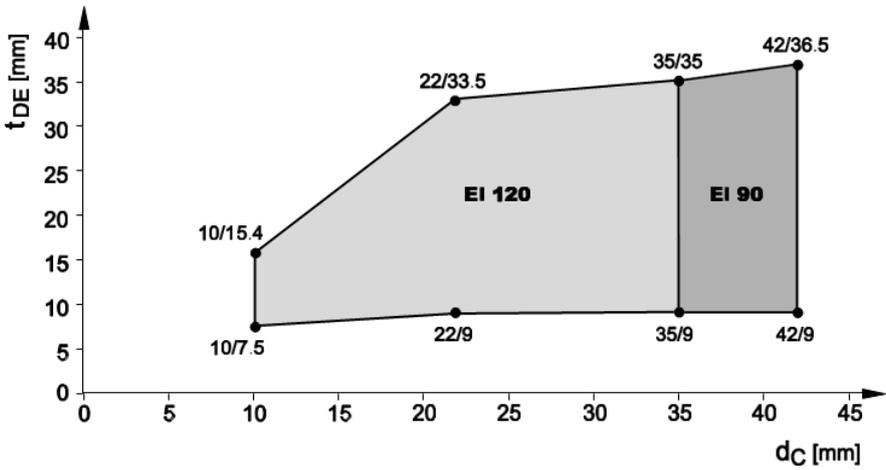


Figure 25 – Copper pipes for FRL of -/90/90 and -/120/120

Table 4 – Steel pipes in rigid walls, minimum 200mm thick

Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL	
			from	to	-	AP 2*
			Steel	10.2 to 60	1 to 14.2	7.5
Steel	76 to 159	1.8 to 14.2	17.5	45	-/90/90	
Steel	159	2 to 14.2	16	45	-/120/120	
Steel	159 to 813	2 to 14.2	25	25		-/120/120
Steel ^{1a,1,2}	28 to 88.9	1/2 – 14.2	10/30	30	-/90/90	
Steel ^{1,2}	88.9 to 159	2.0 – 14.2	40	80	-/90/90	

^{1a} FRL -120/120 solutions; Zero separation distance between insulated pipes with insulation greater than 30mm. 100mm separation required for all other services

¹Minimum separation distance between insulated pipes and all other services 100mm

