K.OSA/KYLÄ	KORTTELI/TILA	TONTTI/RN:O	VIRANOMAISTEN ARKISTOMERKINTÖJÄ VARTEN
MAHLAMÄKI	105a/105b	1/4	

RAKENNUSTOIMENPIDE	PIIRUSTUSLAJI	JUOKS. N:O
VESIJOHTOSANEERAUS	PALOKATKOT	

RAKENNUSKOHTEEN NIMI JA OSOITE	PIIRUSTUKSEN SISÄLTÖ	MITTAKAAVAT
HARTOLAN KUNTA MAHLAMÄENTIE 3–4 19600 HARTOLA	DETALJIT JA DOKUMENTIT	–

TJT-RAKENNE OY
Siltakatu 14 L 6, 18100 Heinola
Tuomo Asikainen LVI–ins. (amk)
tuomo.asikainen@tjt–rakenne.fi
050 358 8889

SUUNN.	PIIRT.	SUUNNITTELUALA, TYÖN NUMERO JA PIIRUSTUKSEN NUMERO	MUUTOS
TA		LVI PK–5	
YHT.HLÖ TA	TARK.		
PVM. 28.3.2025			
ALLEKIRJ. Tuomo Asikainen			TILAAJAN N:O

WÜRTH

SISÄLTÖ

PALOKATKO, komposiittiputki, palamaton eriste

TUNNUS

PS-3-4

RAKENNUSOSA

seinärakenne

PALOLUOKKA

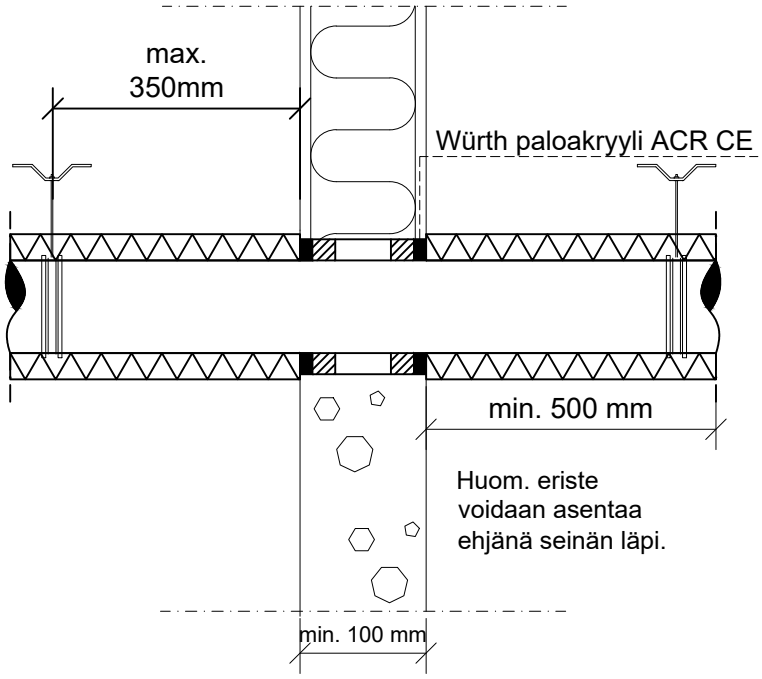
EI120

REV

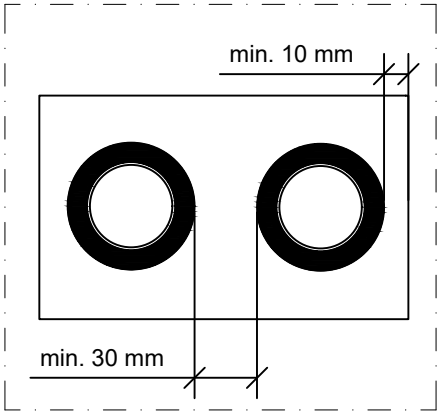
Würth paloakryyli ACR CE

ETA-21/0085

VIRANOMAISEN MERKINTÖJÄ



Periaateleikkaus



- seinärakenne
- aukko max. 300 X 300 mm
- Würth paloakryyli ACR CE
- täyttö: kivivilla A1/A2
- komposiittiputki max. Ø 75 mm

Reijän Ø = putki + min. 20 mm

Putken kannakointi max. 350 mm

Äänieristävyys 61 dB asti

Ei mittakaavassa

Rakenne	Rakenteen minimipaksuus	Aukkokoko	Läpivienti	Paloakryylin asennus	Paloakryylin leveys	Paloakryylin syvyys	Eriste paloakryylin alla	Eriste	Paloluokka EI
Seinärakenne	min. 100 mm	max. 300 X 300 mm	max. Ø 75 mm komposiittiputki	Seinän molemmin puolin	min. 10 mm	min. 12,5 mm	min. 12,5 mm kivivilla A1/A2; min. 40 kg/m³	500 mm / 20 mm kivivilla A1/A2; min. 80 kg/m³ Huom. eriste voidaan asentaa ehjänä seinän läpi.	120

WÜRTH

SISÄLTÖ

PALOKATKO, teräs- sekä kupariputki, jatkuva palamaton eriste

TUNNUS

PS-1-3

RAKENNUSOSA

seinärakenne

PALOLUOKKA

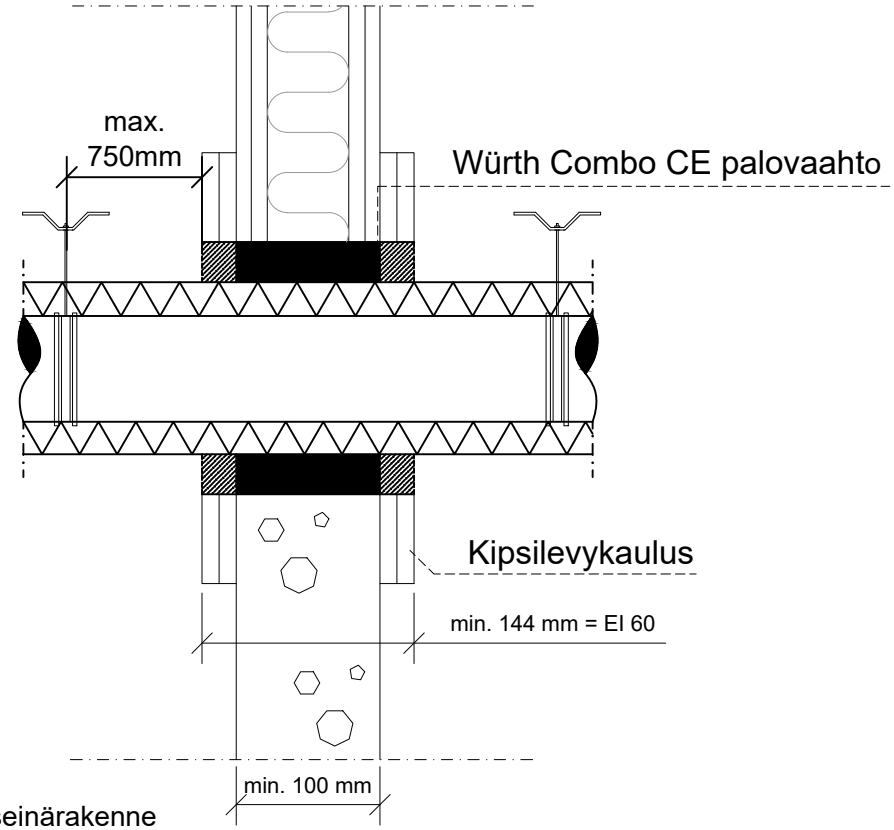
EI60

REV

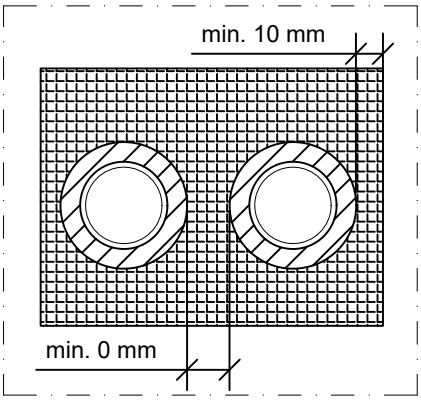
Würth Combo CE palovaahto

ETA-11/0528

VIRANOMAISEN MERKINTÖJÄ



Periaateleikkaus



- seinärakenne
- aukko max. 450 X 500 mm
- Würth Combo CE palovaahto
- kivilla A1/A2 min. 30 mm
- teräs- tai kupariputki max. Ø 54 mm
- täyttöaste; läpiviennin poikkipinta-alasta max. 60% putkia

Reijän Ø = putki + kivivillaeriste + min. 20 mm
Putken kannakointi max. 750 mm
Äänieristävyys 66 dB asti

Ei mittakaavassa

Rakenne	Rakenteen minimipaksuus	Aukkokoko	Läpivienti	Seinämän paksuus	Massan paksuus	Eriste	Eristepaksuus	Eristys	Paloluokka EI
Kipsilevyseinä	min. 100 mm	max. 450 X 500 mm	max. Ø 54 mm teräs- tai kupariputki	1 - 14 mm	min. 144 mm / 200 mm	Kivivilla A1/A2 90kg/m^3	min. 30 mm	650 mm / puoli tai jatkuvana palokatkon läpi	60 / 90
Betoni-,tiili- ja harkkoseinä									

ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Internet www.etadanmark.dk

Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

MEMBER OF EOTA

European Technical Assessment ETA-21/0085 of 2021/01/03

I General Part

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

Trade name of the construction product:	ACR 240
Product family to which the above construction product belongs:	Fire Stopping and Sealing Product: • Penetration Seals
Manufacturer:	Würth International AG Aspermontstrasse 1 CH- 7000 Chur Switzerland
Manufacturing plant:	A/003
This European Technical Assessment contains:	63 pages including 1 annex which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	EAD 350454-00-1104, September 2017
This version replaces:	-

Table of Contents

I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

1) ACR 240 is an acrylic sealant used to form a penetration seal around metallic pipes, plastic pipes, composite pipes and electrical cables to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.

2) The ACR 240 is supplied in liquid form contained within 310 & 380 ml cartridges and 600 ml foil packs. The sealant is gunned into the aperture in the separating element/elements and around the service or services, to a specified depth utilising mineral fibre insulation backing material.

3) ACR 240 contains no carcinogenic substances or mutagenic substances, flame retardants or antimicrobiological agents.

4) The applicant has submitted a written declaration that ACR 240 does not contain substances which have to be classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the EGDS - taking into account the installation conditions of the construction product and the release scenarios resulting from there. An emission report has also been provided.

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

5) The use catagory of ACR 240 in relation to BWR 3 (Hygiene, health and environment) is IA1, S/W3

2 Specification of the intended uses of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): EAD 350454-00-1104

Detailed information and data is given in Annex A.

1) The intended use of system ACR 240 is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by various metal pipe services with and without combustible insulation, plastic pipes, composite pipes and electrical cables.

2) The specific elements of construction that the system ACR 240 may be used to provide a penetration seal in, are as follows:

   a. Flexible walls: The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs* lined on both faces with minimum 1 layers of 12.5 mm thick boards.

   b. Rigid walls: The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m^3.

   c. Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m^3.

   * no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.

   The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

3) The system ACR 240 may be used to provide a penetration seal with specific single insulated metal pipes, uninsulated metal pipes, plastic pipes, composite pipes and with specific electrical cables, single or in a bundle (for details see Annex A).

4) Apertures in the separating element shall be maximum 300 x 300 mm or 100 x 1000 mm. The annular space/gap around the services shall be infilled with mineral fibre insulation backing material and ACR 240 sealant. Blank seals up to 300 x 300 mm are permitted. For full details, see Annex A.

5) Pipes shall be supported at maximum 350 mm away from both faces of the wall constructions and from the upper face of floor constructions.

6) The provisions made in this European Technical Assessment are based on an assumed working life of the ACR 240 of 30 years, provided that the conditions laid down in the product data sheet regarding packaging/transport/ storage/installation/use/repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

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

Product-type: Sealant		Intended use: Penetration Seal
	Essential characteristic	Product performance
BWR 2 Safety in case of fire		
	Reaction to fire	Class D-s1, d1
	Resistance to fire	Annex A
BWR 3 Hygiene, health and environment		
	Air permeability	No performance assessed
	Water permeability	No performance assessed
	Content, emission and/or release of dangerous substances	Use categories: IA1, S/W3 Declaration of manufacturer
BWR 4 Safety in use		
	Mechanical resistance and stability	No performance assessed
	Resistance to impact/movement	No performance assessed
	Adhesion	No performance assessed
	Durability	Z_2
BWR 5 Protection against noise		
	Airborne sound insulation	No performance assessed
BWR 6 Energy economy and heat retention		
	Thermal properties	No performance assessed
	Water vapour permeability	No performance assessed

4 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE

According to the decision 1999/454/EC – Commission Decision of date 22nd June 1999 on on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, published in the Official Journal of the European Union (OJEU) L178/52 of 14/07/1999, see http://eur-lex.europa.eu/JOIndex.do) of the European Commission[1], as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table(s) applies (apply).

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Fire stopping and Fire Sealing Products	For fire compartmentation and/or fire protection or fire performance	Any	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark A/S prior to CE marking

Issued in Copenhagen on 2021-01-03 by

Thomas Bruun

Managing Director, ETA-Danmark

[1] Official Journal of the European Communities L178/52 of 14/7/1999

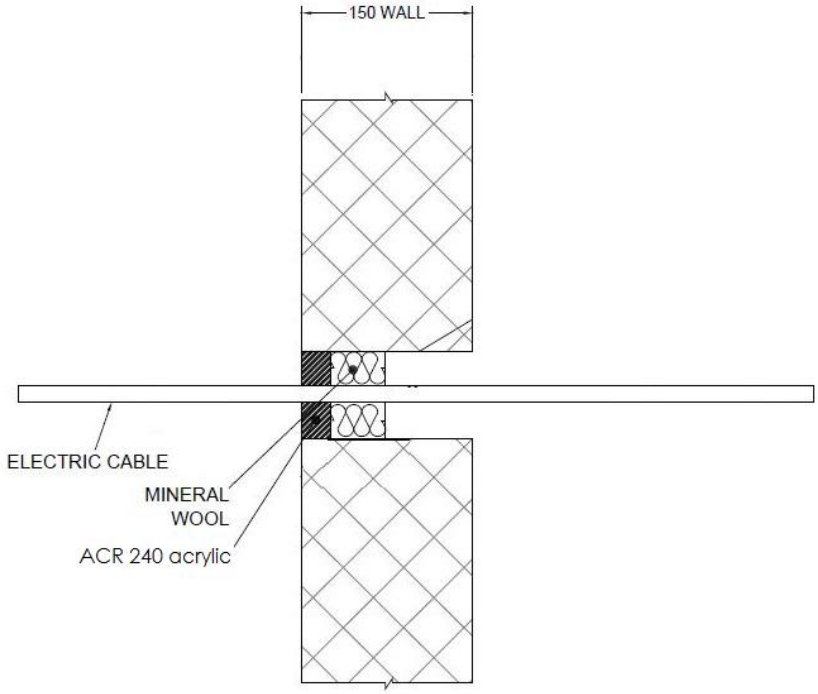
ANNEX A – Resistance to Fire Classification – ACR 240

A.1 Rigid wall constructions according to 1.2.1 with wall thickness of minimum 150 mm

A.1.1 Single side penetration seal with cables

Penetration Seal: Cables (single) fitted at any position within the aperture, with ACR 240 to either side of the wall (or at any position in between), backed with stone wool insulation 35kg/m^3 or 'Würth FP Backing'. Minimum separation between cables and the edge of the seal of 7 mm.

Construction details:



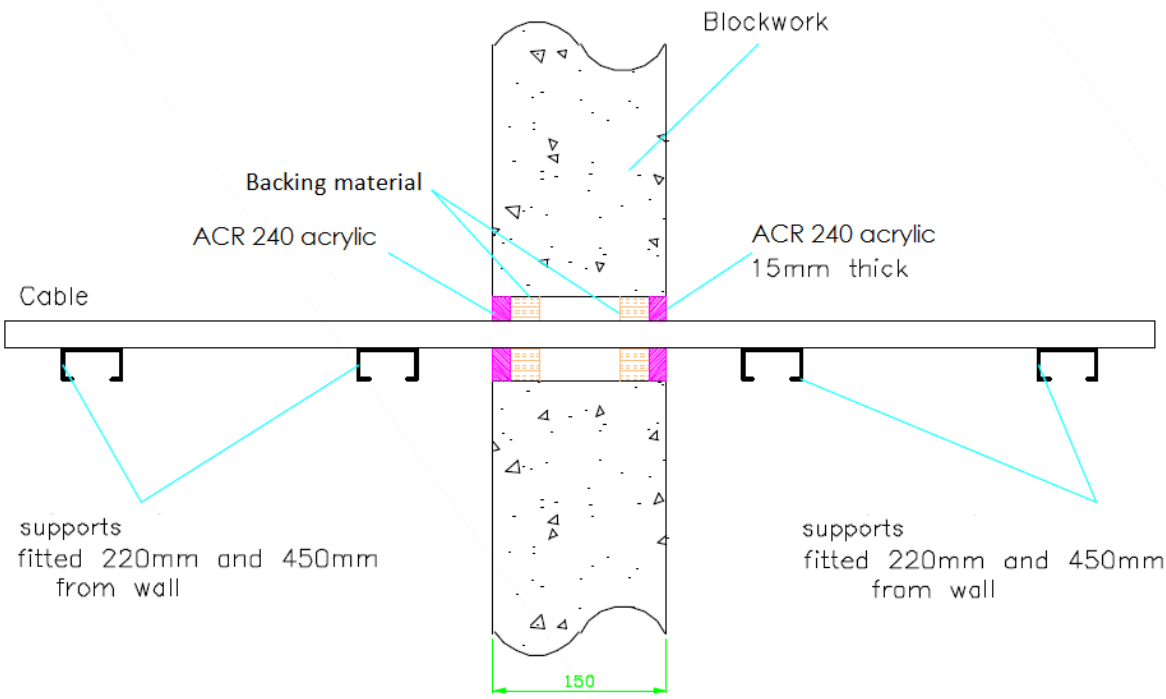
A.1.1.1

Services	Sealant depth	Backing	Maximum seal size	Classification
Single electrical cables up to 21 mm Ø	25 mm	48 mm deep Würth FP Backing	87 mm Ø	**E 240, EI 90**
Blank seals	25 mm	48 mm Würth FP Backing insulation	300 x 300 mm	**E 240, EI 60**
Electric cables up to 21 mm diameter, single.				
Blank seals			35 x 35 mm / 36 mm Ø	**E 240, EI 120**
Electric cables up to 21 mm diameter, single.				

A.1.2 Double side penetration seal with cables

Penetration Seal: Cables fitted with ACR 240 to both sides of the wall, backed with stone wool insulation 35kg/m^3. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

Construction details:



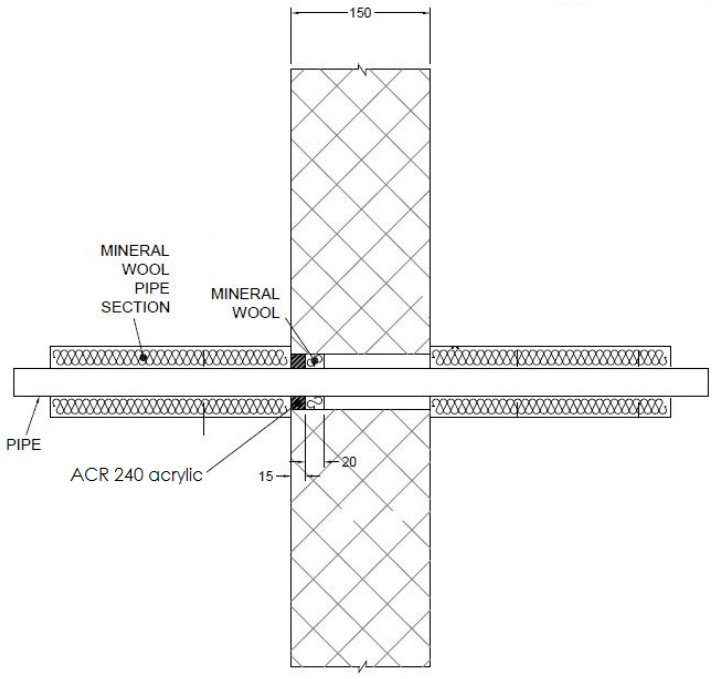
A.1.2.1

Services	Sealant depth	Backing	Insulation	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m^3	None	**EI 240**
Electric cables up to 21 mm diameter, single or in a bundle.				**E 240 EI 120**
Electric cables 22-80 mm diameter, single or in a bundle.				**E 120 EI 60**
Blank seals	25 mm	48 mm Würth FP Backing		**EI 240**
Electric cables up to 80 mm diameter, single or in a bundle.				**E 240 EI 60**
Cables up to 21 mm diameter, single or in a bundle up to 100 mm diameter				**EI 240**

A.1.3 Single side penetration seal with metallic (and composite) pipes

Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 15 mm deep ACR 240 to either side of the wall (or at any position between), backed with 20 mm deep 40 kg/m^3 stone wool insulation*.