² alternative glass fibre wool insulation according section 3

* AP2 - Minimum Length 250mm

**AP2 - Minimum Length 500mm for pipe between 159-813mm in diameter

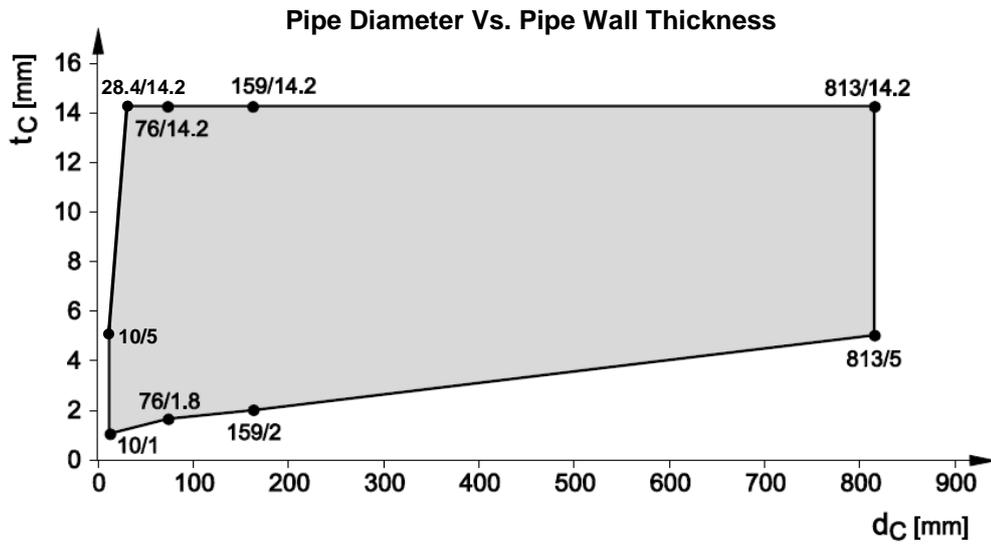


Figure 26 – Steel pipes

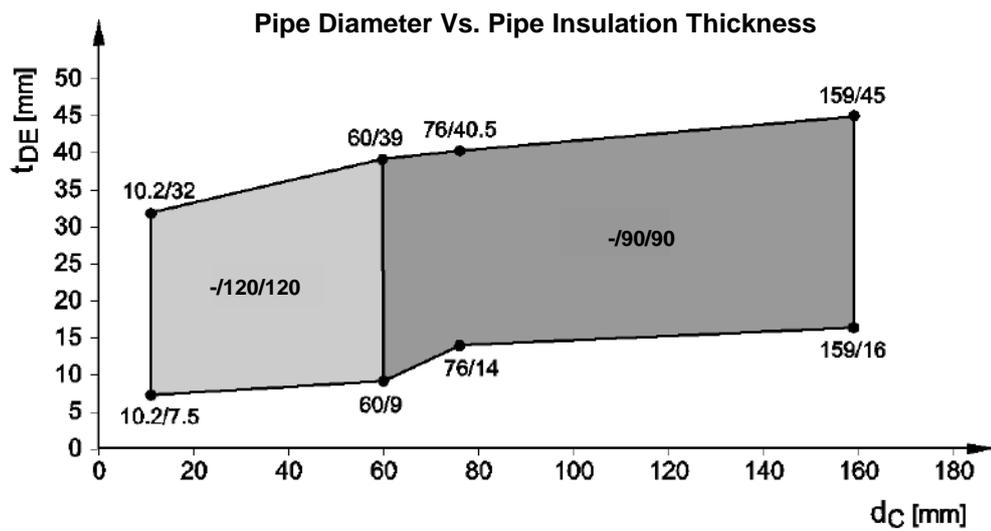


Figure 27 – Steel pipes for FRL of -/90/90 and -/120/120

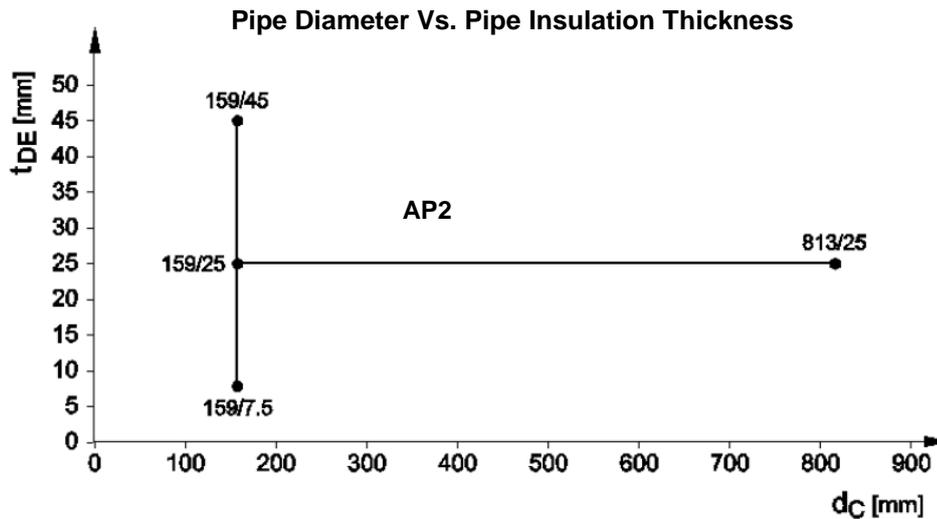


Figure 28 – Steel pipes for FRL of -/120/120 with addition protection AP2

Aluminium Composite Pipes

Aluminium composite pipes were available only at one pipe thickness for each diameter.

Manufacturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)		FRL - U/C
			from	to	
Fränkische Rohrwerke	Alpex F50 Profi	16 to 63	8.0	39.0	-/120/120
Geberit	Mepla	16 to 63	8.0	39.0	-/120/120
Georg Fischer	Sanipex	16 to 63	8.0	39.0	-/120/120
IVT	PRINETO Stabilrohr	16 to 63	8.0	39.0	-/120/120
KeKelit	KELOX KM 110	16 to 63	8.0	39.0	-/120/120
Rehau	Rautitan stabil	16 to 63	8.0	39.0	-/120/120
TECE	TECEflex Verbundrohr	16 to 63	8,0	39,0	-/120/120
Viega	SANIFIX Fosta-Rohr	16 to 63	8,0	39,0	-/120/120

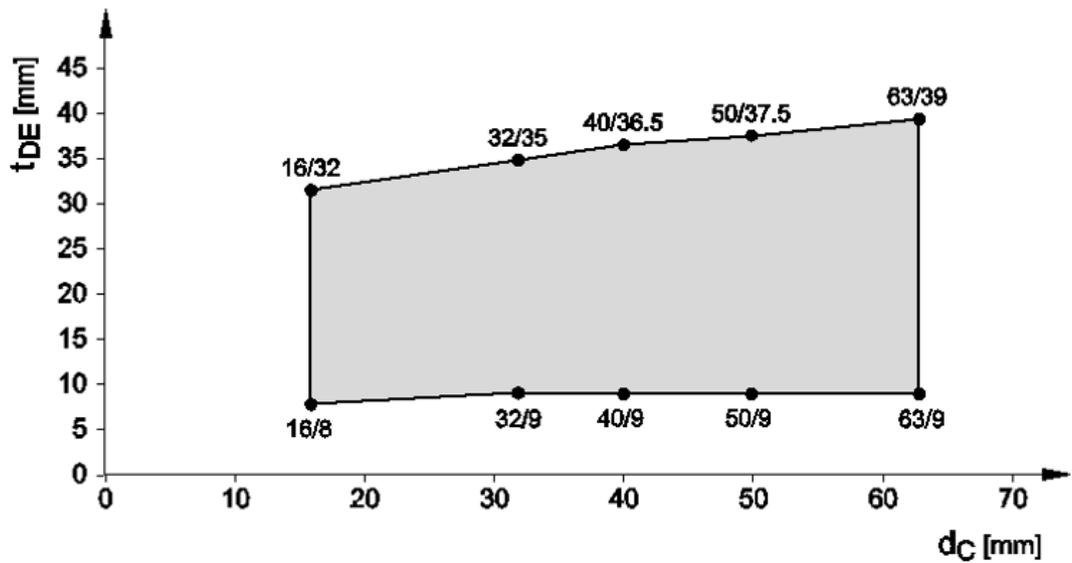


Figure 28A – Aluminum composite pipes for FRL of -/120/120

5.3 PIPE PENETRATIONS IN RIGID FLOOR MINIMUM 120MM THICK SPECIFIED IN SECTION 3.5 WITH ARMAFLEX AF

Table 5 – Copper Pipes in rigid floor, minimum 120mm thick

Service	Pipe diameter dc [mm]	Pipe wall thickness tc [mm]	Insulation thickness tDE [mm]		FRL		
			from	to	-	AP 1	AP 2*
			Copper	10 to 35	1 – 14.2	7.5	35.0
Copper	35 to 42	1 – 14.2	9.0	36.5	-/60/60		-/120/120
Copper	42	1.2	9.0	35	-/120/120		
^{1,2} Copper	28 to 88.9	1/2 – 14.2	10	100	-/90/90		

¹ Minimum separation distance between insulated pipes and all other services 100mm

² alternative glass fibre wool insulation according section 3

* AP2 Applied to length of 250mm

Pipe Diameter Vs. Pipe Wall Thickness

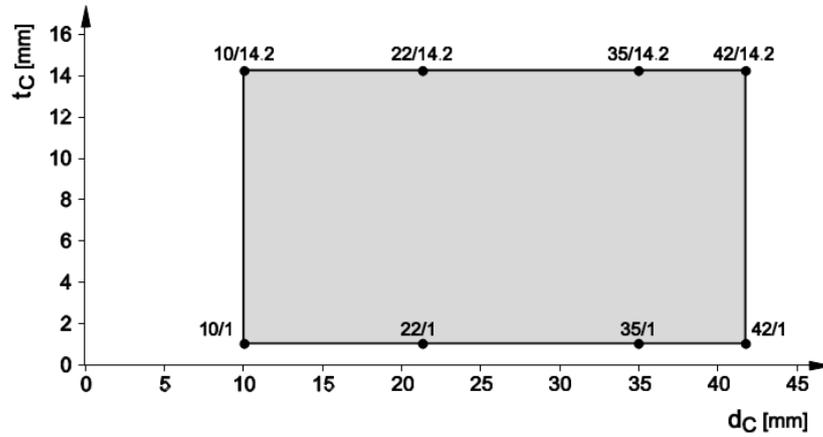


Figure 29 – copper pipes

Pipe Diameter Vs. Pipe Insulation Thickness

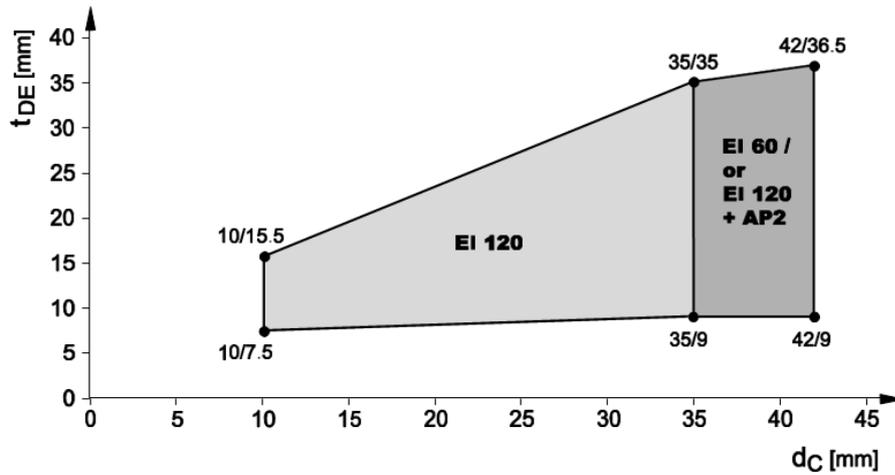


Figure 30 – copper pipes for FRL of -/60/60 and -/120/120 plus AP2

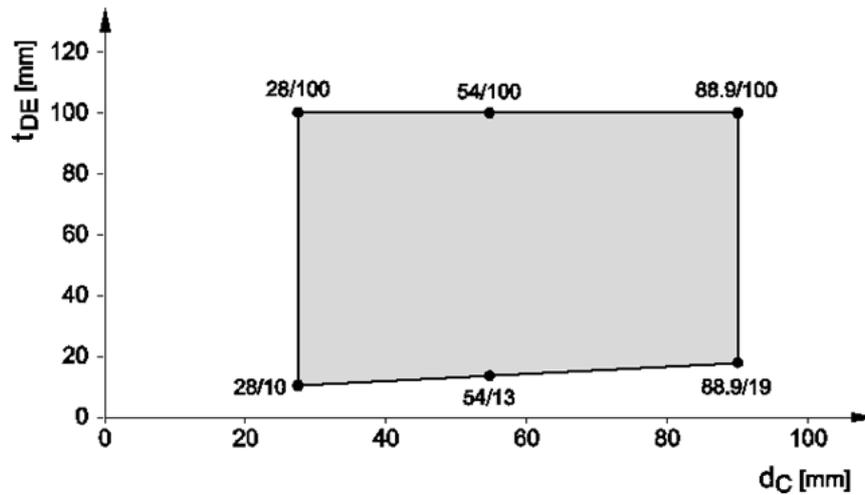


Figure 30A – copper pipes for FRL of -/90/90

COPPER PIPES WITH PREINSTALLED WICU FLEX PE INSULATION

Copper pipes are pre-insulated with PE insulation (CS) ranging in thickness [mm] from 12 mm till 22 mm.