Construction details:

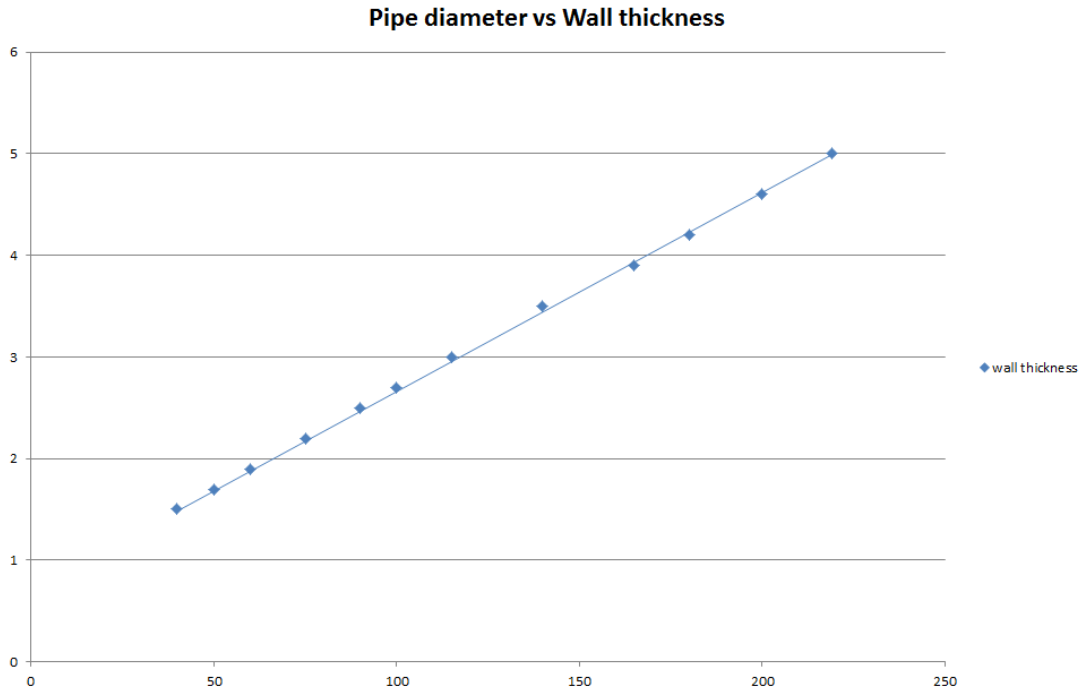


A.1.3.1

Services	Seal width around pipe	Insulation (minimum)	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	8-9 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m^3	**E 240 C/U, EI 180 C/U**
Copper pipe up to 12 mm diameter/0.9-5 mm wall	8 mm		**EI 240 C/U**
Alupex composite pipe 75 mm diameter/7.5 mm wall	30 mm	25 mm Würth FP Backing insulation, 600 mm long (min.)	**EI 120 C/U**

Services Mild or stainless steel pipe	Seal width around pipe	Insulation (minimum)	Classification
40 mm diameter/1.5-14.2 mm wall*	6-18 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m^3	**EI 240 C/U**
40 mm diameter/1.5-14.2 mm wall*		1000 mm length of 30 mm Stone wool insulation 80 kg/m^3	**E 180, EI 90 C/U**
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

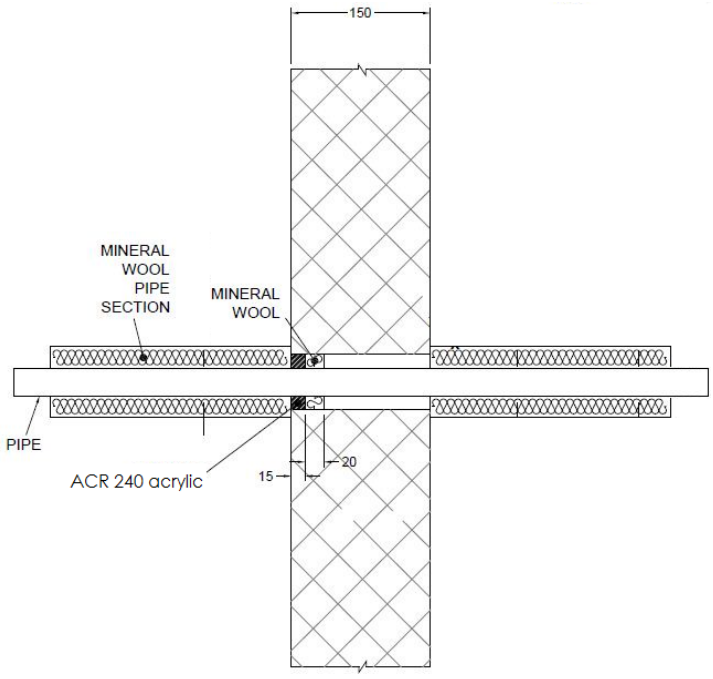
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.4 Single side penetration seal with metallic (and composite) pipes

Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 25 mm deep ACR 240 to either side of the wall (or at any position between), backed with 25 mm deep 40 kg/m^3 stone wool insulation*.

Construction details:

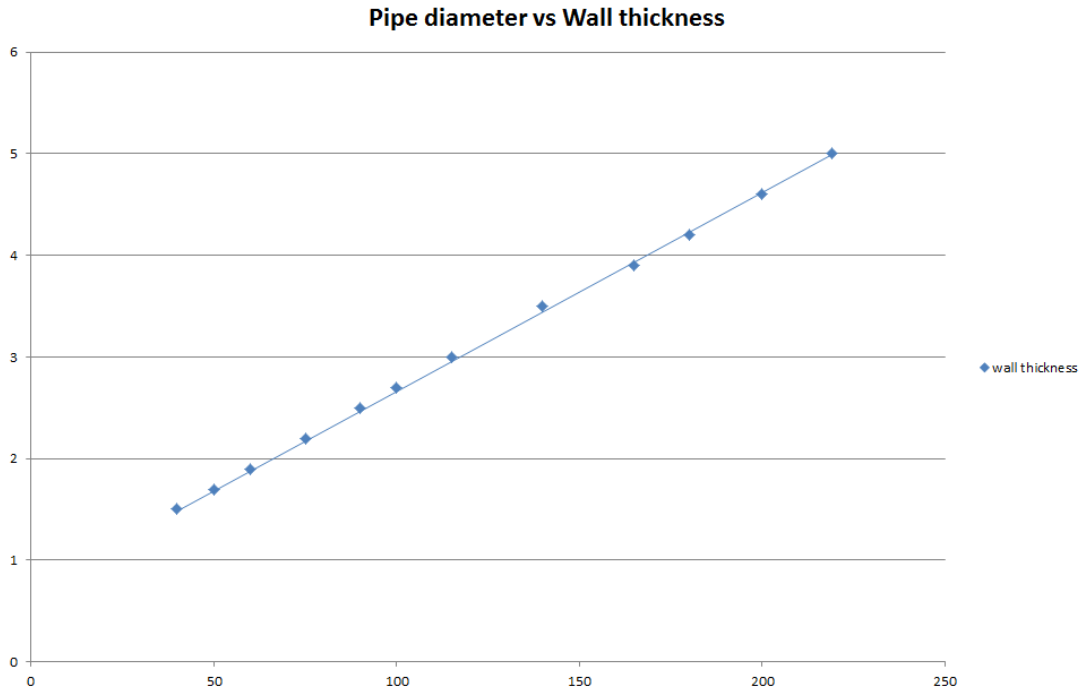


A.1.4.1

Services	Maximum Seal size	Insulation (minimum)	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m^3	**E 240 C/U, EI 60 C/U**
Copper pipe up to 12 mm diameter/0.9-5 mm wall			
Alupex composite pipe 75 mm diameter/7.5 mm wall		25 mm Würth FP Backing insulation, 600 mm long (min.)	

Services Mild or stainless steel pipe	Maximum seal size	Insulation (minimum)	Classification
40 mm diameter/1.5-14.2 mm wall*	300 x 300 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m^3	**E 240 C/U, EI 60 C/U**
40 mm diameter/1.5-14.2 mm wall*		1000 mm length of 30 mm Stone wool insulation 80 kg/m^3	
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

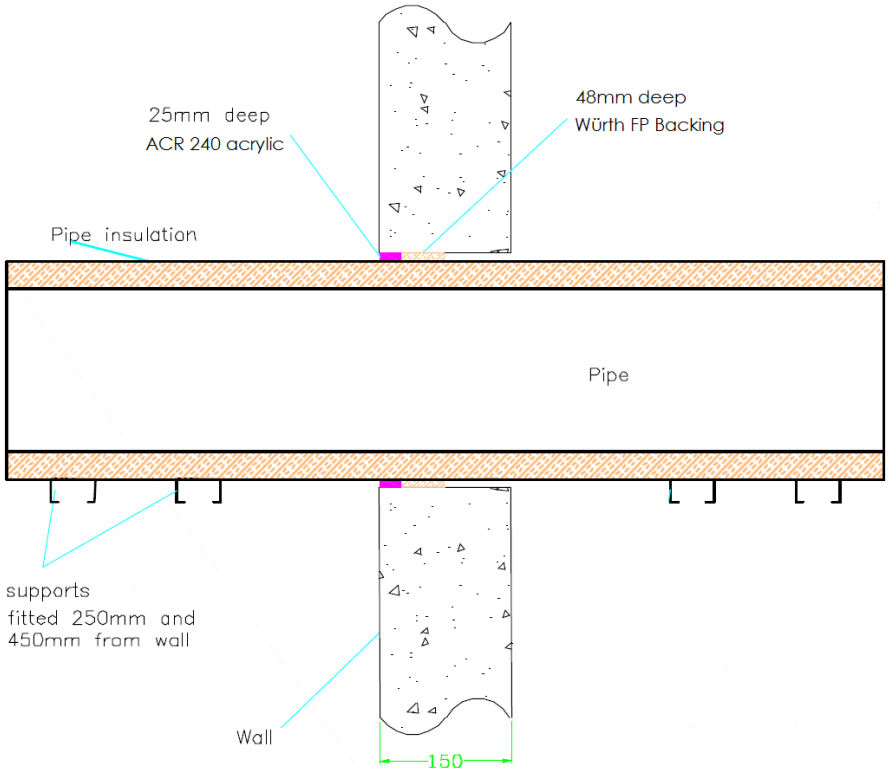
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.5 Single side penetration seal with metallic pipes

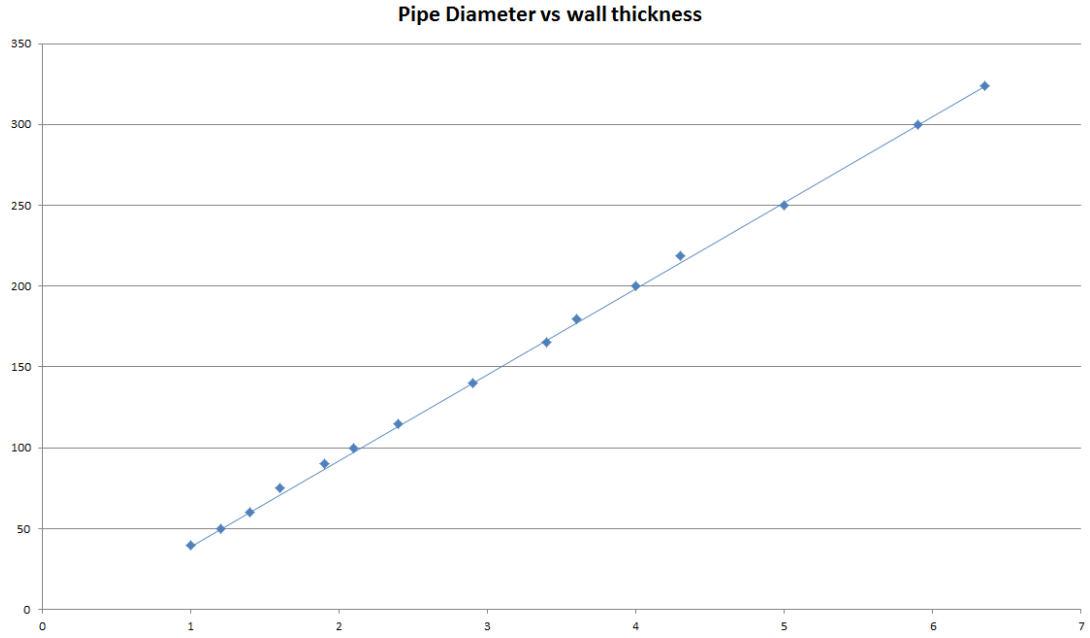
Penetration Seal: CS (Continuous Sustained) insulated metallic (single), with 25 mm deep ACR 240 to either side of the wall (or at any position between), backed with 48 mm deep Würth FP Backing insulation. Minimum annular space 10 mm and minimum separation between penetrations seals of 30 mm. Maximum seal size 300 x 300 mm or 504 mm Ø.

Construction details:

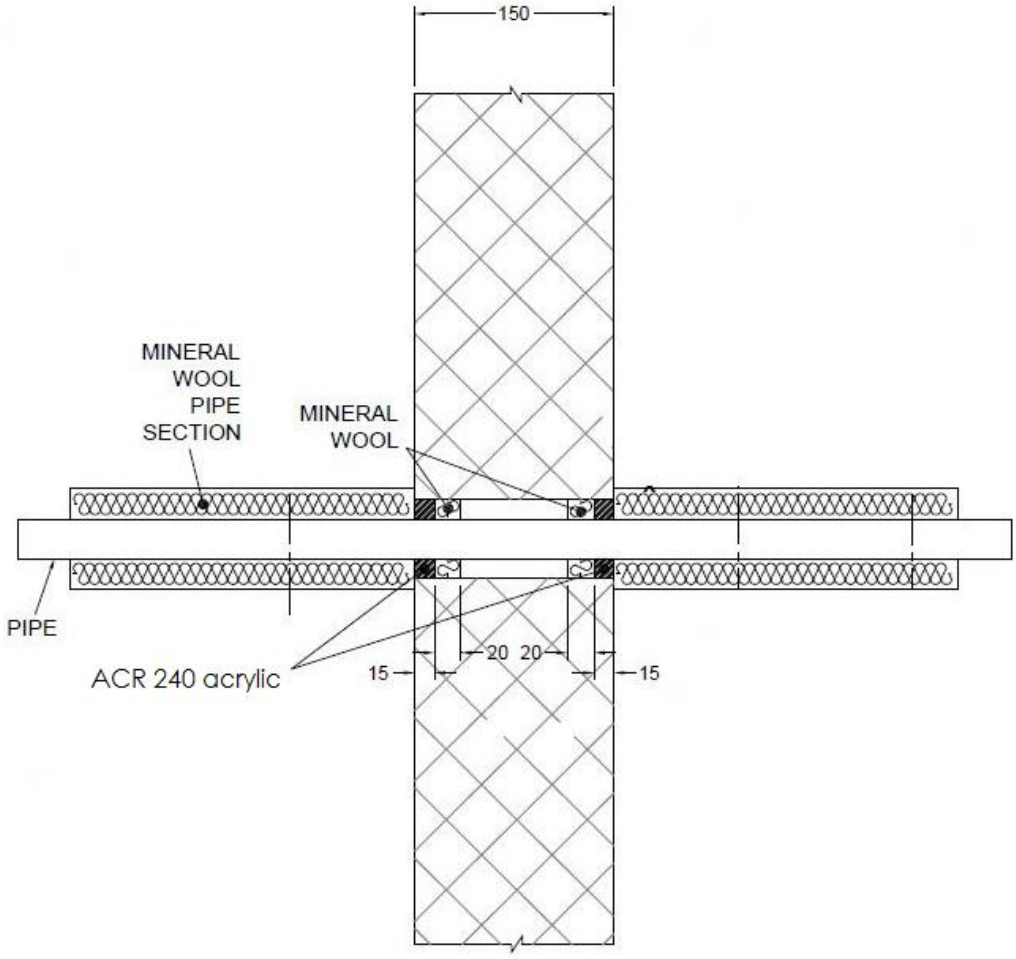


A.1.5.1 Single side penetration seal with pipes

Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool 80 kg/m^3	**EI 240 C/U**
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m^3	**EI 180 C/U**
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*		
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		



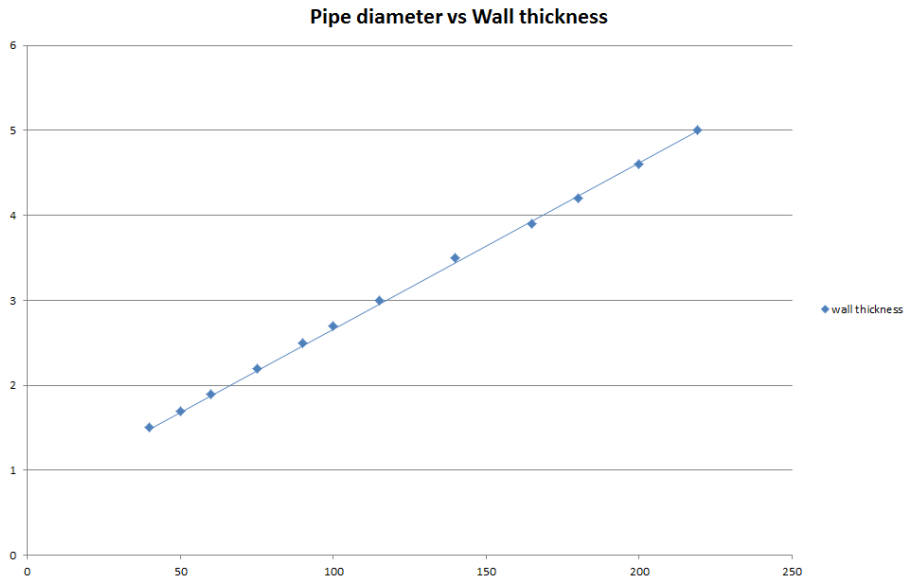
A.1.6 Double side penetration seal with metallic pipes

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep ACR 240 to both sides of the), backed with 20 or 30 mm deep 40 kg/m^3 stone wool insulation.
Construction details: 

A.1.6.1

Services Mild or stainless steel pipe	Maximum seal size	Insulation (minimum)	Classification
40 mm diameter/1.5-14.2 mm wall*	300 x 300 mm	20 mm Stone wool insulation 80 kg/m^3	**EI 240 C/U**
40 mm diameter/1.5-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m^3	**E 240, EI 120 C/U**
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

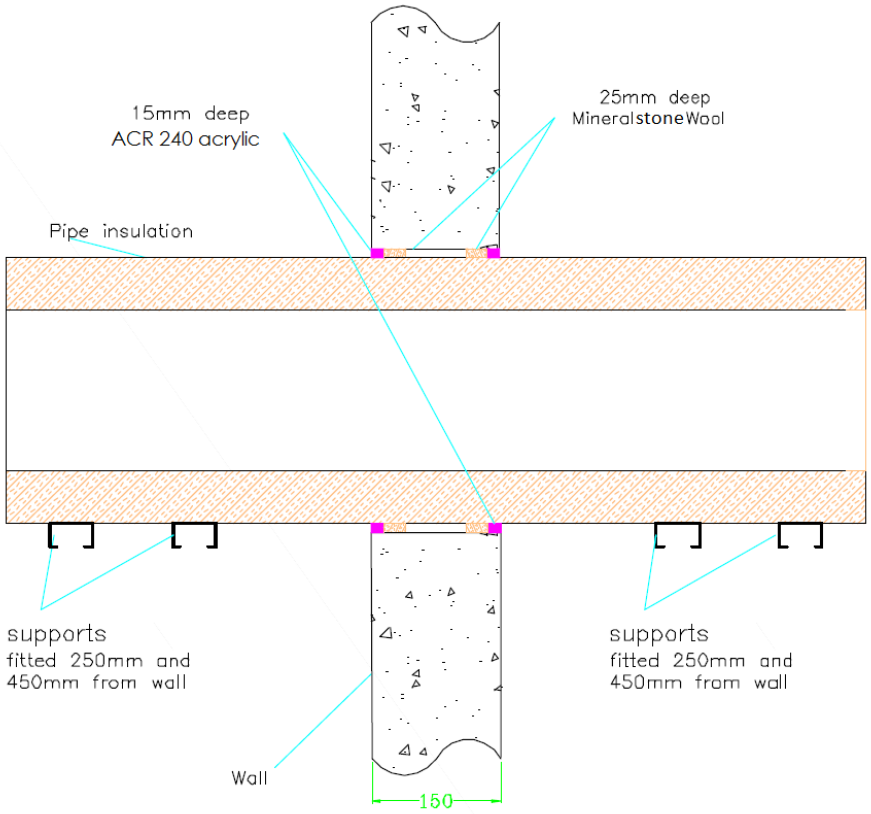
* Typical pipe diameters shown, see below graph for intermediate sizes

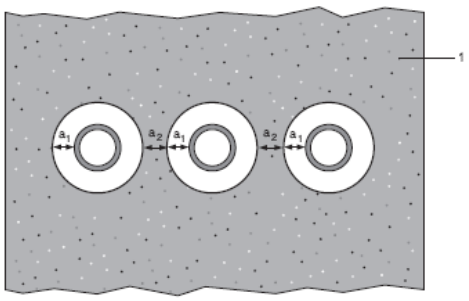
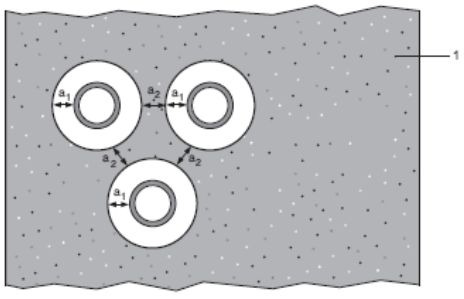


A.1.7 Double side penetration seal with metallic pipes

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm ACR 240 to both sides of the wall, backed with 25 mm deep stone wool insulation 35 kg/m³. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:



Configuration 1	Configuration 2
Option 1 	*Option 2* 

Key

1 Supporting construction

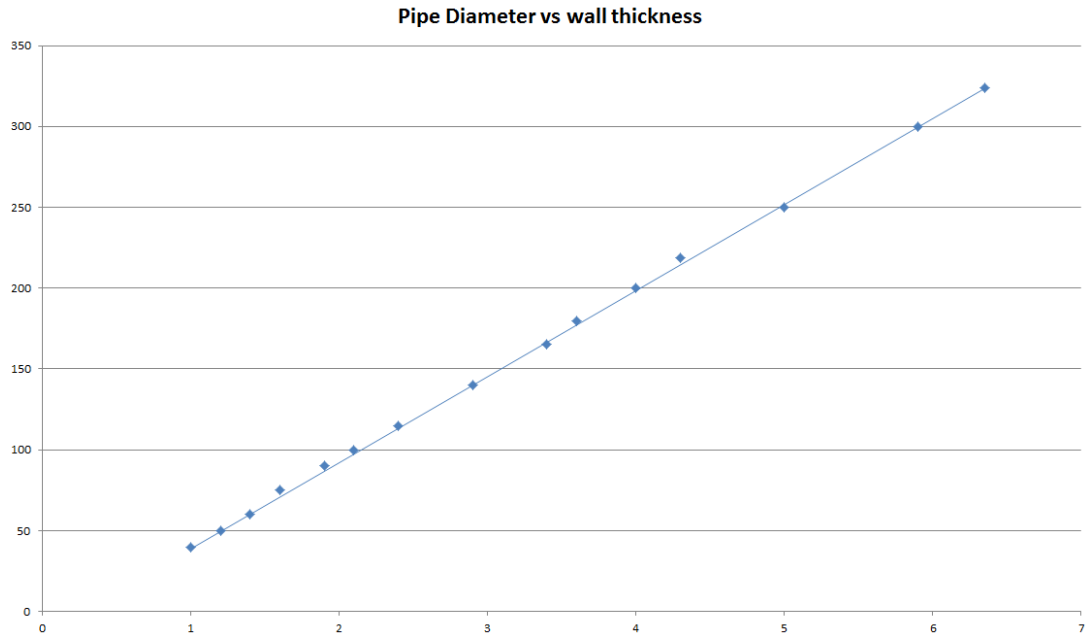
a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