Copper Service	Pipe diameter d_c [mm]	Pipe wall thickness t_c [mm]	Insulation thickness t_{DE} [mm]		FRL
			from	to	
Wicuflex*	22	1.0 to 14.2	6.0	6.0	-/180/180

*distance to next penetration ≥ 150 mm; first pipe support ≥ 250 mm

Copper pipes with PUR insulation

Copper pipes are insulated with PUR insulation of density 39,4kg/m³ ranging in thickness [mm] from 12 mm till 54 mm (CS).

Copper Service	Pipe diameter d_c [mm]	Pipe wall thickness t_c [mm]	Insulation thickness t_{DE} [mm]		FRL
			from	to	
PUR insulation *	12 to 54	1.5 to 14.2	10.0	50.0	-/120/120

*distance to next penetration ≥ 150 mm; first pipe support ≥ 250 mm

Table 6 – Steel Pipes in rigid floor, minimum 120mm thick

Service	Pipe diameter d _c [mm]	Pipe wall thickness t _c [mm]	Insulation thickness t _{DE} [mm]		FRL	
			from	to	-	AP 2*
			Steel	10.2 to 60	1 to 14.2	7.5
Steel	60 to 76	1 to 14.2	9.0	40.5	-/90/90	-120/120
Steel	76 to 108	1.8 to 14.2	14.0	42.5	-/90/90	
Steel	10.2 to 114.3	1 to 14.2	15.5	42.5	-120/120	
Steel ³	76 to 159	1.8 to 14.2	9.5	45		-120/120
Steel ³	159 to 323.9	1.8 to 14.2	25	25		-120/120
Steel ⁴	76 to 159	1.8 to 14.2	9.0	45	-/60/60	
Steel ^{1,2}	88.9 to 159	2.0 to 14.2	25	80	-/90/90	
Steel ^{1,2,5}	28 to 54	1/2 to 14.2	10	40	-/90/90	

¹ Minimum separation distance between insulated pipes and all other services 100mm

² alternative glass fibre wool insulation according to section 3

³ pipe diameters up to Ø159 mm insulation thickness is up to 45mm; pipe diameters above butyl rubber based insulation is 25 mm. AP 2 – Klima Rock Insulation 40mm at a length of 500 mm.