A.1.7.1 Double side penetration seal with pipes

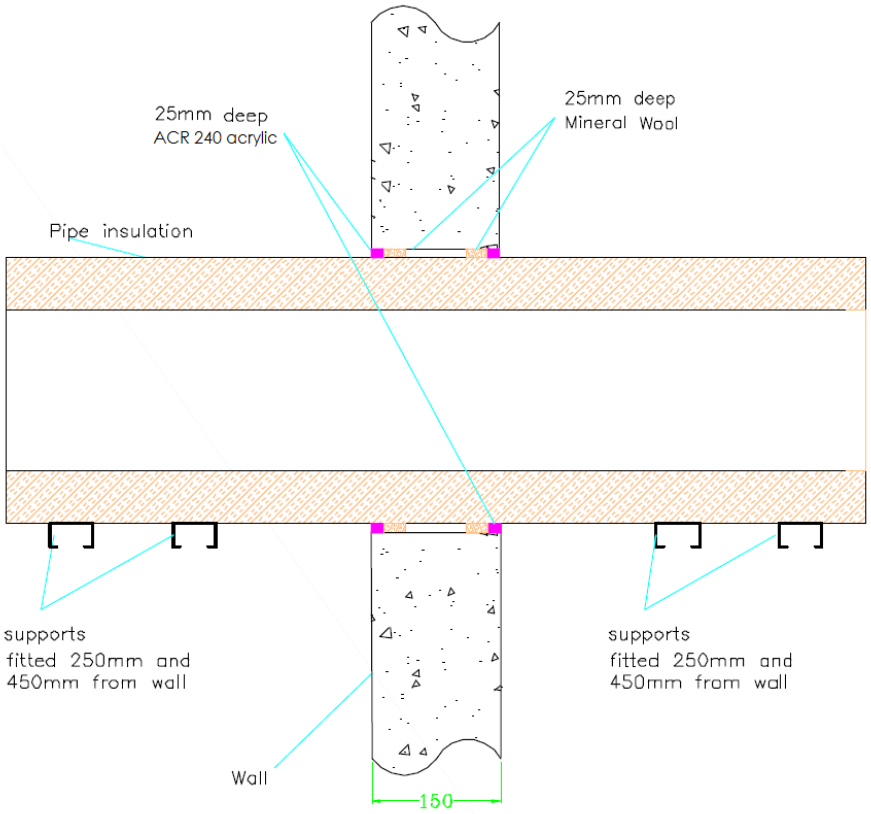
Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m^3	**EI 240 C/U**
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m^3	
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*		
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		

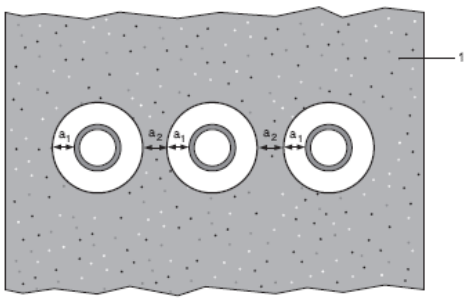
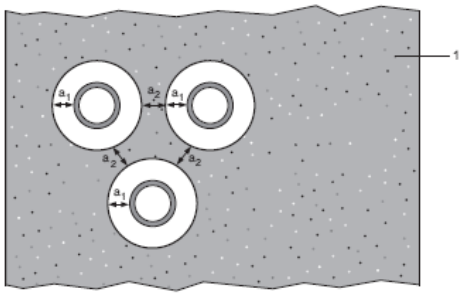


A.1.8 Double side penetration seal with metallic pipes with combustible insulation

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm ACR 240 to both sides of the wall, backed with 25 mm deep stone wool insulation 35 kg/m³. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø

Construction details:



Configuration 1	Configuration 2
Option 1 	*Option 2* 

Key

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

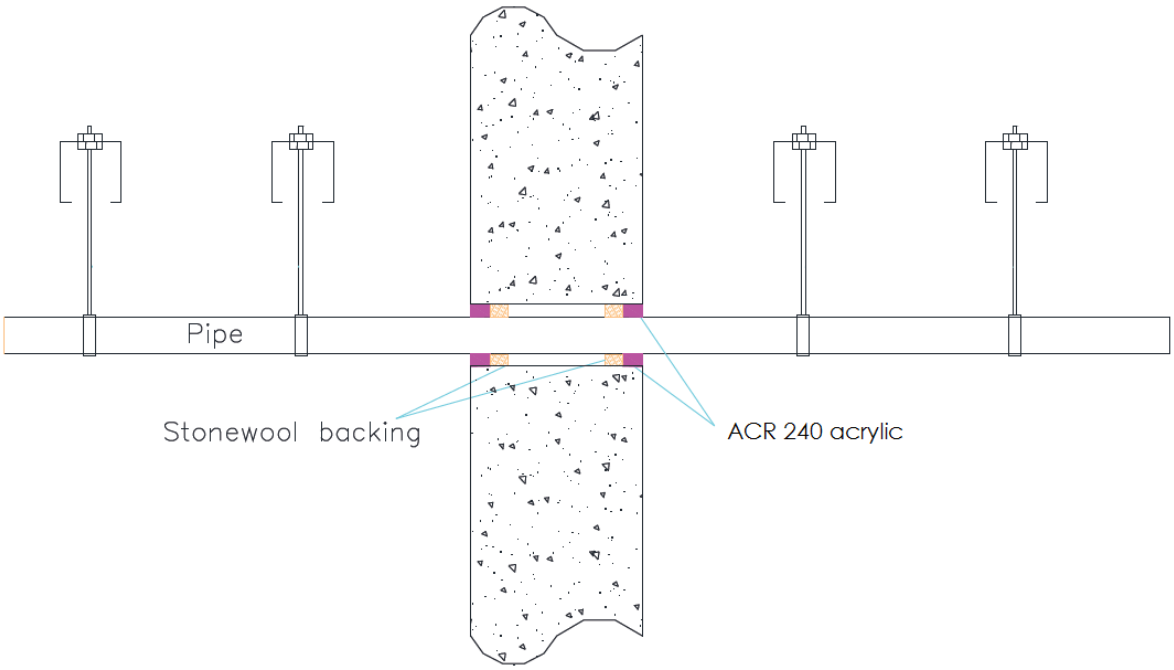
A.1.8.1 Double side penetration seal with metallic pipes with combustible insulation

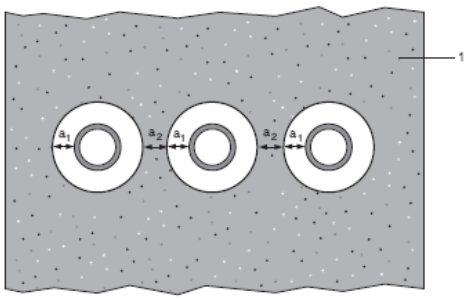
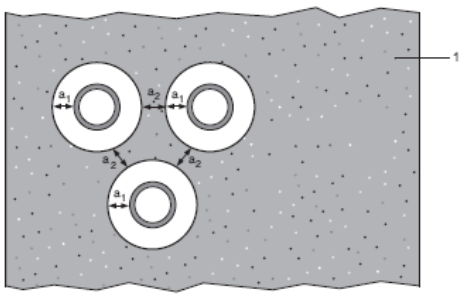
Mild or stainless steel pipe	Insulation	Classification
22 mm diameter/2-11 mm wall	13 mm thick Elastomeric insulation minimum class B-s3,d0	**E 240 C/U, EI 180 C/U**
22-114 mm diameter/2-14.2 mm wall	13-25 mm thick Elastomeric insulation minimum class B-s3,d0	**E 120 C/U, EI 90 C/U**
22-114 mm diameter/2-14.2 mm wall	25-50 mm thick Elastomeric insulation minimum class B-s3,d0	**EI 60 C/U**

A.1.9 Double side penetration seal with plastic pipes

Penetration Seal: Plastic pipes (single) fitted at any position within the aperture, with 25 mm ACR 240 to both sides of the wall, backed with 25 mm deep stone wool insulation 35 kg/m³. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø

Construction details:



Configuration 1	Configuration 2
Option 1 	*Option 2* 

Key

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

A.1.9.1 Double side penetration seal with plastic pipes

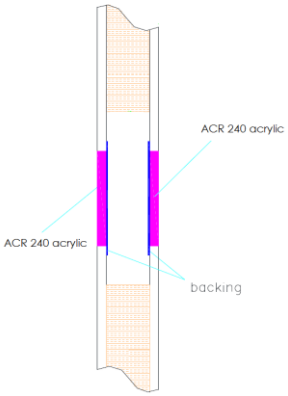
Pipe material	Size	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	32 mm diameter/1.6 mm wall	**EI 240 U/C**
PP pipe according to EN 1451-1	32 mm diameter/2.0-4.4 mm wall	**EI 180 C/U**
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1	20-32 mm diameter/2.0 mm wall	**EI 240 C/U**

A.2 Flexible wall constructions according to 2. 2) with wall thickness of minimum 75 mm

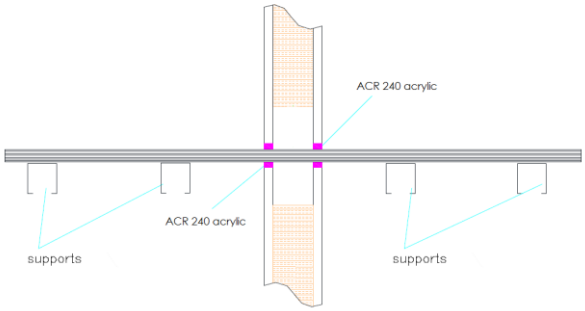
A.2.1 Double side penetration seal with cables

Penetration Seal: Cables (single or bundles up to 100 mm Ø) and pipes fitted at any position within the aperture, with ACR 240 to both sides of the wall. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 150 x 150 mm / 344 mm diameter (when incorporating a pipe of seal diameter -20 mm).

Construction details:



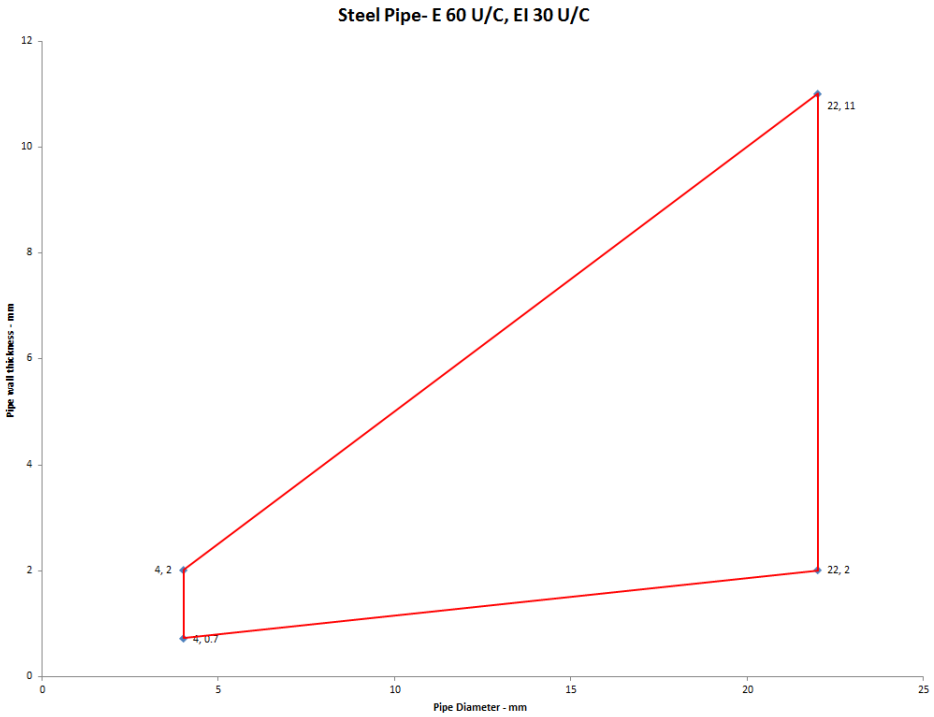
Construction details:

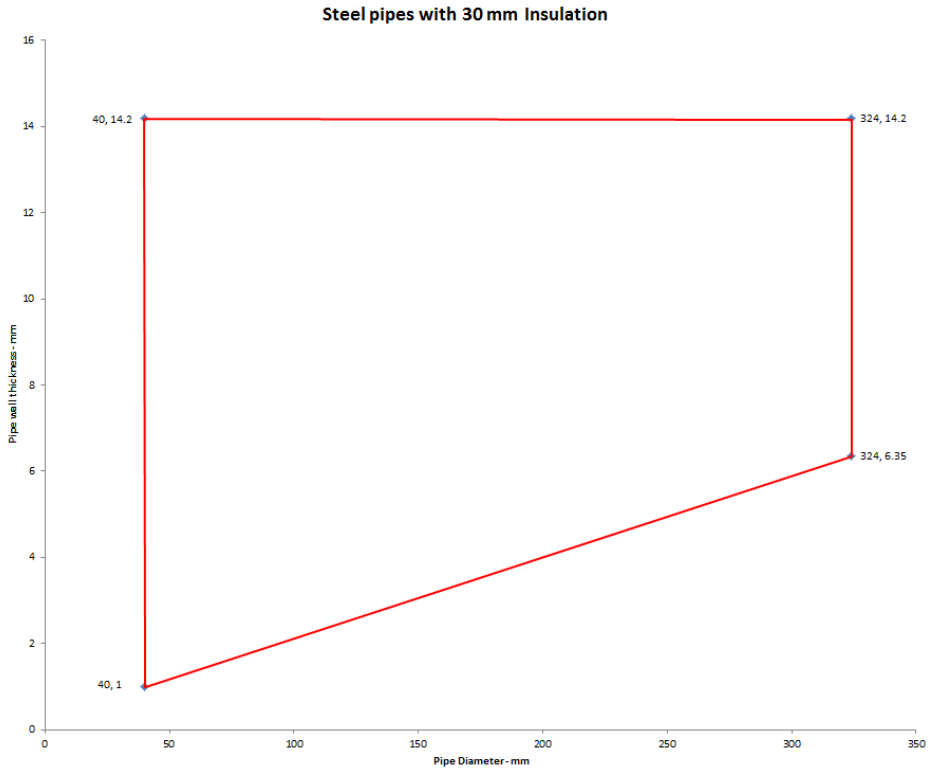


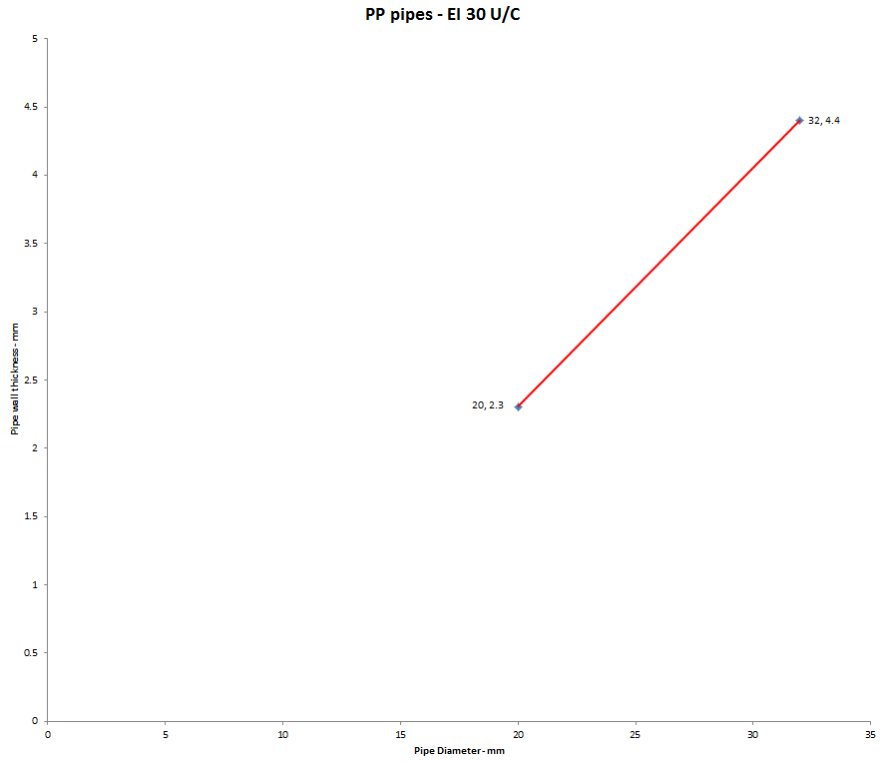
A.2.1.1

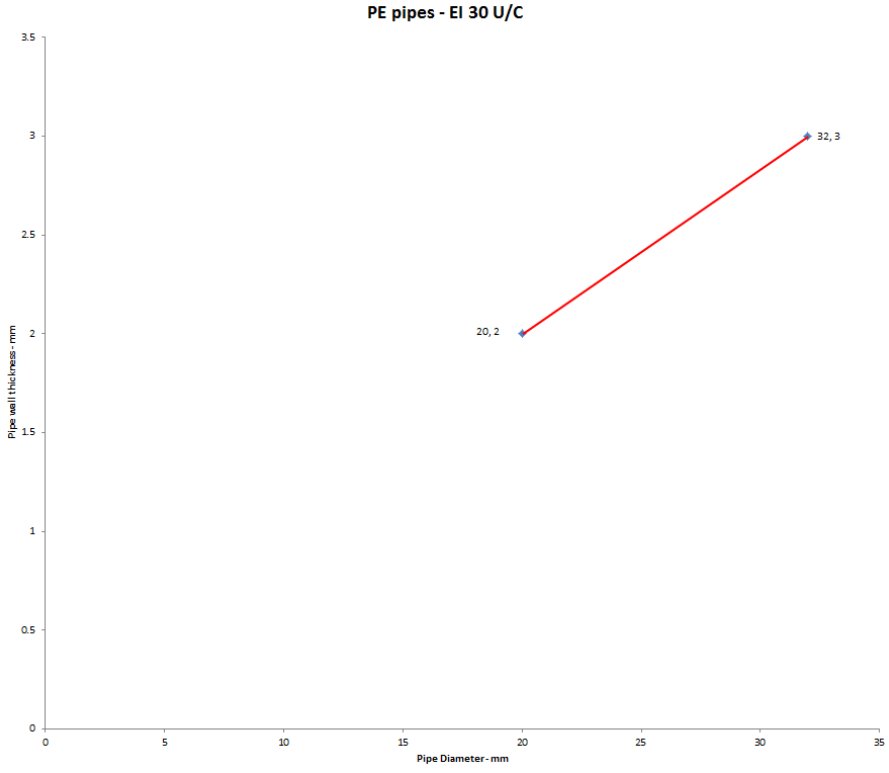
Services	Sealant depth	Backing	Classification
None (blank)	12.5 mm	Any material	**EI 60**
Cables up to 21 mm Ø, single		None	**E 60, EI 45**
Cables up to 21 mm Ø, in bundles up to 100 mm Ø			**E 45, EI 30**
Mild or stainless steel pipe			
4 mm diameter /0.7-2.0 mm wall	12.5 mm	None	**E 60 C/U, EI 45 C/U**
5-22 mm diameter /0.7-11 mm wall*			**E 60 C/U, EI 30 C/U**
Mild or stainless steel pipe with 80 kg/m^3 density stone wool insulation Continuous Sustained (CS)			
40 mm diameter /1-14.2 mm wall, 20 mm insulation	12.5 mm	None	**E 60 C/U, EI 45 C/U**
40-324 mm diameter /1.0-14.2 mm wall, 30 mm insulation*			
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
6-32 mm Ø/1.0-1.8 mm wall, with bundle of cables up to 21 mm diameter*	12.5 mm	None	**E 60 U/C, EI 45 U/C**
PP pipe according to EN 1451-1			
20 mm Ø/2.3 mm wall	12.5 mm	None	**EI 45 U/C**
21-32 mm Ø/2.3-4.4 mm wall*			**EI 30 U/C**
21-32 mm Ø/2.3-4.4 mm wall, with bundle of cables up to 21 mm diameter*			**E 45 U/C, EI 30 U/C**
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
20 mm Ø/2.0 mm wall	12.5 mm	None	**EI 45 U/C**
21-32 mm Ø/2.0-3.0 mm wall*			**EI 30 U/C**
21-32 mm Ø/2.0-3.0 mm wall, with bundle of cables up to 21 mm* diameter			**E 45 U/C, EI 30 U/C**

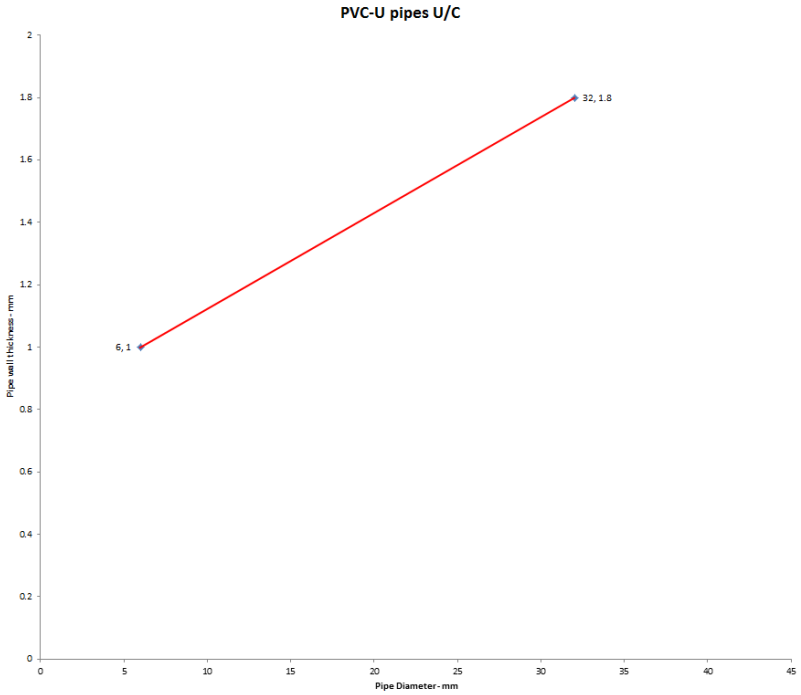
* See below graphs for interpolated pipe sizes


Steel Pipe- E 60 U/C, EI 30 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
22, 11
4, 2
22, 2
4, 0.7
0
2
4
6
8
10
12
0
5
10
15
20
25


Steel pipes with 30 mm Insulation
Pipe wall thickness - mm
Pipe Diameter - mm
40, 14.2
324, 14.2
324, 6.35
40, 1
0
2
4
6
8
10
12
14
16
0
50
100
150
200
250
300
350


PP pipes - EI 30 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
20, 2.3
32, 4.4
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
35


PE pipes - EI 30 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
20, 2
32, 3
0
0.5
1
1.5
2
2.5
3
3.5
0
5
10
15
20
25
30
35

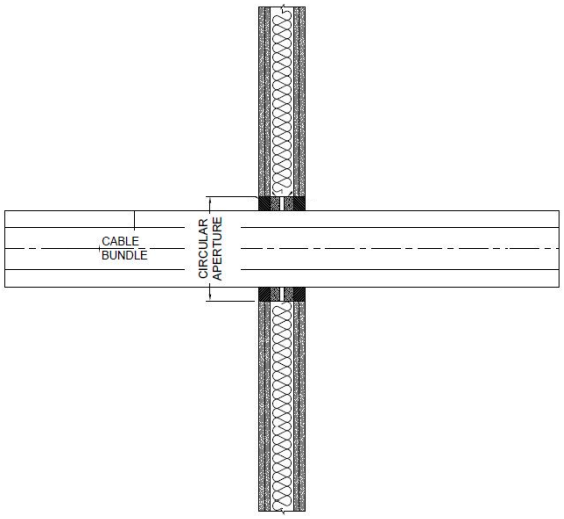

PVC-U pipes U/C
Pipe wall thickness - mm
Pipe Diameter - mm
6, 1
32, 1.8
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45

A.3 Flexible wall constructions according to 2. 2) with wall thickness of minimum 100 mm

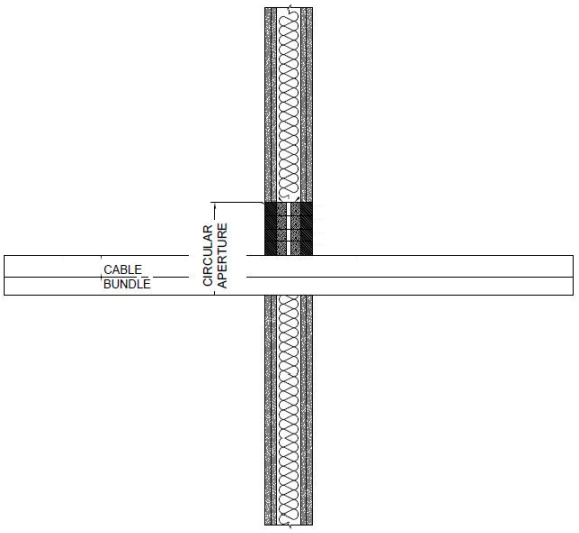
A.3.1 Double side penetration seal with cables

Penetration Seal: Cables (single or bundles up to 100 mm Ø) fitted at any position within the aperture, with ACR 240 to both sides of the wall, backed with stone wool insulation 40kg/m^3, 140 kg/m^3 or 'Würth FP Backing'.