⁴ minimal insulation thickness above Ø114.3 mm is increased to 16 mm

*AP2 - Minimum Length 250mm

**AP2 - Minimum Length of 500mm applied on pipe Ø323.9

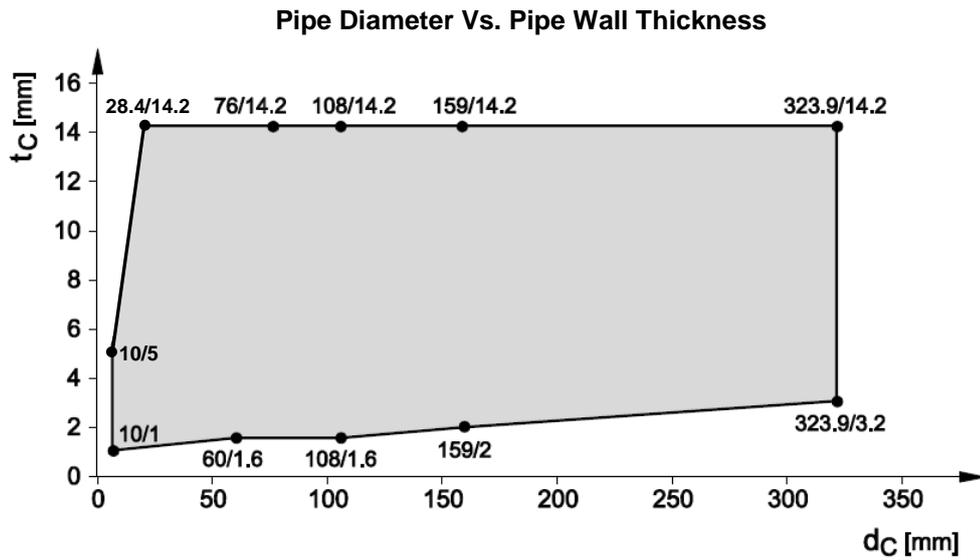


Figure 31 – steel pipes

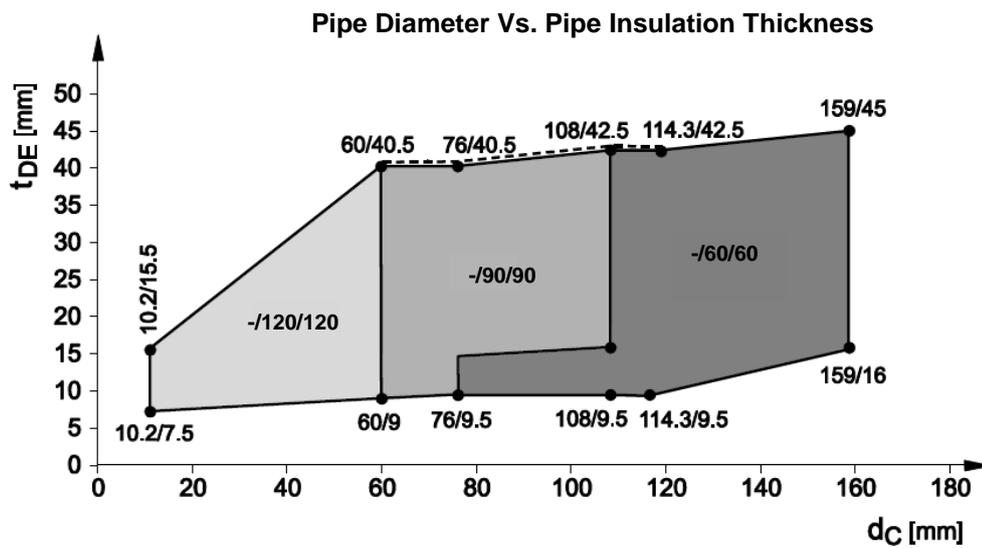


Figure 32 – steel pipes for FRL of -/60/60, -/90/90 and -/120/120

Pipe Diameter Vs. Pipe Insulation Thickness

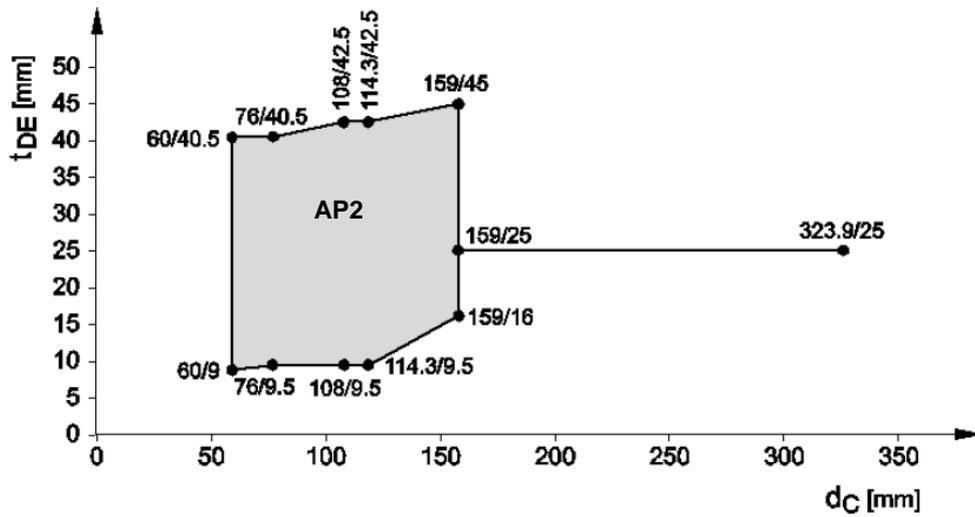


Figure 33 – steel pipes for FRL of -/120/120 with addition protection AP2

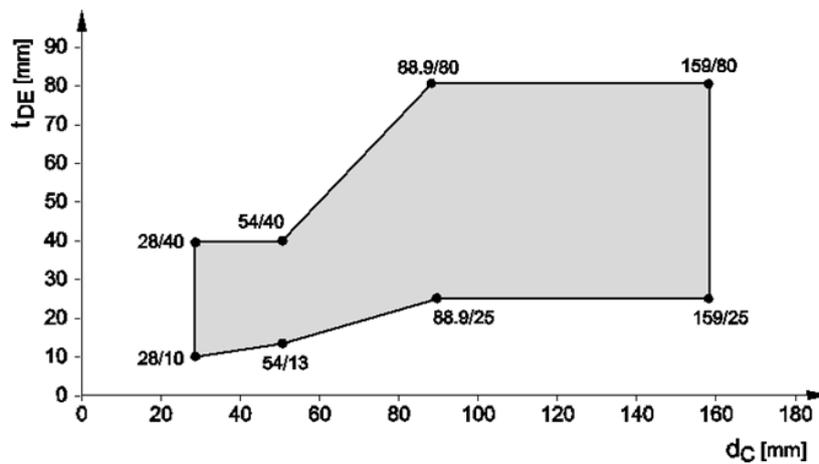


Figure 33A – steel pipes for FRL of -/90/90

Aluminium Composite Pipes

Aluminium composite pipes were available only at one pipe thickness for each diameter.

Aluminium Composite Pipes insulated with butyl rubber based flexible foam

Manu- facturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)		FRL - U/C
			from	to	
Fränkische Rohrwerke	Alpex F50 Profi	16 to 40	8.0	36.5	-/120/120
		40 to 75	9.0	40.5	-/90/90
		75	40.5	40.5	-/180/180
Geberit	Mepla	16 to 32	0	0	-/240/240
		16 to 75	8.0	39.5	-/120/120
		75	40.5	40.5	-/180/180
Georg Fischer	Sanipex	16 to 63	8.0	39.5	-/120/120
IVT	PRINETO	17 to 63	8.0	39.5	-/120/120
KeKelit	KELOX KM 110	16 to 75	8.0	40.5	-/120/120
		75	9.5	40.5	-/180/180
Rehau	Rautitan Stabil	16 to 40	8.0	38.5	-/90/90
TECE	TECEflex Verbundro hr	16 to 63	8.0	39.5	-/120/120
Uponor	Unipipe Plus	16 to 32	8.0	35.0	-/240/240
	Unipipe MLC	16 to 63	8.0	39.0	-/120/120
Viega	SANIFIX Fosta- Rohr	16 to 63	8.0 9.0	39.5	-/120/120
		Raxofix	16 to 63	8.0	39.5

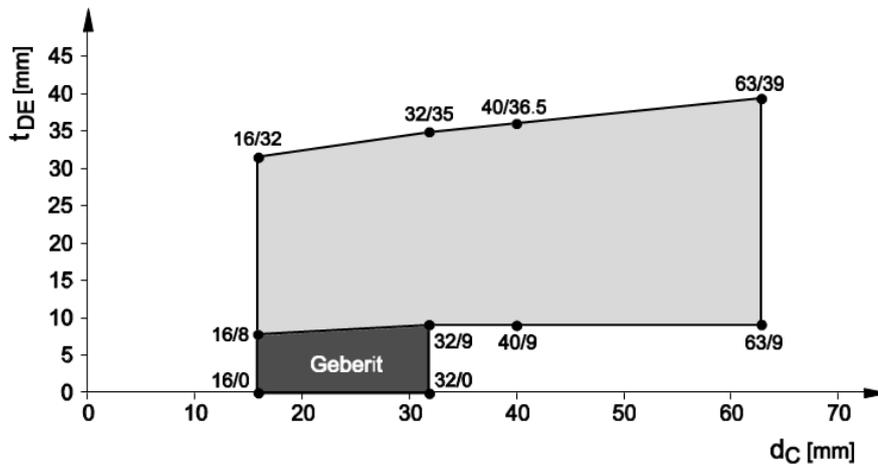


Figure 33B – Aluminum composite pipes for FRL of -/120/120

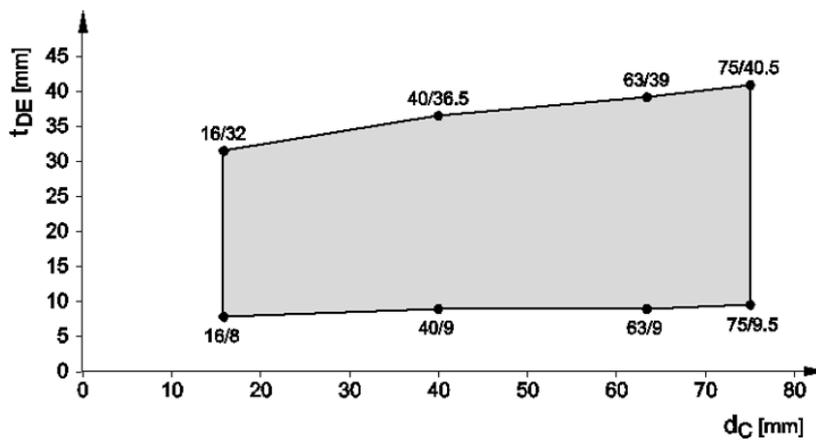


Figure 33C – Aluminum composite pipes for FRL of -/90/90

Aluminium Composite Pipes insulated with protection pipe and or pre- insulated closed-cell PE foam

Manufacturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)		FRL - U/C
			From	To	
Geberit*	Mepla pre-insulated	16 to 26	6.0	13.0	-/120/120
KeKelit	Pro KM 130	14 to 32	9.0	9.0	-/120/120
	Plus KM 134	14 to 32	4.0	9.0	-/120/120

Kelox	Pro KM 140	16 to 20	PE HD	tube	-/120/120
	Plus KM 144	16 to 20	4+ PE	HD tube	-/120/120
Uponor	Unipipe plus	16 to 25	4.0	10.0	-/120/120
	Unipipe MLC	16 to 20	PE HD	tube	-/120/120

Plastic pipes

Plastic pipes made of PE-Xa

Service	Pipe diameter d_c [mm]	Pipe wall thickness t_c [mm]	Insulation thickness t_{DE} [mm]		FRL
			from	to	
PE-Xa Rautitan Flex	16 to 63	2.2 to 8.6	8.0	39.0	-/180/180
PE / XSC 50 Wavin TS PE 100	50 to 110	4.6 to 10	9.0	42.5	-/180/180