Construction details:



Construction details:



A.3.1.1

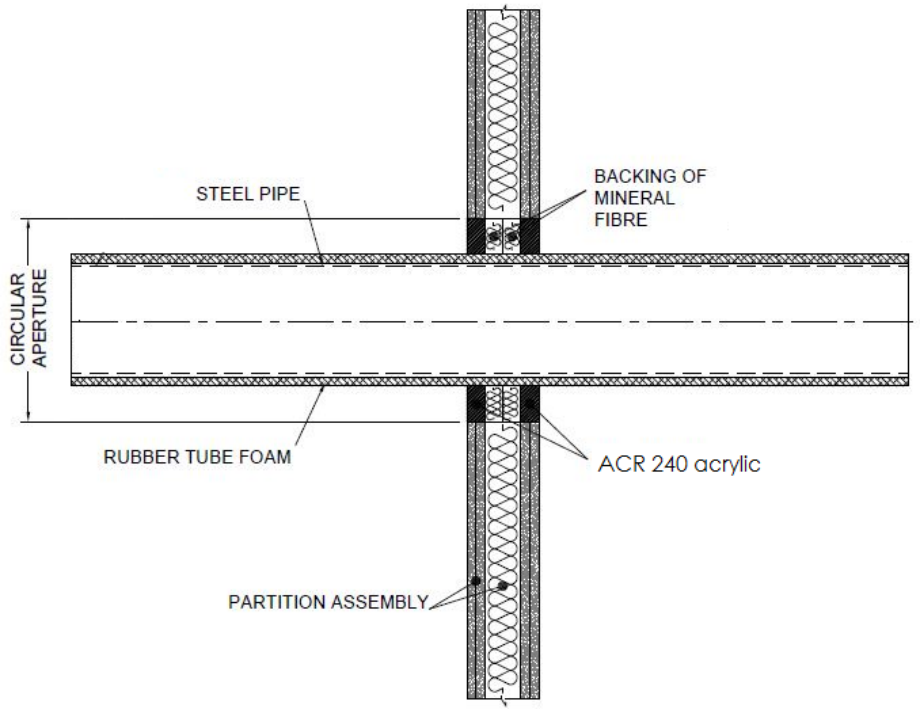
Services	Sealant depth	Backing	Maximum aperture	Classification
None (blank)	12.5 mm	Stone wool 20 mm deep 35-140 kg/m^3	300 x 300 mm*	**EI 120**
Electrical cables up to 21 mm Ø, single or in bundles up to 100 mm Ø	25 mm	Stone wool 20 mm deep 40 kg/m^3		**EI 120**
Electrical cables up to 80 mm Ø, single or in bundles up to 100 mm Ø		25 mm Würth FP Backing		**E 120, EI 60**
Cables up to 21 mm Ø single or in bundles up to 100 mm Ø		Stone wool 20 mm deep 40 kg/m^3		**EI120**
Single 'E cable' - 1 x 185 mm^2 core HD603.3 electrical cable with PVC insulation, PVC sheath and 23-27 mm diameter	12.5 mm	Stone wool 20 mm deep/140 kg/m^3		**E 120, EI 60**

* Or 30 mm wide x 3000 mm high for cables up to 21 mm Ø

A.3.2 Double side penetration seal with metallic pipes

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with ACR 240 to both sides of the wall, backed with stone wool insulation or 'Würth FP Backing', 300 x 300 mm maximum seal size.

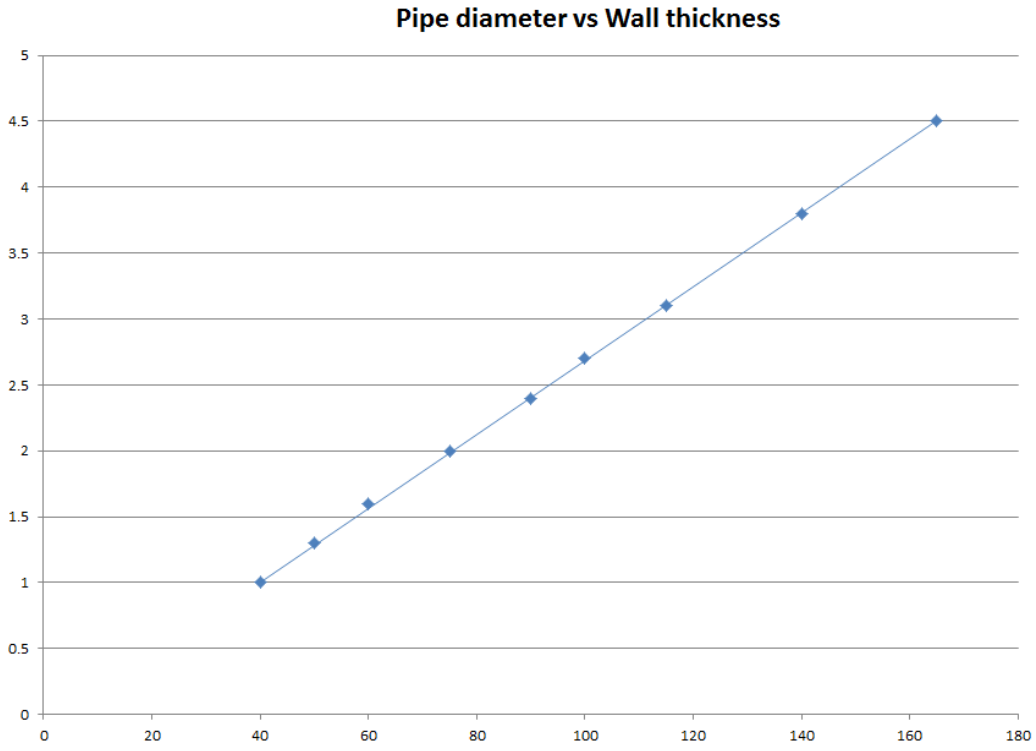
Construction details:



A.3.2.1

Services Mild or stainless steel pipe	Sealant depth	Backing	Insulation	Classification
22 mm diameter/3-10 mm wall	25 mm	Stone wool 25 mm deep 35 kg/m^3	None	**EI 120 C/C**
40 mm diameter/1-14.2 mm wall	12.5 mm	20 mm Stone wool 40 kg/m^3	13 -19 mm Elastomeric insulation minimum class B-s3,d0	**EI 120 C/C**
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm Würth FP Backing		**E 120 C/C** **EI 60 C/C**
50 mm diameter/1.3-14.2 mm wall*				
60 mm diameter/1.6-14.2 mm wall*				
75 mm diameter/2-14.2 mm wall*				
90 mm diameter/2.4-14.2 mm wall*				
100 mm diameter/2.7-14.2 mm wall*				
115 mm diameter/3.1-14.2 mm wall*				
140 mm diameter/3.8-14.2 mm wall*				
165 mm diameter/ 4.5-14.2 mm wall*				

* Typical pipe diameters shown, see below graph for intermediate sizes

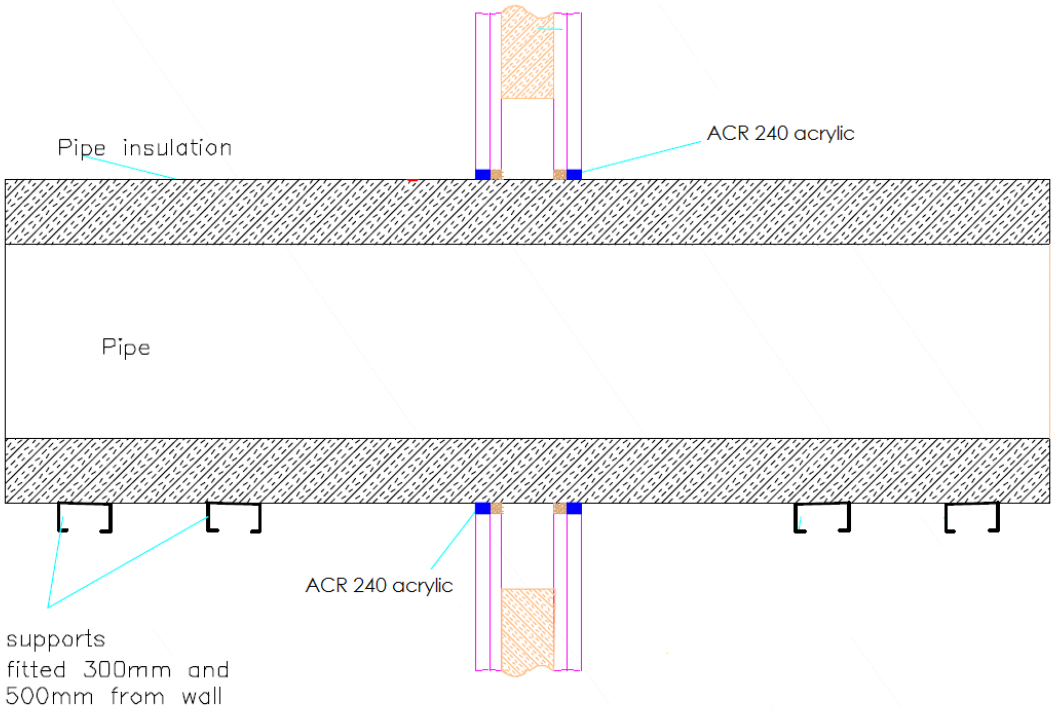


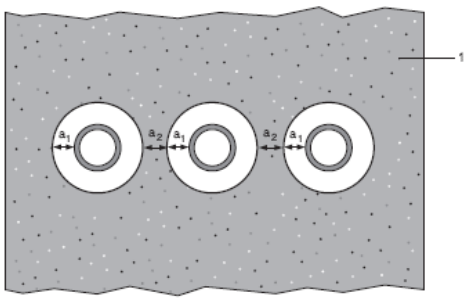
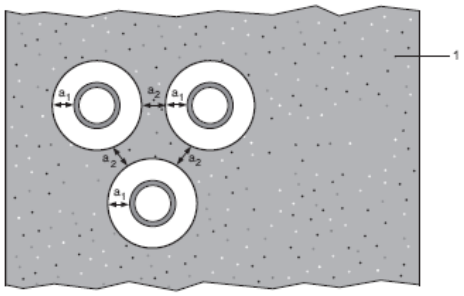
Services	Sealant depth	Backing	Insulation	Classification
Copper pipe				
12 mm diameter/1 mm wall	25 mm	25 mm Würth FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0	**EI 120 C/C**
12-54 mm diameter/1-1.2 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0	**E 120, EI 60 C/C**
12-54 mm diameter/1-1.2 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0	**EI 60 C/C**
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	25 mm	25 mm Würth FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0	**EI 120 C/C**
16 mm diameter/2.25 mm wall			9-25 mm Elastomeric insulation minimum class B-s3,d0	**EI 60 C/C**
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

A.3.3 Double side penetration seal with metallic pipes

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 12.5 mm ACR 240 to both sides of the wall, backed with 12.5 mm deep stone wool insulation 35 kg/m³. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:



Configuration 1	Configuration 2
Option 1 	*Option 2* 

Key

1 Supporting construction

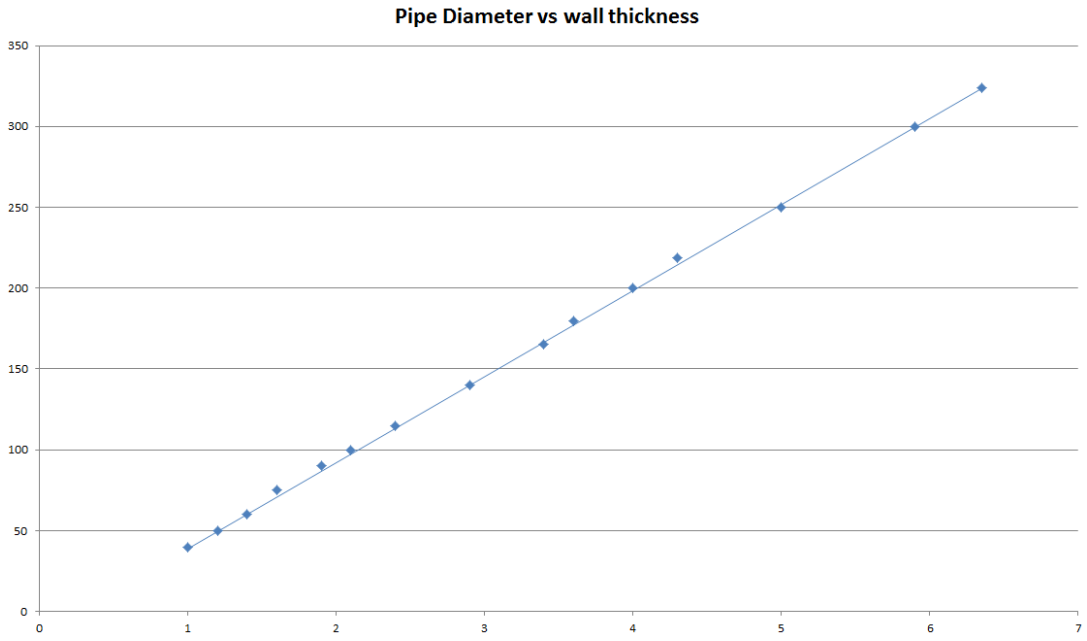
a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

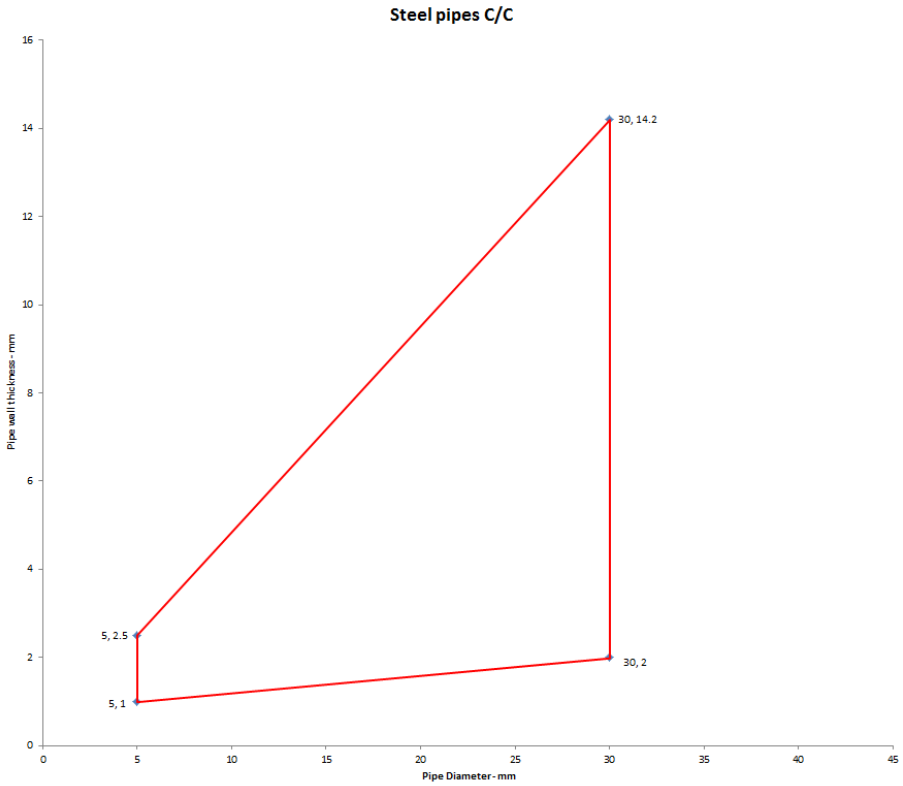
A.3.3.1 Double side penetration seal with pipes

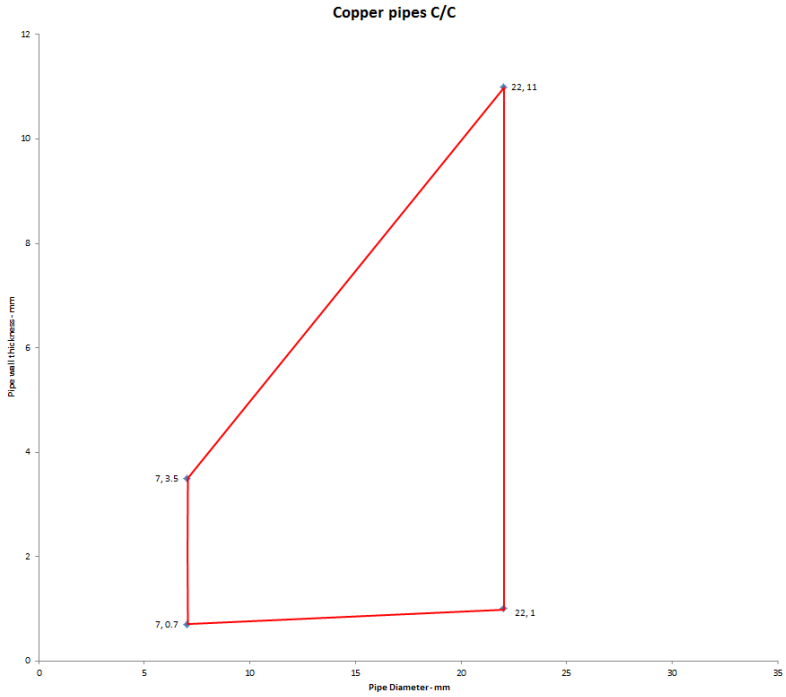
Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m^3	**E 120 C/U** **EI 90 C/U**
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m^3	
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*		
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		



PEX pipe in pipe system	Insulation	Classification
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	**EI 120 C/C**
Alupex pipe	**Insulation**	**Classification**
16-20 mm diameter/2.0 mm wall	None	**EI 120 C/C**
Mild or Stainless Steel pipe	**Insulation**	**Classification**
4 mm diameter/1.0-2.0 mm wall	None	**EI 90 C/C**
5-30 mm diameter/1.0-14.2 mm wall*		
30 mm diameter/2.0-14.2 mm wall		**EI 120 C/U**
Copper or Steel pipe	**Insulation**	**Classification**
6 mm diameter/0.7-3.0 mm wall	None	**E 90 C/C, EI 60 C/C**
7-22 mm diameter/0.7-11 mm wall		**E 90 C/C, EI 30 C/C**

* See below graphs for interpolated pipe sizes

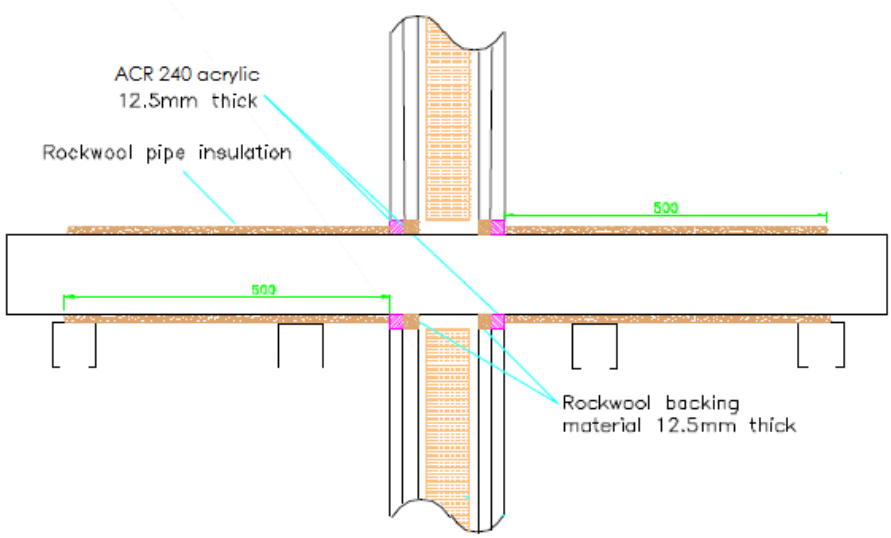



Copper pipes C/C
Pipe wall thickness - mm
Pipe Diameter - mm
22, 11
7, 3.5
7, 0.7
22, 1
0
2
4
6
8
10
12
0
5
10
15
20
25
30
35

A.3.4 Double side penetration seal with composite pipes

Penetration Seal: CI (Continuous Interrupted) or CS (Continuous Sustained) insulated composite pipes (single) fitted at any position within the aperture, with ACR 240 to both sides of the wall, minimum 10 mm seal width around service, maximum seal size 300 x 300 mm, backed with stonewool.