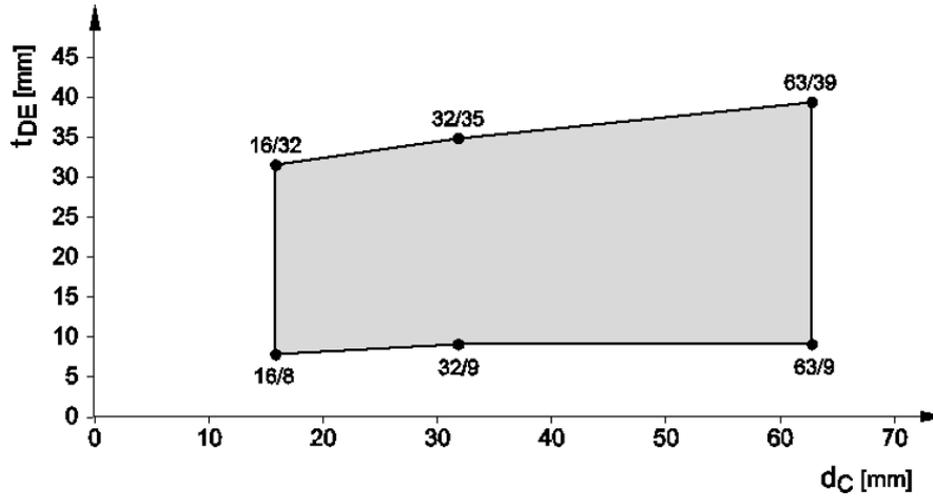


Figure 33D – Plastic PE-X pipes for FRL of -/90/90

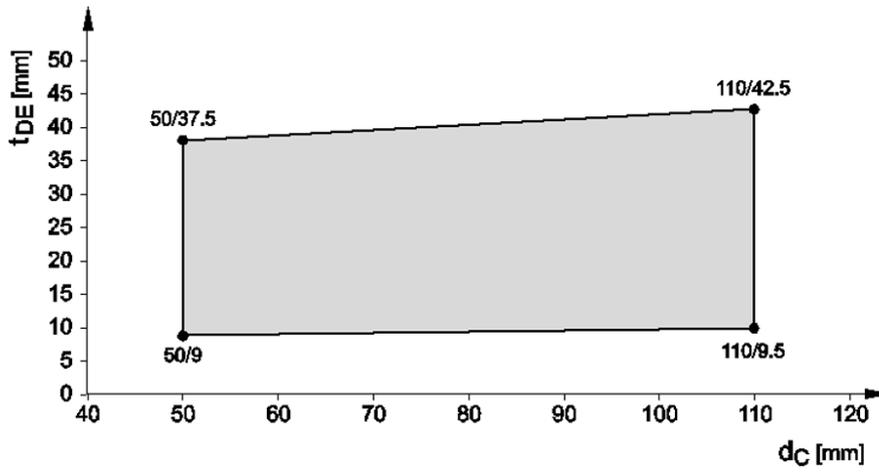


Figure 33E – Plastic PE-HD pipes for FRL of -/180/180

Plastic pipes made of PP-R

Plastic pipes are continued, sustained (CS) insulated with elastomeric thermal foam

Manu- facturer	Product name	Pipe diameter dc (mm)	Wall thickness (mm)	Insulation thickness (mm)		FRL - U/C
				From	To	
Aquatec	Green	20 to 110	1.9 to 10	8.0	40.5	-/240/240
	Blue	20 to 110	1.9 to 10	8.0	40.5	-/240/240
Poloplast	Polo-Polymutan ML5	20 to 75	2.8 to 10.3	8.0	40.5	-/240/240
	Polo-Polymutan	20 to 75	1.9 to 6.8	8.0	40.5	-/240/240
	Polo-Tersia	20 to 75	1.9 to 12.5	8.0	40.5	-/240/240
Kekelit Katrix	Cryolen Polyolefinblend	20 to 75	1.9 to 6.8	8.0	40.5	-/240/240

5.4 PIPE PENETRATIONS IN FLEXIBLE WALLS AND RIGID WALLS 100MM THICK SPECIFIED IN SECTION 3.3 AND 3.4 WITH MINERAL WOOL INSULATION

Table 7 – Copper pipes in flexible and rigid walls, minimum 100mm thick

Service	Pipe Ø _{dc} (mm)	Min. Pipe Wall Thickness t _c (mm)	Insulation thickness t _{DE} (mm)	FRL		
				Additional Protection		
				- (Fig. 10)	AP 1 (Fig. 11)	AP 3 (Fig. 12)
Copper	10 to 22	1	40	-/90/90	-	-
Copper	18 to 42	1	40	-/60/60	-/90/90	
Copper	22 to 42	1	40	-/90/90	-	-
Copper	18 to 42	1	40	-	-	-/90/90
Copper	10 to 35	1	40			-/120/120

Maximum allowable pipe wall thickness 14.2mm

Table 8 – Steel pipes in flexible and rigid walls, minimum 100mm thick

Service	Pipe Ø _{dc} (mm)	Min. Pipe Wall Thickness t _c (mm)	Insulation thickness t _{DE} (mm)	FRL		
				Additional protection		
				- (Fig. 10)	AP 1 (Fig. 11)	AP 3 (Fig. 12)
Steel	10 to 22	1	40	-/90/90	-	-
Steel	18 to 42	1	40	-/60/60	-/90/90	-
Steel	22 to 42	1	40	-/90/90	-	-
Steel	42.4 to 76	1.4	40	-/90/90	-	-
Steel	10.2 to 76	1	40	-	-/90/90	-
Steel	10.2 to 60	1	40	-	-	-/120/120