Construction details:



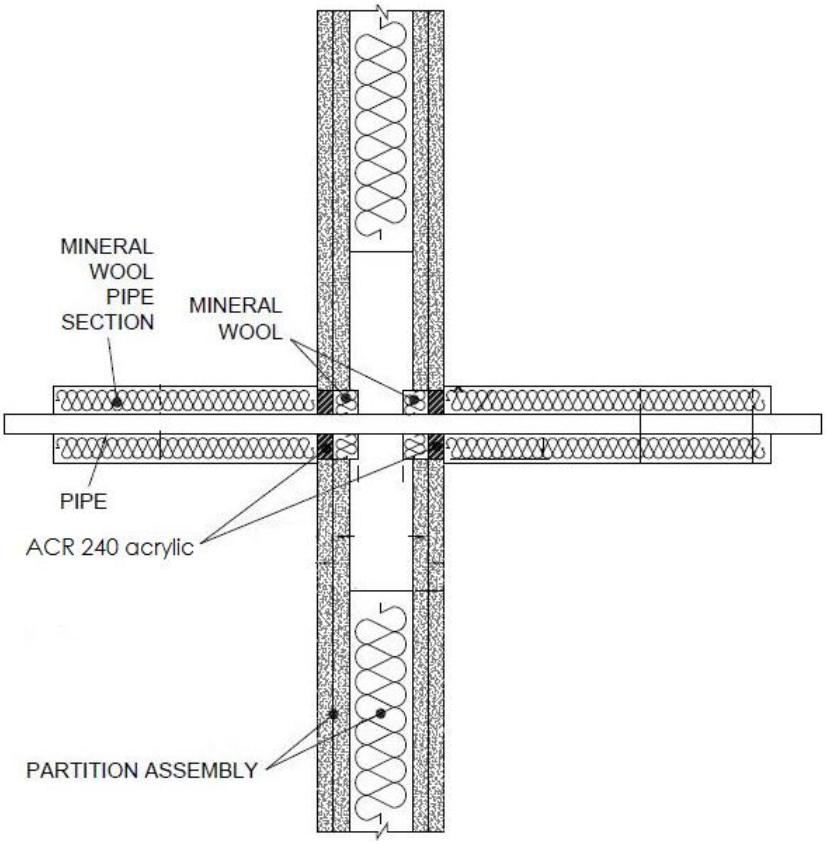
A.3.4.1

Services Alupex Composite Pipe	Sealant depth	Backing	Insulation (minimums)	Classification
16 mm diameter/2.25 mm wall	12.5 mm	12.5 mm stonewool 40 kg/m^3	20 mm stonewool 80 kg/m^3, 500 mm length from both sides of the seal	**EI 120 C/C**
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

A.3.5 Double side penetration seal with metallic (and composite) pipes

Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic pipes and composite (single) fitted at any position within the aperture, with ACR 240 to both sides of the wall, min. 10 mm seal width around service, backed with stone wool insulation or 'Würth FP Backing'.

Construction details:

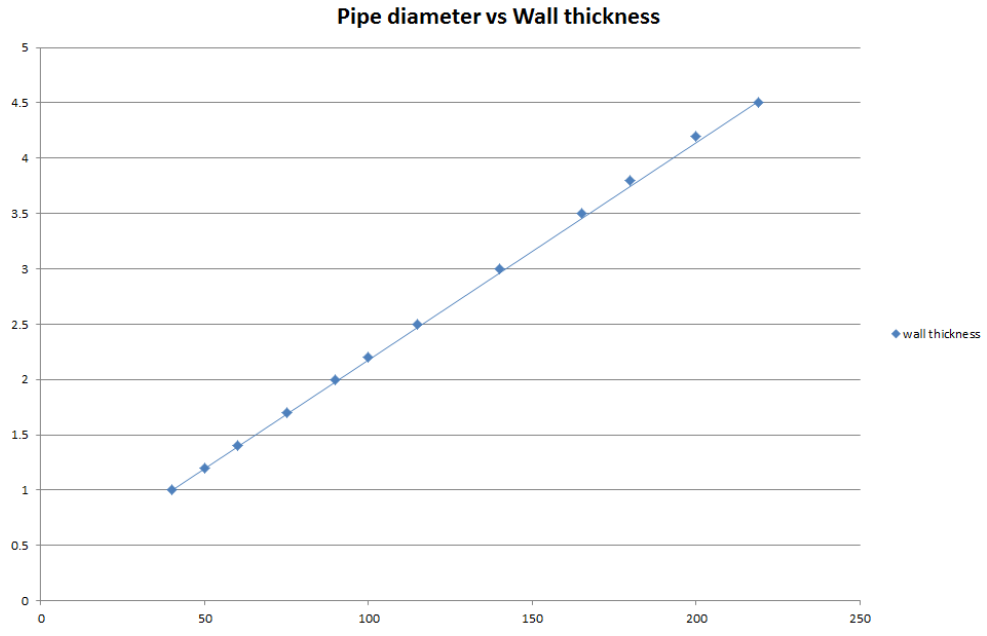


A.3.5.1

Services	Sealant depth	Backing	Insulation (minimum)	Classification
Maximum aperture size 300 x 300 mm				
Copper pipe up to 54 mm diameter/1-14.2 mm wall	12.5 mm	20 mm Stone wool 40 kg/m^3	500 mm length of 20 mm stone wool 80 kg/m^3	**EI 120 C/U**
Alupex composite pipe 75 mm diameter/7.5 mm wall		20 mm Stone wool 140 kg/m^3	600 mm length of 25 mm Würth FP Backing	**EI 60 C/U**

Services Mild or stainless steel pipe	Sealant depth	Backing	Insulation (minimum)	Classification
Maximum aperture size 300 x 300 mm				
40 mm diameter/1-14.2 mm wall	12.5 mm	20mm Stone wool 40 kg/m^3	500 mm length of 20 mm stone wool 80 kg/m^3	**EI 120 C/U**
40 mm diameter/1-14.2 mm wall*			500 mm length of 30 mm stone wool 80 kg/m^3	**E 120, EI 90 C/U**
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*	12.5 mm	20mm Stone wool 40 kg/m^3	500 mm length of 30 mm stone wool 80 kg/m^3	**E 120, EI 90 C/U**
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				

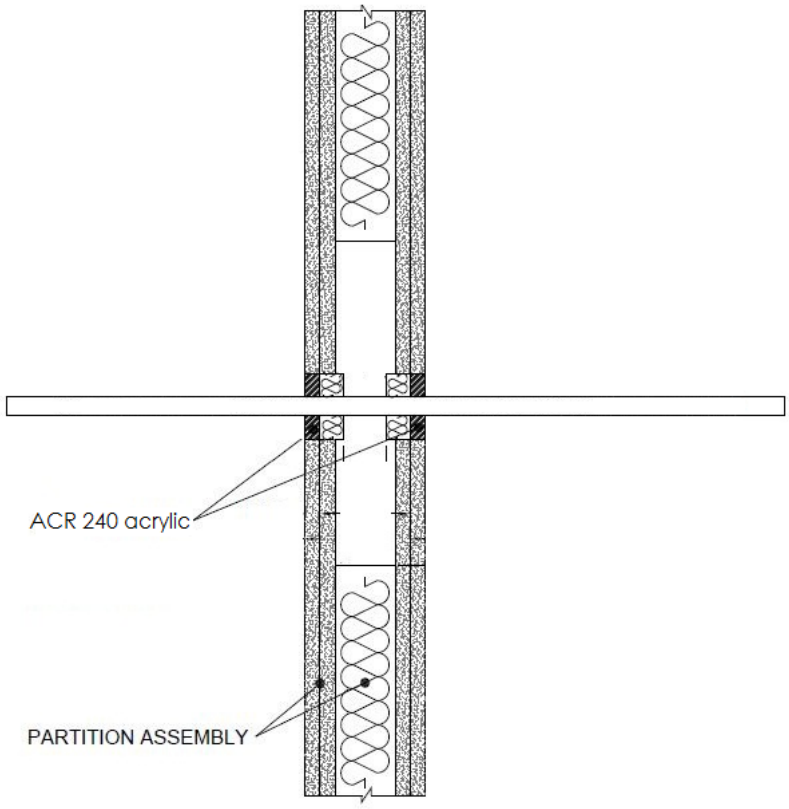
* Typical pipe diameters shown, see below graph for intermediate sizes



A.3.6 Double side penetration seal with plastic pipes

Penetration Seal: Combustible pipes (single) fitted at any position within the aperture, with ACR 240 to both sides of the wall, 10 mm seal width around PVC pipes and 29 mm around PP pipes. No backing material is required but PE foam may be utilised.

Construction details:



A.3.6.1

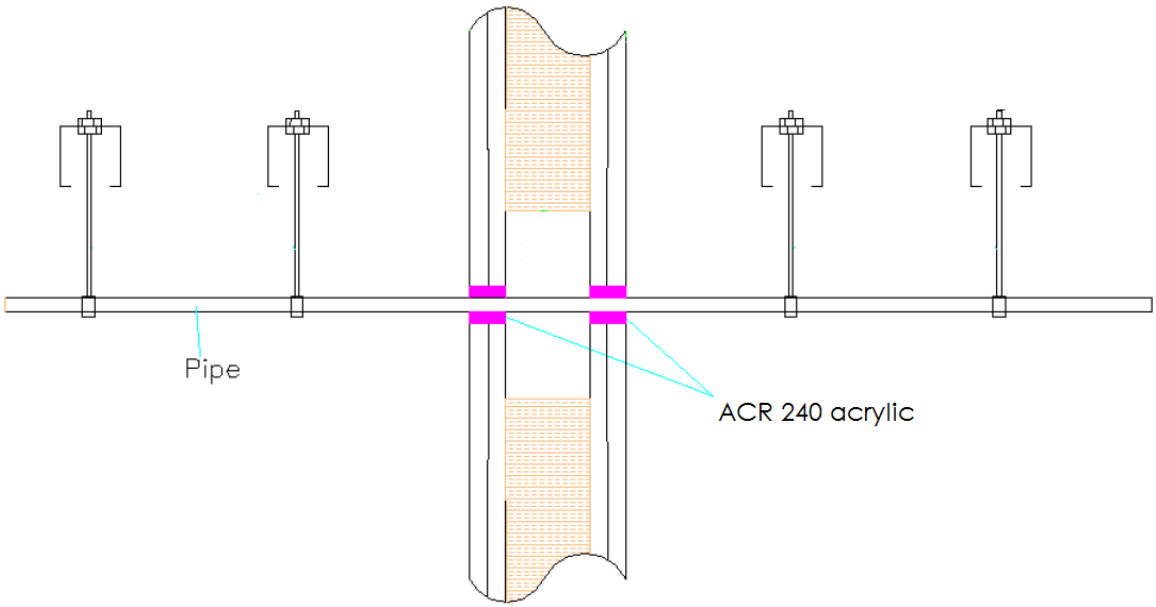
Services	Sealant depth	Backing	Aperture Ø	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1* 32 mm Ø/1.7 mm wall	12.5 mm	None required	52 mm	**EI 45 U/C, EI 45 C/C**
	25 mm			**EI 90 U/C, EI 90 C/C**
PP pipe according to EN 1451-1 32 mm Ø/2 mm wall	25 mm		90 mm	

* In Germany the pipes have additionally to comply with DIN 19531-10

A.3.7 Double side penetration seal with plastic pipes

Penetration Seal: Combustible pipes (single) fitted at any position within the aperture, with ACR 240 to both sides of the wall, Minimum annular space 10 mm and minimum separation between penetration seals 30 mm (A2).

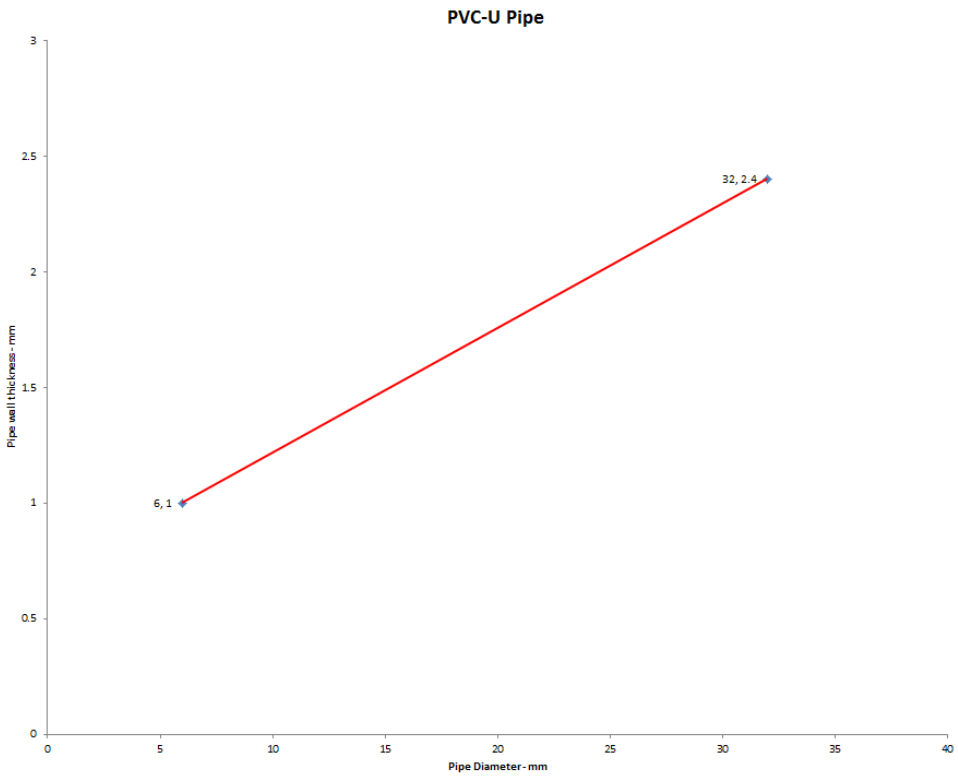
Construction details:



A.3.7.1

Pipe material	Sealant depth	Pipe size	Maximum Annular space	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	25 mm	6-32 mm Ø/1.0-2.4 mm wall*	10 mm	**EI 120 U/C**
			30 mm	**E 120 U/C, EI 90 U/C**
PP pipe according to EN 1451-1		20 mm Ø/2.2 mm wall		**EI 120 U/C**
		20 mm Ø/2.2-4.4 mm wall*		**EI 60 U/C**
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		20 mm Ø/2.0 mm wall	10 mm	**EI 60 U/C**
			30 mm	**EI 120 U/C**

***** See below graphs for interpolated pipe sizes

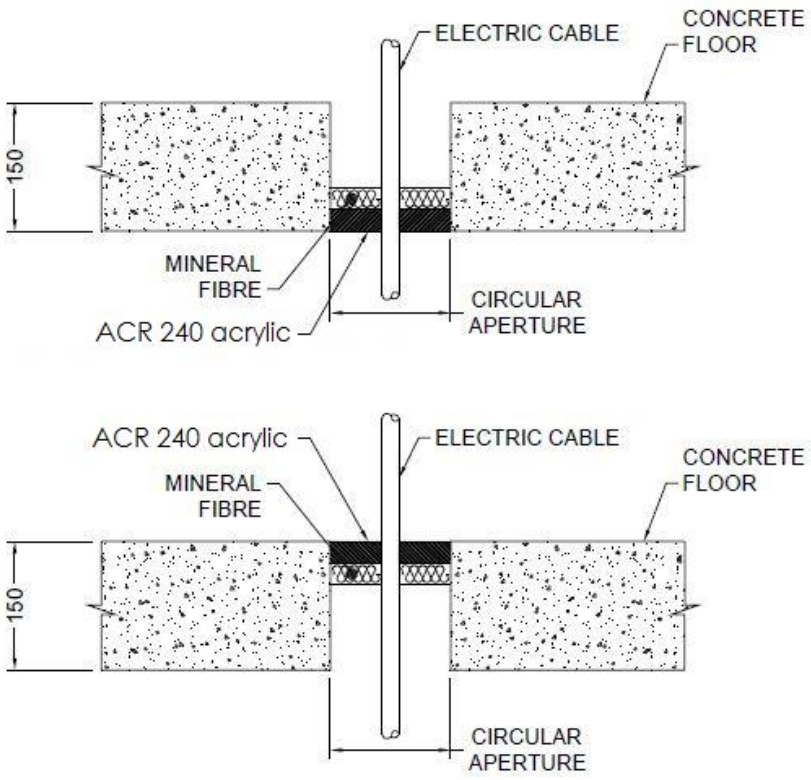

PVC-U Pipe
Pipe wall thickness - mm
Pipe Diameter - mm
6, 1
32, 2.4
0
0.5
1
1.5
2
2.5
3
0
5
10
15
20
25
30
35
40

A.4 Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm

A.4.1 Single side penetration seal with cables

Penetration Seal: Cables (single) fitted at any position within the aperture, min. 30 mm from the edges, with ACR 240 to either side of the floor (or at any position in between), backed with 'Würth FP Backing'.

Construction details:



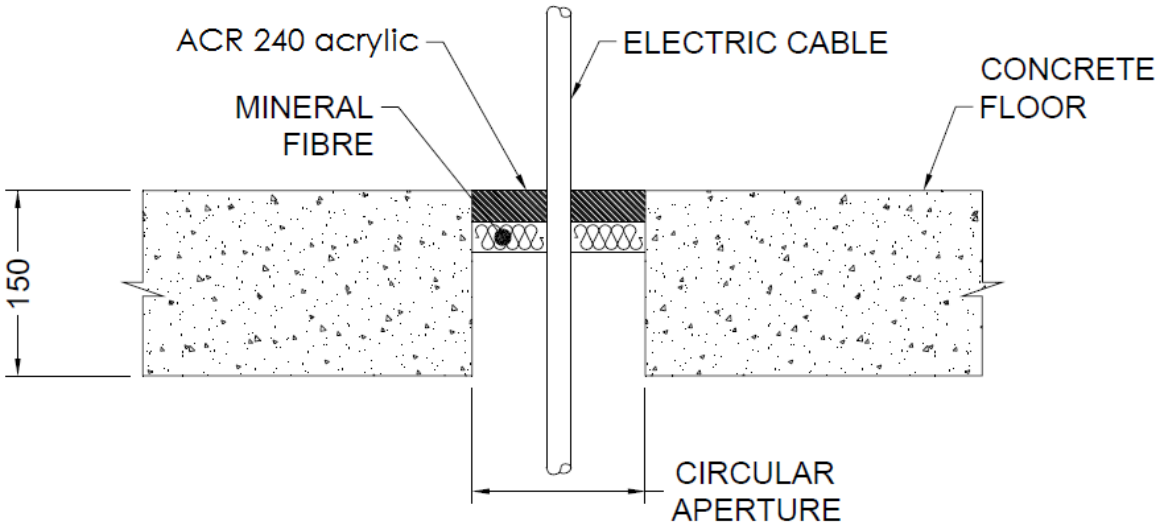
A.4.1.1

Services	Sealant depth	Backing	Aperture	Classification
Single electrical cables up to 21 mm Ø	25 mm	Würth FP Backing 25 mm deep	82 mm Ø or max. 100 x 1000 mm	**E 120, EI 60**

A.4.2 Single side penetration seal with cables

Penetration Seal: Cables fitted with ACR 240 to the top side of the floor, backed with stone wool insulation 35kg/m^3 or Würth FP Backing. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

Construction details:



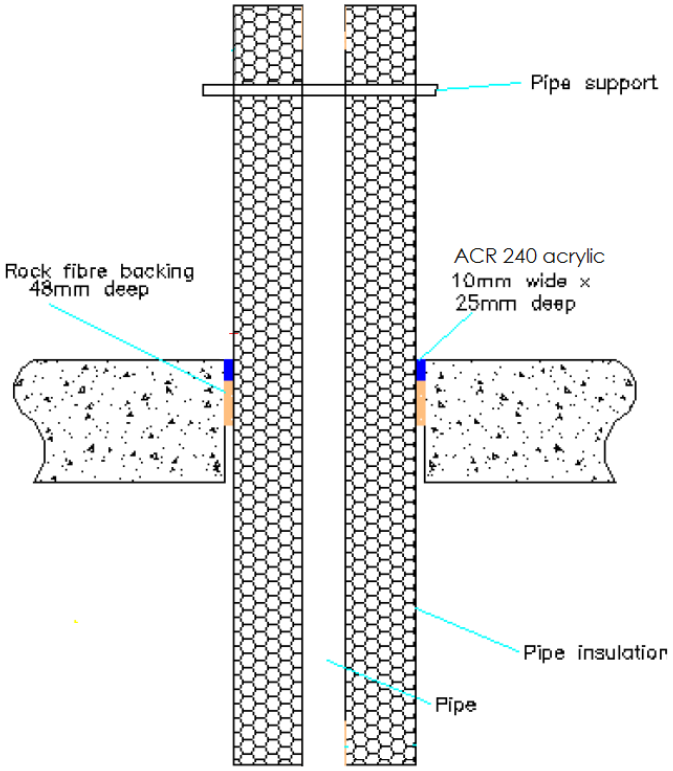
A.4.2.1

Services	Sealant depth	Backing	Insulation	Classification
Blank seals	15 mm	20 mm Stone wool 35 kg/m^3	None	**E 90 EI 60**
	25 mm	25 mm Stone wool 35 kg/m^3		**EI 120**
		48 mm Würth FP Backing		**EI 240**
Electric cables up to 21 mm diameter, single.				**E 120 EI 90**
23-27 mm diameter, 1 mm × 185 mm^2 core, PVC sheath and insulation electrical cable, single				**EI 240**

A.4.3 Single side penetration seal with pipes

Penetration Seal: Pipes fitted at any position within the aperture, with ACR 240 to the top face of the floor, backed with 48 mm stone wool 33kg/m^3. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

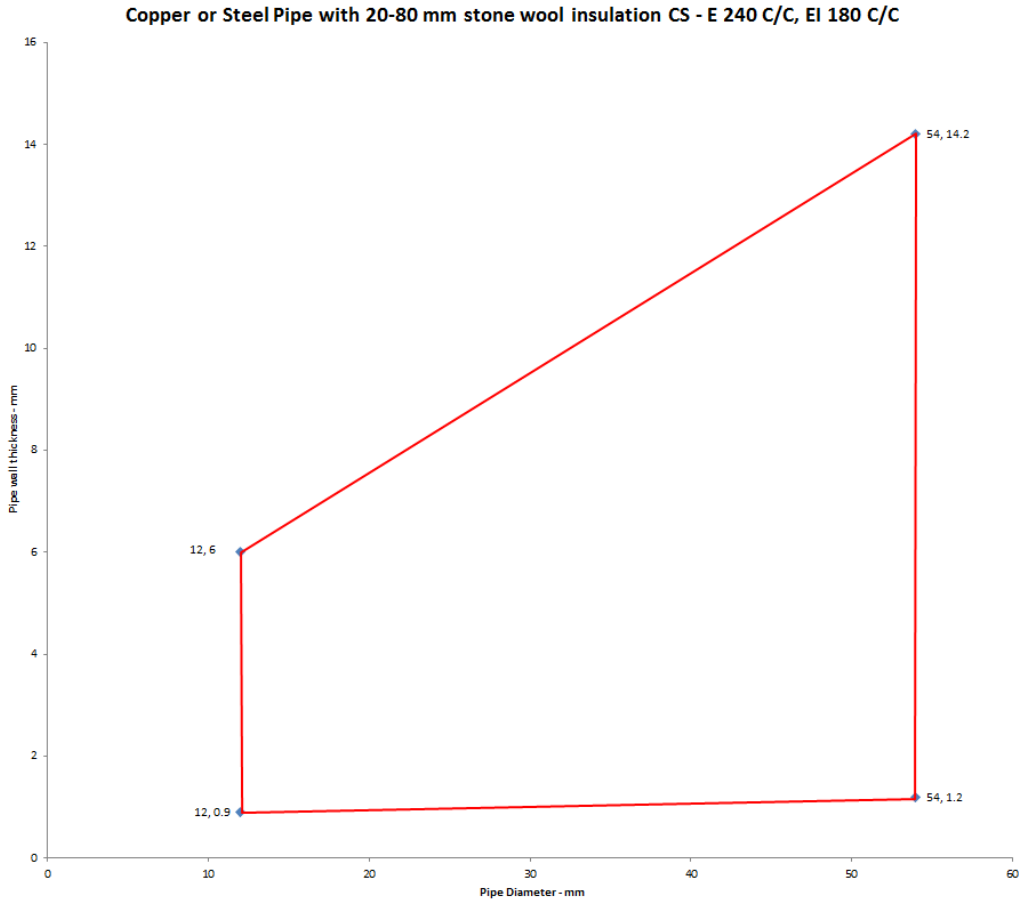
Construction details:



A.4.3.1

Services	Sealant depth	Backing	Classification
Mild or stainless steel pipe			
4 -16 mm diameter /1.0-8.0 mm wall	25 mm	48 mm stone wool	**EI 120 C/U**
Copper or steel pipe			
6 mm diameter /0.7-3.0 mm wall	25 mm	48 mm stone wool	**EI 120 C/C**
6 -15 mm diameter /0.7-7.5 mm wall			**E 120 C/C, EI 60 C/C**
Copper or steel pipe with 80 kg/m^3 density stone wool insulation Continuous Sustained (CS)			
12 mm diameter/0.9-6 mm wall, 20-80 mm insulation	25 mm	48 mm stone wool	**EI 240 C/C**
13-54 mm diameter/0.9-14.2 mm wall, 20-80 mm insulation*			**E 240 C/C, EI 180 C/C**
Alupex Pipe			
16 -20 mm diameter/2.0 mm wall	25 mm	48 mm stone wool	**EI 120 C/C**

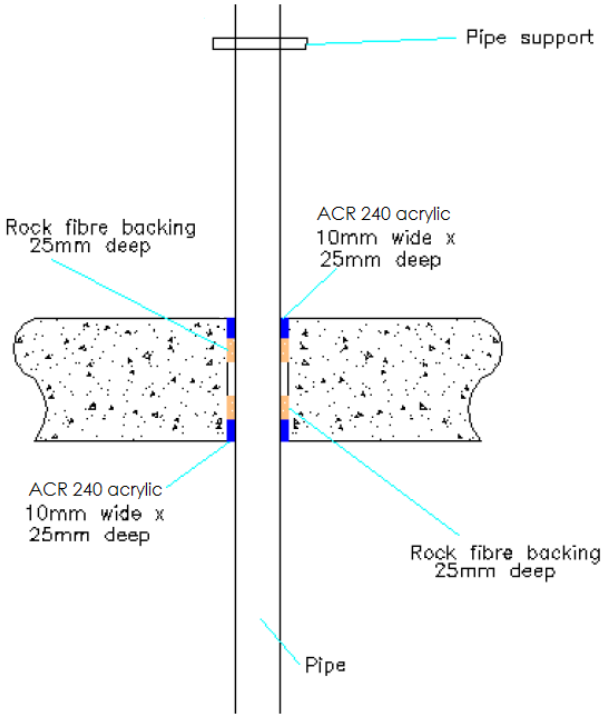
*See below graphs for interpolated pipe sizes


Copper or Steel Pipe with 20-80 mm stone wool insulation CS - E 240 C/C, EI 180 C/C
Pipe wall thickness - mm
Pipe Diameter - mm
54, 14.2
12, 6
12, 0.9
54, 1.2
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60

A.4.4 Double side penetration seal with pipes

Penetration Seal: Pipes fitted at any position within the aperture, with ACR 240 to the both faces of the floor, backed with 25 mm stone wool 33kg/m^3. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

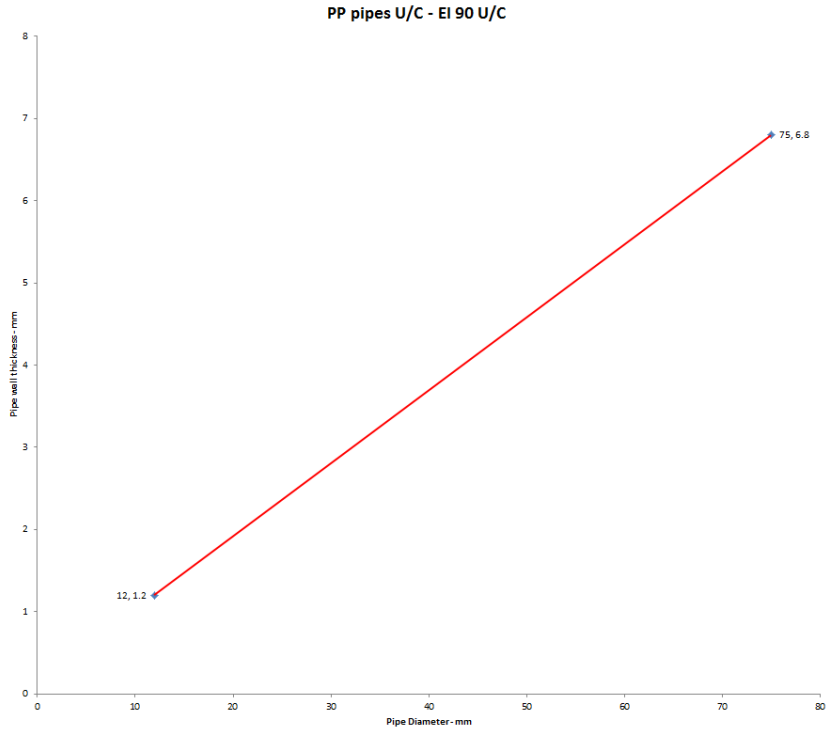
Construction details:

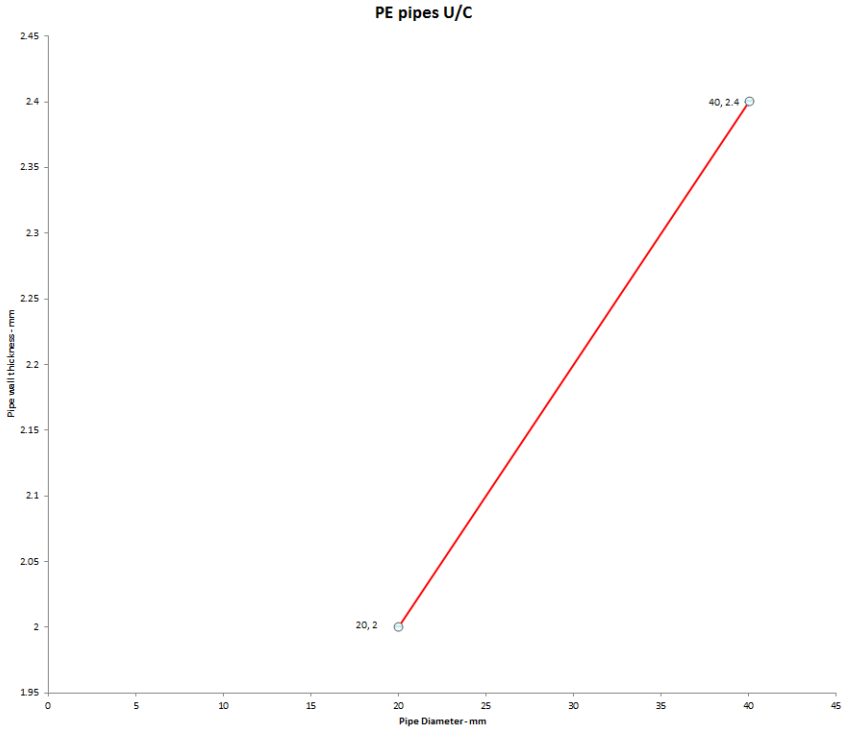


A.4.4.1

Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to 50 mm Ø/1.6-3.7 mm wall	25 mm	25 mm Stone wool	**EI 240 U/C**
Up to 40 mm Ø/1.6-3.7 mm wall, with bundle of cables up to 21 mm diameter			
PP pipe according to EN 1451-1			
12 mm Ø/1.2 mm wall	25 mm	25 mm Stone wool	**EI 240 U/C**
13-75 mm Ø/1.2-6.8 mm wall*			**EI 90 U/C**
Up to 40 mm Ø/1.2-1.8 mm wall, with bundle of cables up to 21 mm diameter			**EI 180 U/C**
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
20-40 mm Ø/2.0-2.4 mm wall*	25 mm	25 mm Stone wool	**EI 240 U/C**
Up to 40 mm Ø/2.0-2.4 mm wall, with bundle of cables up to 21 mm diameter			**EI 180 U/C**

*See below graphs for interpolated pipe sizes

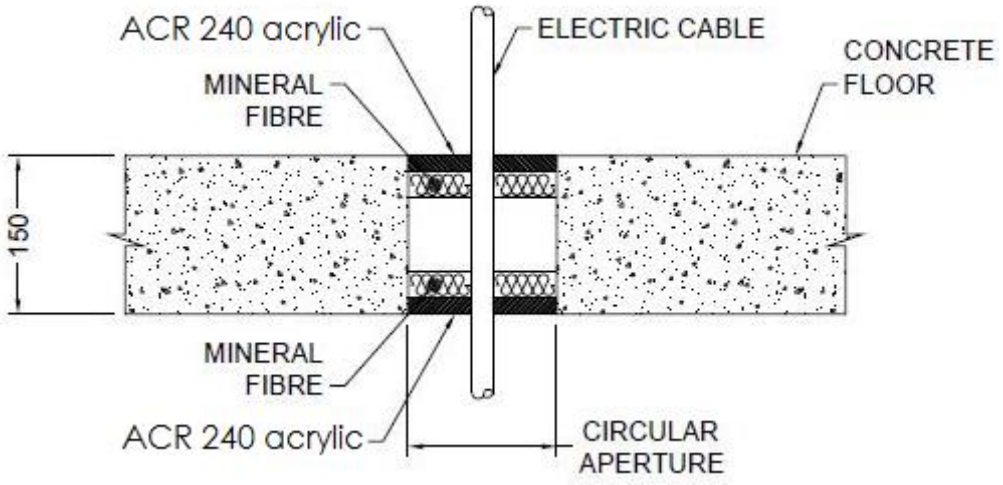

PP pipes U/C - EI 90 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
12, 1.2
75, 6.8
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80


PE pipes U/C
Pipe wall thickness - mm
Pipe Diameter - mm
20, 2
40, 2.4
1.95
2
2.05
2.1
2.15
2.2
2.25
2.3
2.35
2.4
2.45
0
5
10
15
20
25
30
35
40
45

A.4.5 Double side penetration seal with cables

Penetration Seal: Cables fitted circular apertures or min. 7 mm from the edges of rectilinear apertures, with ACR 240 to both sides of the floor, backed with stone wool insulation 35kg/m^3.

Construction details:



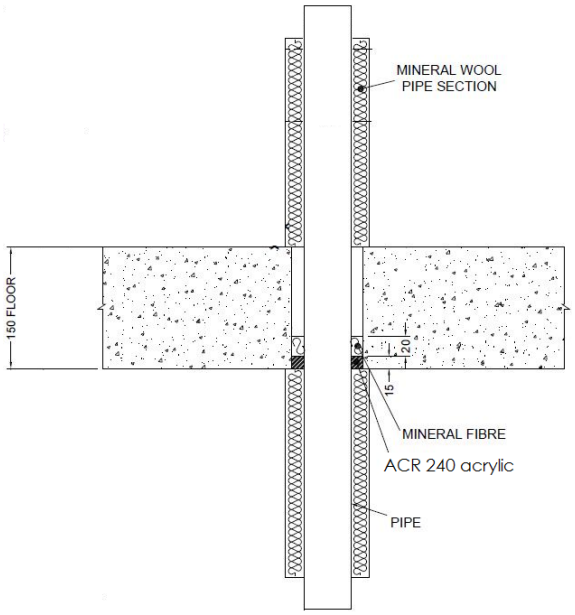
A.4.5.1

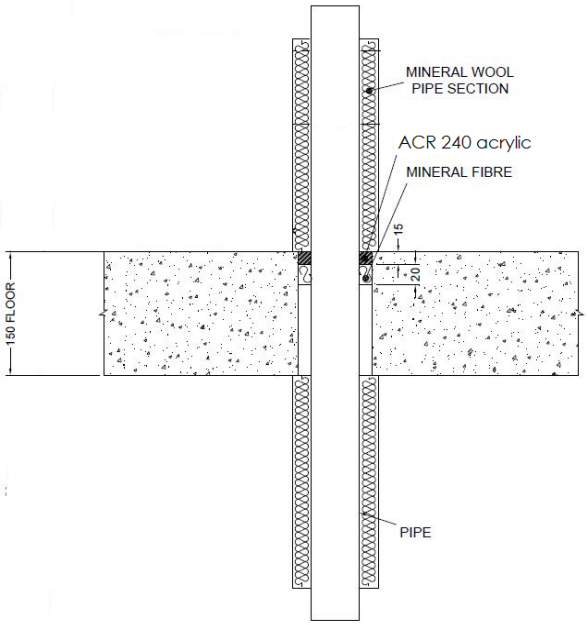
Services	Sealant depth	Backing	Maximum Aperture	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m^3	300 x 300 mm	**EI 240**
Electric cables up to 21 mm diameter, single or in a bundle.				**EI 120**
Electric cables 22-50 mm diameter, single or in a bundle.				**E 120 EI 90**
Electric cables 51-80 mm diameter, single or in a bundle.				**E 120 EI 60**

A.4.6 Single side penetration seal with metallic pipes

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 or 25 mm deep ACR 240 to either side of the floor (or at any position between), backed with 40 kg/m^3 stone wool insulation or Würth FP Backing.

Construction details:





A.4.6.1

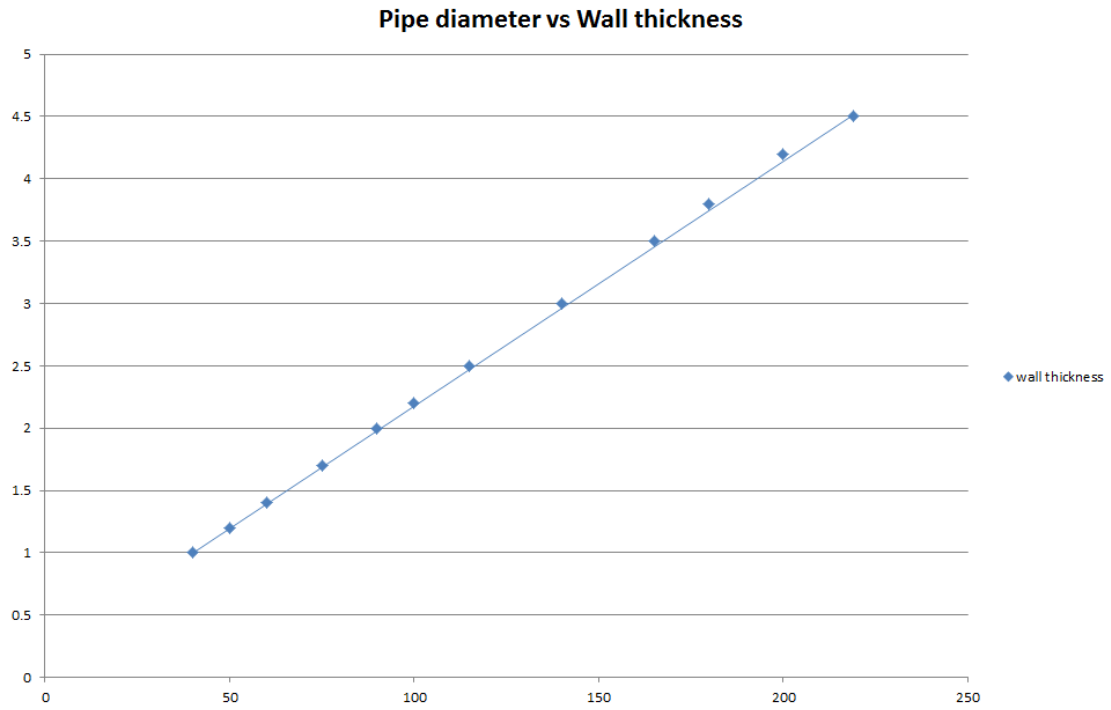
Services	Max. seal size	Insulation (min)	Sealant depth	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m^3	15 mm	**E 240 C/U, EI 180 C/U**
Copper pipe up to 12 mm diameter/0.9-5 mm wall				**EI 240 C/U**
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	Up to 100 x 1000 mm		25 mm	**EI 120 C/U**
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m^3	15 mm	**E 90 C/U, EI 60 C/U**
Copper pipe up to 12 mm diameter/0.9-5 mm wall				
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall			25 mm	**EI 120 C/U**

Services	Max. Seal Size	Insulation (min)	Sealant Depth	Classification
Mild or stainless steel pipe				
40 mm diameter/1-14.2 mm wall	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m^3	15 mm	**EI 240 C/U**
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m^3		**E 240, EI 90 C/U**
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				
40 mm diameter/1-14.2 mm wall*	Up to 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m^3	25 mm	**E120, EI 90 C/U**
50 mm diameter/1.2-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m^3		
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				

* Typical pipe diameters shown, see below graph for intermediate sizes

Services Mild or stainless steel pipe	Max. Seal Size	Insulation (minimum)	Sealant Depth	Classification
40 mm diameter/1-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m^3	15 mm	**E 90 C/U, EI 60 C/U**
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m^3		
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				
40 mm diameter/1-14.2 mm wall*		20 mm Stone wool insulation 80 kg/m^3	25 mm	**E120, EI 90 C/U**
50 mm diameter/1.2-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m^3		
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				

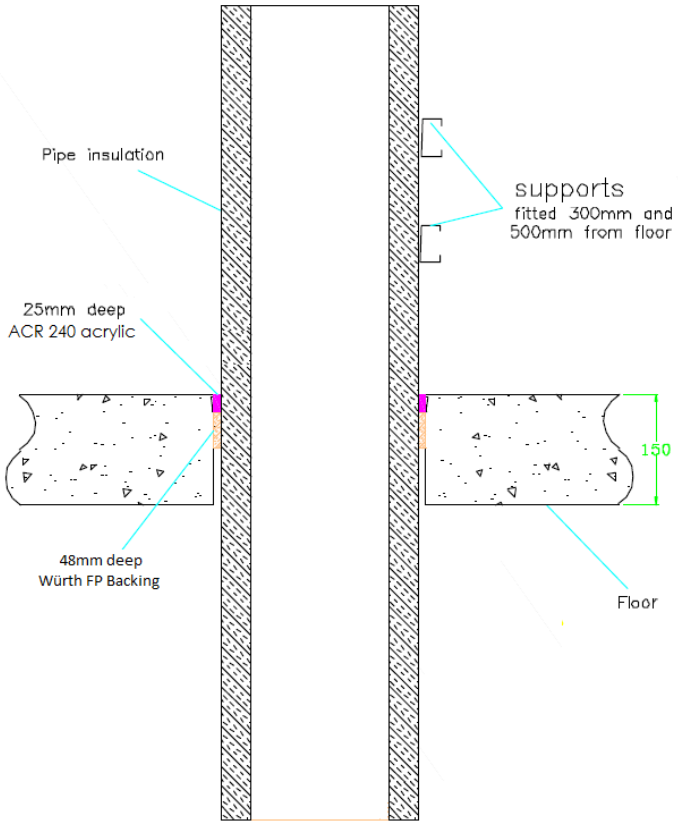
* Typical pipe diameters shown, see below graph for intermediate sizes