Maximum allowable pipe wall thickness 14.2mm

5.5 PIPE PENETRATIONS IN RIGID WALLS MINIMUM 200MM THICK SPECIFIED IN SECTION 3.4 WITH MINERAL WOOL INSULATION

Table 9 – Copper pipes in rigid walls, minimum 200mm thick

Service	Pipe Ø _{dc} (mm)	Pipe Wall Thickness t _c (mm)	Insulation thickness t _{DE} (mm)	FRL (Fig. 13)
Copper	10 to 42	1	40	-/90/90
Copper	10 to 35	1	40	-/120/120

Maximum allowable pipe wall thickness 14.2mm

Table 10 – Steel pipes in rigid walls, minimum 200mm thick

Service	Pipe Ø _{dc} (mm)	Min. Pipe Wall Thickness t _c (mm)	Insulation thickness t _{DE} (mm)	FRL	
				Additional protection	
				- (Fig. 13)	AP 2 (Fig. 14)
Steel	10 to 60	1	40	-/120/120	-
Steel	76 to 159*	1.8	40	-/90/90	-/90/90
Steel	159	4	40	-/120/120	
Steel	159-813**	2	40	-	-/120/120

* AP2 insulation is applied in length of 250mm.

** AP 2 insulation is applied in a length of 500mm for pipe range Ø159mm to Ø813mm.

Maximum allowable pipe wall thickness 14.2mm

5.6 PIPE PENETRATIONS IN RIGID FLOOR MINIMUM 120MM THICK SPECIFIED IN SECTION 3.5 WITH MINERAL WOOL INSULATION

Table 11 – Copper Pipes in rigid floor, minimum 120mm thick

Service	Pipe Ø dc (mm)	Min. Pipe Wall Thickness t _c (mm)	Insulation thickness t _{DE} (mm)	FRL	
				Additional Protection	
				- (Fig. 15)	AP 2 (Fig. 16)
Copper	10 to 35	1	40	-/120/120	
Copper	35 to 42*	1	40	-/60/60	-/120/120

* AP2 insulation is applied in length of 250mm.
Maximum allowable pipe wall thickness 14.2mm

Table 12 – Steel Pipes in rigid floor, minimum 120mm thick

Service	Pipe Ø dc (mm)	Min. Pipe Wall Thickness t _c (mm)	Insulation thickness t _{DE} (mm)	FRL	
				Additional protection	
				- (Fig. 15)	AP 2 (Fig. 16)
Steel	10.2 to 60	1	40	-/120/120	-
Steel	60 to 76*	1	40	-/90/90	-/120/120
Steel	76 to 108	1.8	40	-/90/90	-
Steel	10.2 to 114.3	1	40	-/120/120	
Steel	76 to 323.9**	1.8	40		-/120/120
Steel	76 to 159*	2	40	-/60/60	-/120/120

* AP2 insulation is applied in length of 250mm

** till Ø159mm insulation thickness is up to 45mm, pipe diameter above insulation is 25mm.
AP 2 – Klima Rock Insulation 40mm is applied on pipe Ø323.9mm at a length of 500mm.
Maximum allowable pipe wall thickness 14.2mm

6 DIRECT FIELD OF APPLICATION

The referenced assessment report applies to penetrations in walls exposed to fire from either side and floors exposed to fire from underside only.

7 REQUIREMENTS

The referenced assessment report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS1530.4.

Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in the referenced assessment report, may invalidate the conclusions drawn in this report.

It is required that the supporting construction be otherwise tested or assessed to achieve the required FRL of the penetration seal and up to -/120/120 in accordance with AS 1530.4:2014.

Service end conditions shall be representative of those intended to be used in practice, therefore, it is reasonable to extend the FRL achieved in both configurations provided that they are representative of the system used in practice.

As a result, the U/C configuration services can be assessed as tested in the supplied tests. However, it will be the responsibility of the builder to determine the pipe end configuration of each of the services that are installed in any project.

8 VALIDITY

The referenced assessment report does not provide an endorsement by Warringtonfire Aus Pty Ltd of the actual products supplied.

The conclusions of this assessment may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

The assessment can therefore only relate only to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

The referenced assessment report is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that the referenced assessment report be reviewed on or, before, the stated expiry date.

The information contained in the referenced assessment report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

The referenced assessment report is provided to Hilti Pty Ltd for its own purposes and we cannot express an opinion on whether it will be accepted by building certifiers or any other third parties for any purpose.

9 AUTHORITY

9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance, the applicant(s) confirms that:

- to their knowledge the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the Standard against which this assessment is being made, and
- they agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test by a test authority in accordance with the Standard against which this assessment is being made and the results are not in agreement with this assessment, and
- they are not aware of any information that could adversely affect the conclusions of this assessment and if they subsequently become aware of any such information, agree to ask the assessing authority to withdraw the assessment.

9.2 GENERAL CONDITIONS OF USE

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