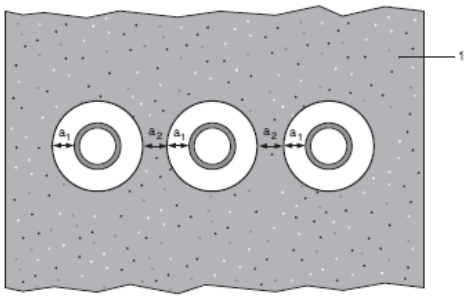
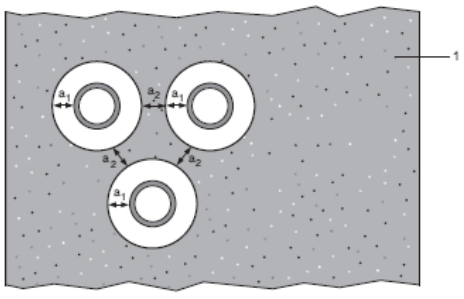

Pipe diameter vs Wall thickness
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
50
100
150
200
250
wall thickness

A.4.7 Single side penetration seal with metallic pipes

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm ACR 240 to the top of the floor, backed with 48 mm deep Würth FP Backing insulation. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:



Configuration 1	Configuration 2
Option 1 	*Option 2* 

Key

1 Supporting construction

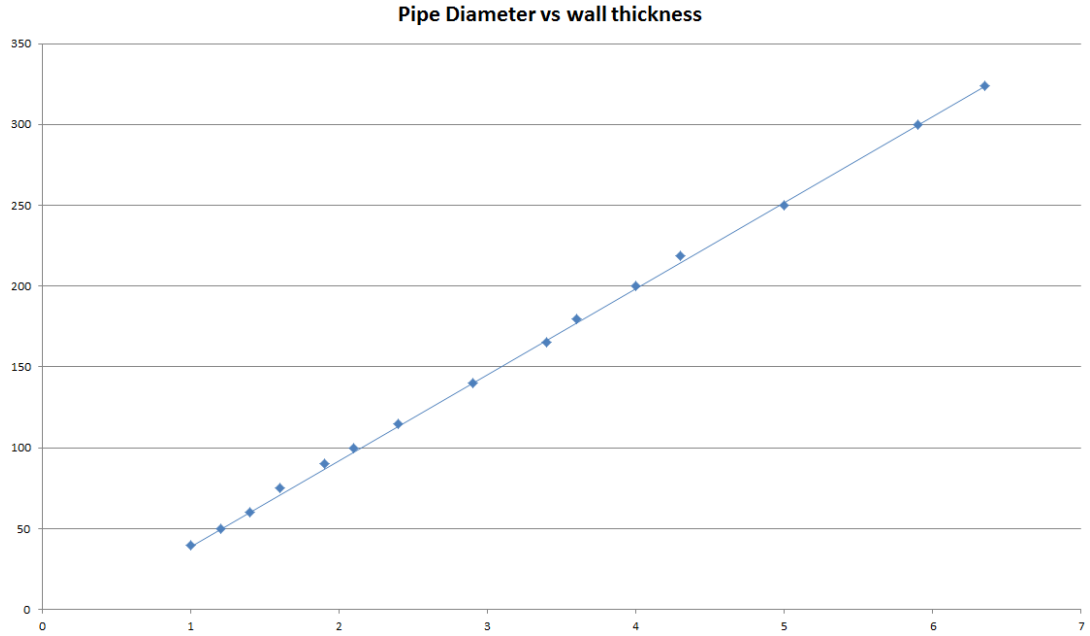
a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

A.4.7.1 Single side penetration seal with pipes

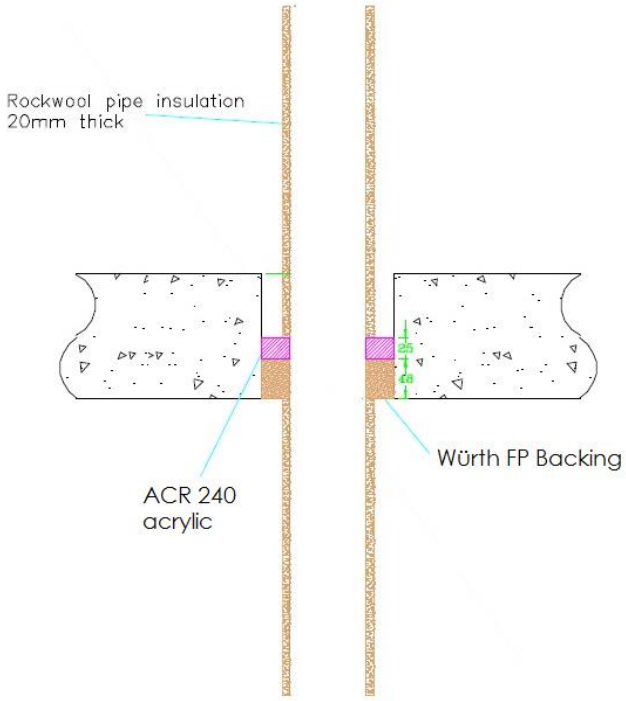
Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m^3	**EI 240 C/U**
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m^3	
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*		
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		
PEX pipe in pipe system	**Insulation**	**Classification**
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	**EI 90 C/C**



A.4.8 Single side penetration seal with composite pipes

Penetration Seal: CI (Continuous Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with ACR 240, minimum 10 mm seal width around service and maximum 300 x 300 mm seal, backed with 'Würth FP Backing'.

Construction details:



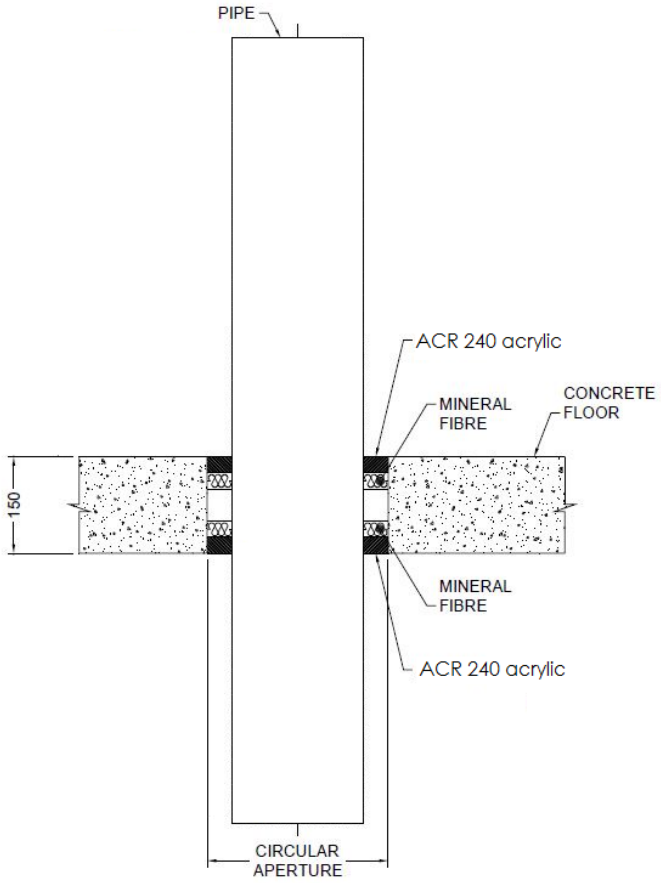
A.4.8.1

Services Alupex Composite Pipe	Sealant depth	Backing	Insulation (minimums)	Classification
16 mm diameter/2.25 mm wall	25 mm	48 mm Würth FP Backing	20 mm stonewool 80 kg/m^3, 500 mm length from both sides of the seal	**EI 240 C/C**
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

A.4.9 Double side penetration seal with metallic pipes

Penetration Seal: Non-insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm deep ACR 240 to both sides of the floor, backed with 25 mm deep 140 kg/m^3 stone wool insulation.

Construction details:



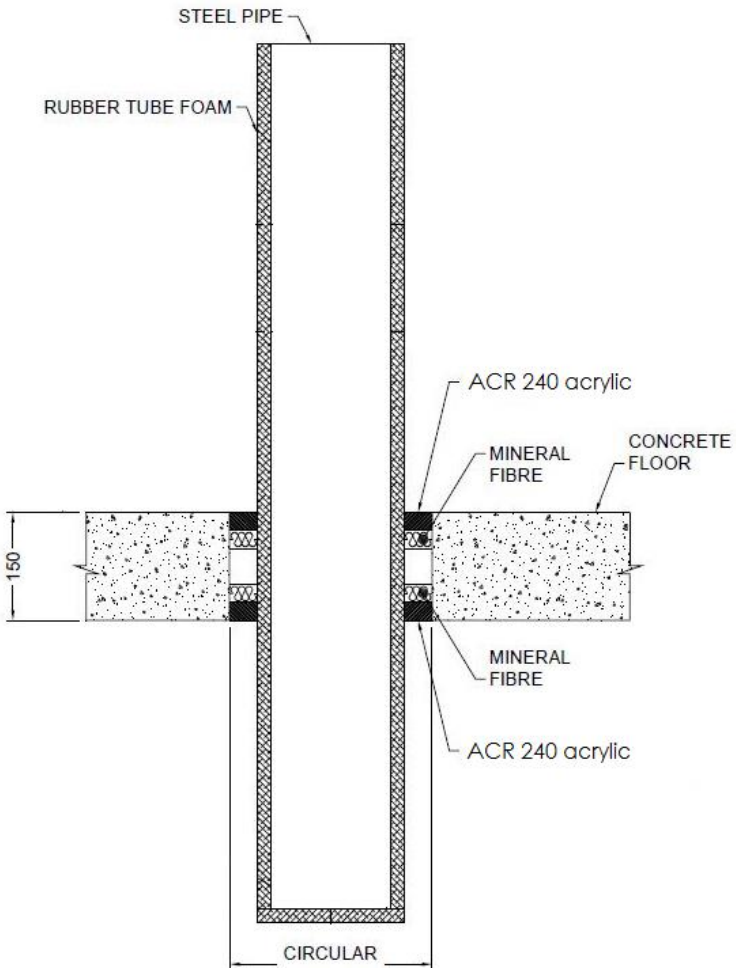
A.4.9.1

Services	Max. Seal Size	Insulation	Backing	Classification
Copper pipe 54 mm diameter/2-14.2 mm wall	300 x 300 mm	None	25 mm deep 140 kg/m^3 stone wool	**E 120 C/U, EI 20 C/U**
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall				**EI 240 C/U**
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall	Up to 100 x 1000 mm		Würth FP Backing 25 mm deep	**EI 120 C/U**

A.4.10 Double side penetration seal with metallic pipes

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with ACR 240 to both sides of the wall, maximum 300 x 300 mm seal width around service, backed with stone wool insulation or 'Würth FP Backing'.

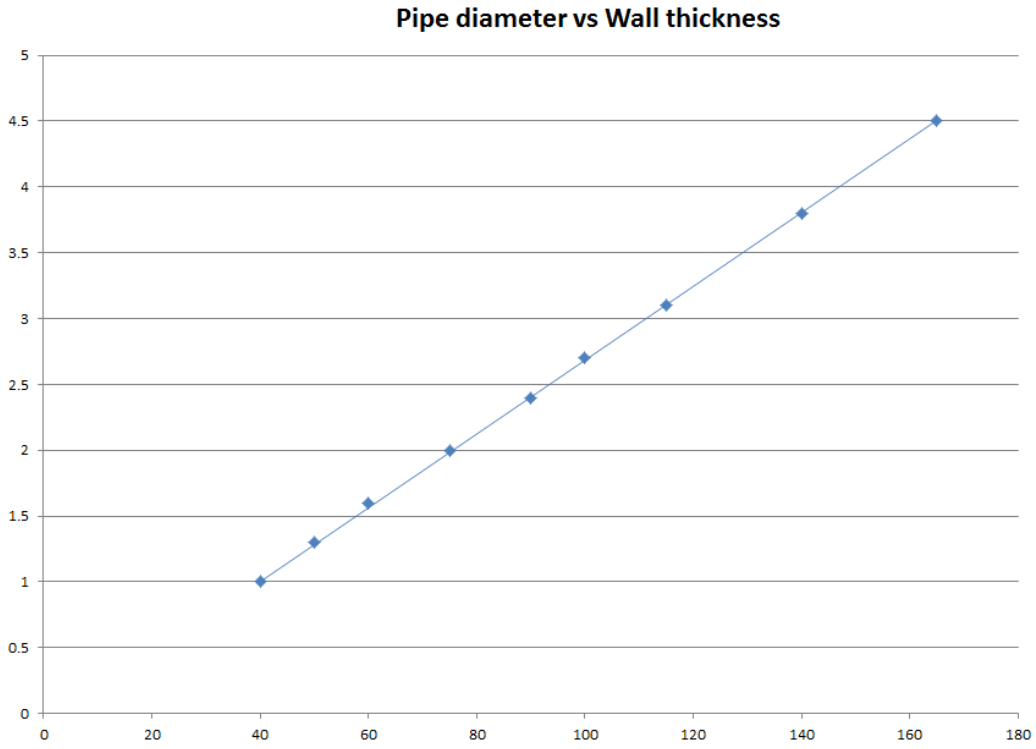
Construction details:



A.4.10.1

Services Mild or stainless steel pipe	Sealant depth	Backing	Insulation	Classification
40 mm diameter/1-14.2 mm wall	25 mm	20 mm Stone wool 40 kg/m^3	13 -19 mm Elastomeric insulation minimum class B-s3,d0	**EI 180**
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm Würth FP Backing		**EI 60**
50 mm diameter/1.3-14.2 mm wall*				
60 mm diameter/1.6-14.2 mm wall*				
75 mm diameter/2-14.2 mm wall*				
90 mm diameter/2.4-14.2 mm wall*				
100 mm diameter/2.7-14.2 mm wall*				
115 mm diameter/3.1-14.2 mm wall*				
140 mm diameter/3.8-14.2 mm wall*				
165 mm diameter/ 4.5-14.2 mm wall*				

* Typical pipe diameters shown, see below graph for intermediate sizes

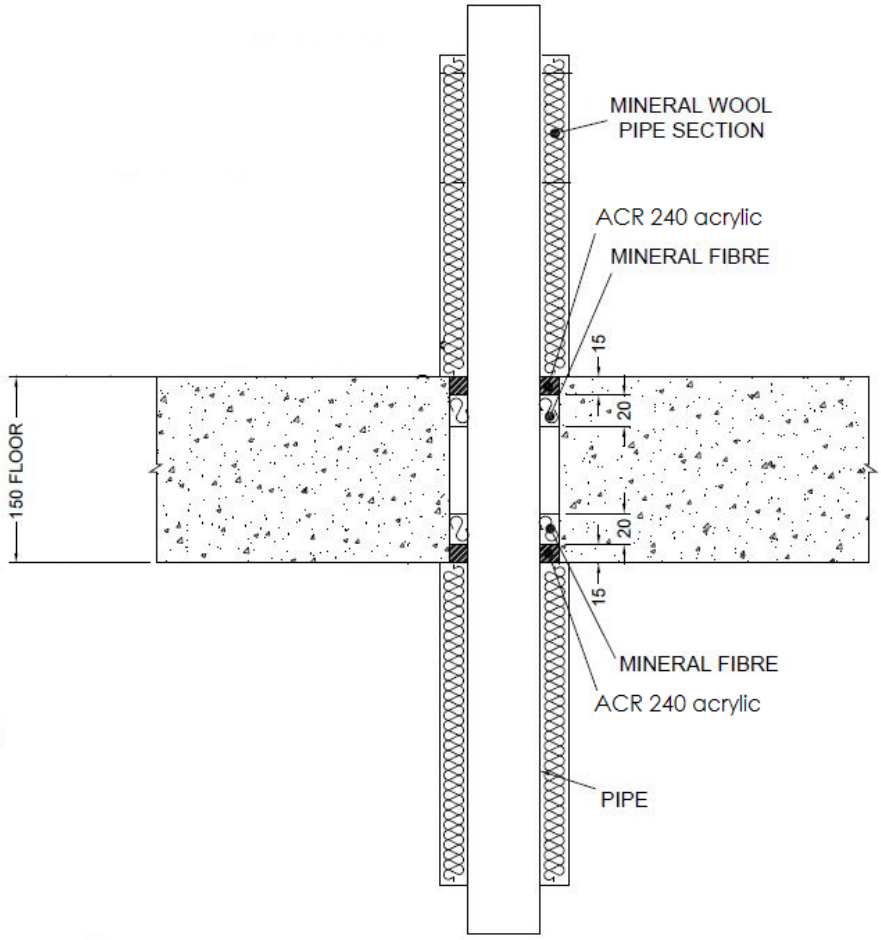


Services	Sealant depth	Backing	Insulation	Classification
Copper pipe				
12 mm diameter/1 mm wall	25 mm	25 mm Würth FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0	**E 240 C/C, EI 180 C/C**
12-54 mm diameter/1-1.2 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0	**E 180, EI 120 C/C**
12-54 mm diameter/1-1.2 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0	**E 90 C/C, EI 60 C/C**
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	25 mm	25 mm Würth FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0	**EI 180 C/C**
16 mm diameter/2.25 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0	**E 120 C/C, EI 60 C/C**
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				
16 mm diameter/2.25 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0	**EI 60 C/C**
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

A.4.11 Double side penetration seal with metallic pipes

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep ACR 240 to both sides of the floor (or at any position between), backed with 20 or 30 mm deep 40 kg/m^3 stone wool insulation*.

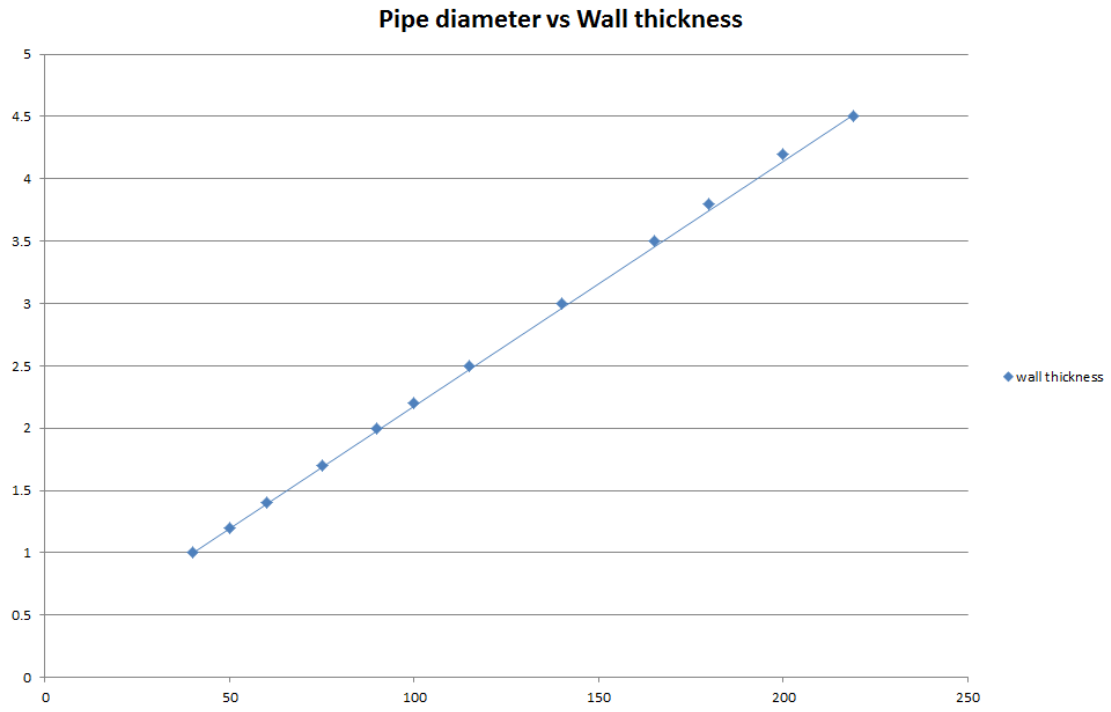
Construction details:



A.4.11.1

Services Mild or stainless steel pipe	Maximum seal size	Insulation (minimum)	Classification
40 mm diameter/1-14.2 mm wall	300 x 300 mm or 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m^3	**EI 240 C/U**
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m^3	**E 240, EI 120 C/U**
50 mm diameter/1.2-14.2 mm wall*			
60 mm diameter/1.4-14.2 mm wall*			
75 mm diameter/1.7-14.2 mm wall*			
90 mm diameter/2-14.2 mm wall*			
100 mm diameter/2.2-14.2 mm wall*			
115 mm diameter/2.5-14.2 mm wall*			
140 mm diameter/3-14.2 mm wall*			
165 mm diameter/3.5-14.2 mm wall*			
180 mm diameter/3.8-14.2 mm wall*			
200 mm diameter/4.2-14.2 mm wall*			
219 mm diameter/4.5-14.2 mm wall*			

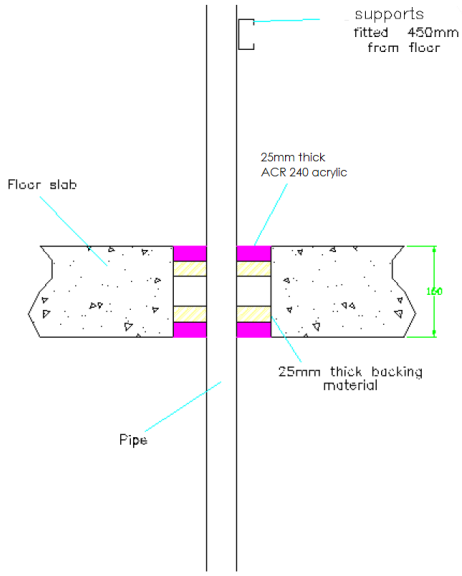
* Typical pipe diameters shown, see below graph for intermediate sizes

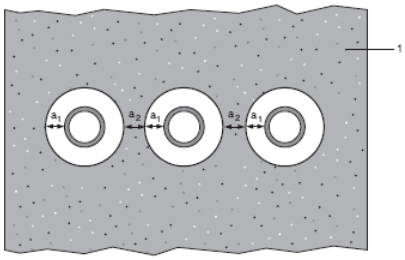
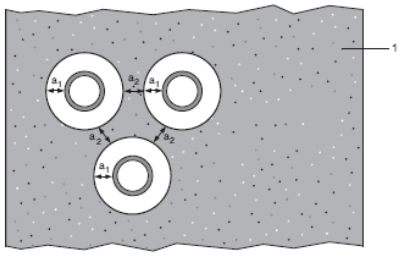


A.4.12 Double side penetration seal with plastic pipes

Penetration Seal: Combustible pipes sealed with ACR 240, to both sides of the floor backed with Stonewool (35kg/m^3 density), 25 mm deep. Minimum separation between penetration seals of 30 mm (a_2) and seal size/annular space of 10-30 mm (a_1).

Construction details:



Configuration 1	**Configuration 2**
	

Key

1 Supporting construction

a_1 Pipe / edge of seal separation (annular space)

a_2 Separation between penetration seals

A.4.12.1

<table>
<tr><th>Services</th><th>Sealant depth</th><th>Backing</th><th>Classification</th></tr>
<tr><td>PP pipe according to EN 1451-1</td><td rowspan="4">25 mm</td><td rowspan="2">25 mm Würth FP Backing</td><td rowspan="2">EI 120 U/C, EI 120 C/C</td></tr>
<tr><td>40 mm Ø/3 mm wall</td></tr>
<tr><td>75 mm Ø/2.8 mm wall</td><td rowspan="2">25 mm stone wool 140 kg/m^3</td><td>EI 180 U/C, EI 180 C/C</td></tr>
<tr><td>PE (PE-HD) pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1
40 mm Ø/4 mm wall</td><td>EI 240 U/C, EI 240 C/C</td></tr>
</table>

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Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
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European Technical Assessment

ETA-11/0528
of 17.09.2018

General part

Technical Assessment Body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB) Austrian Institute of Construction Engineering
Trade name of the construction product	System Brandschutzschaum Kombi System fire protection foam combo
Product family to which the construction product belongs	Fire Stopping and Fire Sealing Products: Penetration Seals
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau GERMANY
Manufacturing plant	Werk 11
This European Technical Assessment contains	44 pages including Annexes A-1 to J-1 which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document EAD 350454-00-1104 „Fire stopping and fire sealing products – Penetration seals”
This European Technical Assessment replaces	European technical approval ETA-11/0528 with validity from 28.06.2013 to 27.06.2018

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Specific parts

1 Technical description of the product

"System Brandschutzschaum Kombi" (System fire protection foam combo) is a kit to be used as a mixed penetration seal or cable penetration seal based on the following components and additional insulations.

Components of "System Brandschutzschaum Kombi" (System fire protection foam combo)	**Characteristics**
Brandschutzschaum Kombi (Fire protection foam combo)	Intumescent fire protection foam in cartridges on the basis of polyurethane. After application it reacts and increases its volume
Brandschutzgewebe (Fire protection texture)	Intumescent fire protection wrap on the basis of butyl rubber and glass fabric reinforcement with a nominal width of 150 mm and a nominal thickness of 3 mm
Brandschutzfüllstein Kombi (Fire protection block)	Intumescent fire protection block (can be vacuum-packed) on the basis of polyurethane
Brandschutzmanschette BS (Fire protection collar BS)	Pipe collar according to Annex E-6 of the ETA with sheet steel housing and an inlay made of intumescent material

Insulations (additional components)	**Characteristics**
Prefabricated pipe shells	Prefabricated pipe shells according to EN 14303 made from stone wool with classification $A2_L$-s1,d0 or $A1_L$ according to EN 13501-1, a minimum density of 90 kg/m³ and a melting point > 1000 °C according to DIN 4102-17 (e.g. "Rockwool 800" from manufacturer "Deutsche Rockwool Mineralwoll GmbH & Co. OHG")
AF/Armaflex	Closed cell, flexible elastomeric foam (FEF) insulation in form of (slotted) tubes (can be provided with a self-adhesive device) with classification B_L-s3,d0 – including "Armaflex 520" – according to EN 13501-1 from manufacturer "Armacell GmbH"
AF/Armaflex Band selbstklebend (AF/Armaflex self-adhesive tape)	Closed cell, flexible elastomeric foam (FEF) insulation in form of tapes with a self-adhesive device with classification B-s3,d0 according to EN 13501-1 from manufacturer "Armacell GmbH"
Armaflex 520	Polychlorene-based adhesive, free from aromatic compounds (special adhesive for processing of all flexible Armaflex insulating material – except "HT/Armaflex") from manufacturer "Armacell GmbH"

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

2.1 Intended use

"System Brandschutzschaum Kombi" (System fire protection foam combo) is intended to be used as a mixed penetration seal or cable penetration seal to temporarily or permanently reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they have been provided with apertures which are penetrated by various cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions (perforated or non-perforated steel cable trays and steel ladders).

The thickness of the penetration seal has to be minimum 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and minimum 100 mm, 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA).

The maximum opening size of the penetration seal has to comply with the dimensions as specified in the following table.

Blank penetration seals with maximum opening sizes as specified in the following table have been tested.

"System Brandschutzschaum Kombi" (System fire protection foam combo) can be installed only in the types of separating elements as specified in the following table.

Separating element	**Construction**	**a) Maximum opening size of the penetration seal (width x height)** **b) Minimum thickness of the penetration seal**
Flexible walls	> Steel studs or timber studs lined on both faces with minimum 2 layer of boards (minimum thickness 12,5 mm), or minimum one layer of boards (minimum thickness 25 mm) with classification A2-s1,d0 or A1 according to EN 13501-1 > For timber stud walls there shall be a minimum distance of 100 mm of the penetration seal to any timber stud. The cavity between the penetration seal and the timber stud has to be closed with minimum 100 mm of insulation with classification A1 or A2 according to EN 13501-1 > Minimum thickness 94 mm > Classification according to EN 13501-2: ≥ EI 60 > This European Technical Assessment does not cover sandwich panel constructions and flexible walls were the lining does not cover studs on both sides. Penetrations in such constructions shall be tested on a case by case basis	<u>Mixed penetration seal (see Annex B-1 of the ETA):</u> a) 450 x 500 [mm] b) 144 mm / 200 mm <u>Cable penetration seal (see Annex G-1 of the ETA):</u> a) 270 x 270 [mm] / Ø 300 mm b) 100 mm / 144 mm / 200 mm / 250 mm

Separating element	Construction	a) Maximum opening size of the penetration seal (width x height) b) Minimum thickness of the penetration seal
Rigid walls	> Aerated concrete, concrete, reinforced concrete, masonry > Minimum density 450 kg/m³ > Minimum thickness 100 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period	Mixed penetration seal (see Annex B-2 and B-3 of the ETA): a) 450 x 500 [mm] b) 144 mm / 200 mm Cable penetration seal (see Annex G-2 and G-3 of the ETA): a) 270 x 270 [mm] / Ø 300 mm b) 100 mm / 144 mm / 200 mm / 250 mm
Rigid floors	> Aerated concrete, concrete, reinforced concrete > Minimum density 450 kg/m³ > Minimum thickness 150 mm > The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period	Mixed penetration seal (see Annex C-1 and C-2 of the ETA): a) 450 x 450 [mm] b) 144 mm / 200 mm Cable penetration seal (see Annex H-1 and H-2 of the ETA): a) 270 x 270 [mm] / Ø 300 mm b) 100 mm / 144 mm / 200 mm / 250 mm

"System Brandschutzschaum Kombi" (System fire protection foam combo) can only be configured as specified in the following tables. Other parts or service support constructions shall not penetrate the penetration seal.

Penetrating element	**Construction characteristics of the penetrating element in "System Brandschutzschaum Kombi" (System fire protection foam combo) in flexible walls, rigid walls and rigid floors**
Cables	> All types of sheathed cables[1] (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 80 mm > Tied bundles[2] up to 100 mm overall diameter containing sheathed cables (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 21 mm > Non-sheathed electrical cables with a diameter ≤ 24 mm
Conduits / Tubes	> Steel conduits / tubes, Ø ≤ 16 mm, wall thickness minimum 1,5 mm (with / without cables): steel conduits according to EN 61386-21 > Plastic conduits, Ø ≤ 16 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Plastic conduits, Ø ≤ 40 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Plastic conduits, Ø ≤ 63 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Bundles with a maximum Ø of 80 mm consisting of plastic conduits, Ø ≤ 40 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Bundles with a maximum Ø of 100 mm consisting of plastic conduits, Ø ≤ 63 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > "speed·pipe®" from manufacturer "gabo Systemtechnik GmbH" of dimension (diameter x wall thickness) 7 mm x 0,75 mm, 10 mm x 1,0 mm, 12 mm x 1,1 mm, 7 mm x 1,5 mm, 10 mm x 2,0 mm and 12 mm x 2,0 mm (with / without optical fibre cables) > Bundles with a maximum Ø of 80 mm consisting of "speed·pipe®" from manufacturer "gabo Systemtechnik GmbH" of dimension (diameter x wall thickness) 7 mm x 0,75 mm, 10 mm x 1,0 mm, 12 mm x 1,1 mm, 7 mm x 1,5 mm, 10 mm x 2,0 mm and 12 mm x 2,0 mm (with / without optical fibre cables)

1 Single or multicore cable with individual insulation of the cores and an additional protective covering of the assembly
2 Several cables running in the same direction, densely packed and bound tightly together by mechanical means

Penetrating element	Construction characteristics of the penetrating element in "System Brandschutzschaum Kombi" (System fire protection foam combo) in flexible walls, rigid walls and rigid floors
Plastic pipes	> PVC-U pipes according to EN ISO 1452-1 and DIN 8061 / DIN 8062 with diameters and wall thicknesses as defined in Annex E-5 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-5 of the ETA. > PE-HD pipes according to EN 1519-1 and DIN 8074 / DIN 8075 with diameters and wall thicknesses as defined in Annex E-5 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-5 of the ETA. > "SC-SH-16/E30", "SC-SH-18/E30" and "SC-SH-20/E30" from manufacturer "Armacell GmbH" with a maximum diameter of 28 mm and a maximum wall thickness of 4 mm.
Metal pipes	> Metal pipes of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater or equal than copper (945 °C for EI 60; 1006 °C for EI 90; 1049 °C for EI 120) and a thermal conductivity smaller or equal than copper with diameters and wall thicknesses as defined in Annex E-1 and Annex E-2 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-1 and Annex E-2 of the ETA. > Metal pipes of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater or equal than steel (945 °C for EI 60; 1006 °C for EI 90; 1049 °C for EI 120) and a thermal conductivity smaller or equal than steel with diameters and wall thicknesses as defined in Annex E-1 and Annex E-2 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-1 and Annex E-2 of the ETA. > "Tubolit® Split" from manufacturer "Armacell GmbH" with diameters and wall thicknesses as defined in Annex E-3 of the ETA. > "Tubolit® DuoSplit" from manufacturer "Armacell GmbH" with diameters and wall thicknesses as defined in Annex E-3 of the ETA. > "WICU® Flex" from manufacturer "KME Germany GmbH & Co. KG" or "Wieland-Werke AG" with diameters and wall thicknesses as defined in Annex E-3 of the ETA. > "WICU® Frio" from manufacturer "KME Germany GmbH & Co. KG" with diameters and wall thicknesses as defined in Annex E-3 of the ETA. > "WICU® Clim" from manufacturer "KME Germany GmbH & Co. KG" with diameters and wall thicknesses as defined in Annex E-3 of the ETA. > "WICU® Eco" from manufacturer "KME Germany GmbH & Co. KG" with diameters and wall thicknesses as defined in Annex E-3 of the ETA.
Cable support constructions	> Steel cable trays (perforated or non-perforated) > Steel ladders > Steel cable trays (perforated or non-perforated) and steel ladders with organic coatings shall at least be classified A2-s1,d0 according to EN 13501-1

2.2 Use condition

"System Brandschutzschaum Kombi" (System fire protection foam combo) is intended for internal use with humidity equal to or higher than 85 % RH, excluding temperatures below 0 °C[3], without exposure to rain or UV, and can therefore – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Z_1. Since the requirements for Type Z_1 are met, also the requirements for Type Z_2 are fulfilled[4].

Although a penetration seal is intended for indoor applications only, the construction process may result in it being subjected to more exposed conditions for a period before the building envelope is closed. For this case provisions shall be made to protect temporarily exposed penetration seals according to the ETA-holder's installation instructions.

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of "System Brandschutzschaum Kombi" (System fire protection foam combo) of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

The real working life might be, in normal use conditions, considerably longer without major degradation affecting the Basic requirements for construction works.

2.4 General assumptions

2.4.1 It is assumed that

- damages to the penetration seal are repaired accordingly,
- the installation of the penetration seal does not affect the stability of the adjacent building element – even in case of fire,
- the lintel or floor above the penetration seal is designed structurally and in terms of fire protection such that no additional mechanical load (other than its own weight) is imposed on the penetration seal,
- the thermal movement in the pipe work will be accommodated in such way that it does not impose a load on the penetration seal,
- the installations are fixed to the adjacent building element (not to the penetration seal) in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed to the penetration seal,
- the support of the installations is maintained for the required period of fire resistance and
- pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire (for sealing off plastic pipes).

2.4.2 This European Technical Assessment does not address any risks associated with the emission of dangerous liquids or gases caused by failure of the pipe(s) in case of fire nor does it prove the prevention of the transmission of fire through heat transfer via the medium in the pipes.

[3] These uses apply for internal humidity class 5 in accordance with EN ISO 13788

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

2.4.3 This European Technical Assessment does not verify the prevention of destruction of adjacent building elements with fire separating function or of the pipes themselves due to distortion forces caused by extreme temperatures. These risks shall be accounted for by taking appropriate measures when designing or installing the pipe work.

The mounting or hanging of the pipes or the layout of the pipe work shall be implemented in such a way that the pipes and the fire resistant building elements shall remain functional within a period of time which corresponds to the fire resistance period required.

2.4.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this European Technical Assessment (see EN 1366-3:2009, clause 1).

2.4.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through the pipe walls.

2.4.6 The assessment does not cover the avoidance of destruction of the penetration seal or of the adjacent building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

2.5 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data / information, deposited with the Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data / information being incorrect, should be notified to the Österreichisches Institut für Bautechnik before the changes are introduced.

The Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment and consequently the validity of the CE marking on the basis of the European Technical Assessment and if so whether further assessment or alterations to the European Technical Assessment, shall be necessary.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 2	Reaction to fire	EN 13501-1: 2007+A1:2009	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009 and EN 13501-2: 2016	Clause 3.1.2 of the ETA and Annex F-1 and Annex J-1 of the ETA
BWR 3	Air permeability	EN 1026:2016	Clause 3.2.1 of the ETA
	Water permeability	No performance assessed	
	Content, emission and/or release of dangerous substances	EAD 350454-00-1104 clause 2.2.5	Clause 3.2.3 of the ETA

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 4	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
	Durability	EAD 350454-00-1104 clause 2.2.9	Clause 3.3.4 of the ETA
BWR 5	Airborne sound insulation	EN ISO 10140-2: 2010	Clause 3.4.1 of the ETA
BWR 6	Thermal properties	EN 12667:2001 and EN 12664:2001	Clause 3.5.1 of the ETA
	Water vapour permeability	No performance assessed	

3.1 Safety in case of fire (BWR 2)

3.1.1 Reaction to fire

The components of “System Brandschutzschaum Kombi” (System fire protection foam combo) were assessed according to EAD 350454-00-1104 clause 2.2.1 and classified according to EN 13501-1:2007+A1:2009.

Component	Class according to EN 13501-1:2007+A1:2009
Brandschutzschaum Kombi (Fire protection foam combo)	**E**
Brandschutzgewebe (Fire protection texture)	**E**
Brandschutzfüllstein Kombi (Fire protection block)	**E**
Intumescent inlay of Brandschutzmanschette BS (Fire protection collar BS)	**E**
Sheet steel housing of Brandschutzmanschette BS (Fire protection collar BS)	**A1**

3.1.2 Resistance to fire

“System Brandschutzschaum Kombi” (System fire protection foam combo) was tested according to EAD 350454-00-1104 clause 2.2.2, prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 in conjunction with EN 1363-1:1999 and EN 1363-1:2012.

Based upon the gained test results and the field of application specified within prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 “System Brandschutzschaum Kombi” (System fire protection foam combo) has been classified according to EN 13501-2:2007+A1:2009 and EN 13501-2:2016. The individual fire resistance classes are listed in Annex F-1 (mixed penetration seal) and Annex J-1 (cable penetration seal) of the ETA.

The maximum fire resistance class of the penetration seal in vertical or horizontal separating element depends on the fire resistance class of the penetrating elements. The fire resistance class of the penetration seal is reduced to the fire resistance class of the penetrating element with the lowest fire resistance classification.

The resistance to fire classification listed in Annex F-1 (mixed penetration seal) and Annex J-1 (cable penetration seal) of the ETA is only valid if “System Brandschutzschaum Kombi” (System fire protection foam combo) is installed according to Annex A-1 to A-6 of the ETA.

3.2 Hygiene, health and the environment (BWR 3)

3.2.1 Air permeability

The air permeability of “Brandschutzschaum Kombi” (Fire protection foam combo) with a thickness of 144 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of ≥ 20 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 360 mm x 360 mm (width x height), resp. 0,130 m².

“System Brandschutzschaum Kombi” (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “Brandschutzgewebe” (Fire protection texture), “Brandschutzfüllstein Kombi” (Fire protection block) and ”Brandschutzmanschette BS” (Fire protection collar BS) were not included in these tests. The measurement accuracy was 0,01 m³/h.

The values given in the following table are the mean values from the pressure- and suction tests.

Δp in Pa	**50**	**100**	**150**	**200**	**250**	**300**	**450**	**600**
q/A in m³/(h*m²)	0,39	0,73	1,18	1,58	1,89	2,12	3,24	4,09

The air permeability of “Brandschutzschaum Kombi” (Fire protection foam combo) with a thickness of 200 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of ≥ 20 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 350 mm x 350 mm (width x height), resp. 0,123 m².

“System Brandschutzschaum Kombi” (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components ”Brandschutzgewebe” (Fire protection texture), “Brandschutzfüllstein Kombi” (Fire protection block) and ”Brandschutzmanschette BS” (Fire protection collar BS) were not included in these tests.

Up to a pressure difference of 600 Pa no air permeability was measured. The measurement accuracy of the test facility was 0,01 m³/h, so that the air permeability at Δ p = 600 Pa is less than 0,08 m³/(h*m²).

The air permeability of “Brandschutzfüllstein Kombi” (Fire protection block) with a thickness of 144 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of ≥ 20 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 560 mm x 360 mm (width x height), resp. 0,202 m².

“System Brandschutzschaum Kombi” (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “Brandschutzgewebe” (Fire protection texture), “Brandschutzschaum Kombi” (Fire protection foam combo) and ”Brandschutzmanschette BS” (Fire protection collar BS) were not included in these tests. The measurement accuracy was 0,01 m³/h.

The values given in the following table are the mean values from the pressure- and suction tests.

Δp in Pa	50	100	150	200	250	300	450	600
q/A in m³/(h*m²)	1,12	1,79	2,38	2,92	3,79	4,42	5,98	7,65

The air permeability of “Brandschutzfüllstein Kombi” (Fire protection block) with a thickness of 200 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of ≥ 20 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 355 mm x 550 mm (width x height), resp. 0,195 m².

“System Brandschutzschaum Kombi” (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “Brandschutzgewebe” (Fire protection texture), “Brandschutzschaum Kombi” (Fire protection foam combo) and ”Brandschutzmanschette BS” (Fire protection collar BS) were not included in these tests. The measurement accuracy was 0,01 m³/h.

The values given in the following table are the mean values from the pressure- and suction tests.

Δp in Pa	50	100	150	200	250	300	450	600
q/A in m³/(h*m²)	0,82	1,43	1,74	2,28	3,07	3,74	4,97	6,61

3.2.2 Water permeability

No performance assessed.

3.2.3 Content, emission and/or release of dangerous substances

The release of semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) has been determined for “Brandschutzschaum Kombi” (Fire protection foam combo), “Brandschutzgewebe” (Fire protection texture) and “Brandschutzfüllstein Kombi” (Fire protection block) according to EAD 350454-00-1104 clause 2.2.5.1 and prEN 16516:2015. The loading factor used for emission testing was 0,007 m²/m³.

Component	Total emission of SVOC after 3 days in mg/m³	Total emission of SVOC after 28 days in mg/m³
Brandschutzschaum Kombi (Fire protection foam combo)	0,024	0,011
Brandschutzgewebe (Fire protection texture)	0,060	0,020
Brandschutzfüllstein Kombi (Fire protection block)	< 0,005	< 0,005

Component	Total emission of VOC after 3 days in mg/m³	Total emission of VOC after 28 days in mg/m³
Brandschutzschaum Kombi (Fire protection foam combo)	0,027	< 0,005
Brandschutzgewebe (Fire protection texture)	< 0,005	< 0,005
Brandschutzfüllstein Kombi (Fire protection block)	0,008	0,006

3.3 Safety and accessibility in use (BWR 4)

3.3.1 Mechanical resistance and stability

No performance assessed.

3.3.2 Resistance to impact / movement

No performance assessed.

Provisions shall be taken to prevent a person from stepping onto a horizontal penetration seal or falling against a vertical penetration seal (e.g. by covering with a wire mesh).

3.3.3 Adhesion

No performance assessed.

3.3.4 Durability

All components of “System Brandschutzschaum Kombi” (System fire protection foam combo) fulfil the requirements for the intended use condition.

“System Brandschutzschaum Kombi” (System fire protection foam combo) is therefore appropriate for internal use with humidity equal to or higher than 85 % RH, excluding temperatures below 0 °C[5], without exposure to rain or UV, and can – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Z_1. Since the requirements for Type Z_1 are met, also the requirements for Type Z_2 are fulfilled.

3.4 Protection against noise (BWR 5)

3.4.1 Airborne sound insulation

The airborne sound insulation of “Brandschutzschaum Kombi” (Fire protection foam combo) with a thickness of 144 mm was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The aperture was lined with 1 layers of ≥ 25 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 350 mm x 350 mm (width x height), resp. 0,123 m².

“System Brandschutzschaum Kombi” (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.10. The components “Brandschutzgewebe” (Fire protection texture), “Brandschutzfüllstein Kombi” (Fire protection block) and “Brandschutzmanschette BS” (Fire protection collar BS) were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are given in the following table.

$D_{n,e,w}$ in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
62	-1	-5	42	-1	-5

The airborne sound insulation of “Brandschutzschaum Kombi” (Fire protection foam combo) with a thickness of 200 mm was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The aperture was lined with 1 layers of ≥ 20 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 360 mm x 360 mm (width x height), resp. 0,130 m².

[5] These uses apply for internal humidity class 5 in accordance with EN ISO 13788

"System Brandschutzschaum Kombi" (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.10. The components "Brandschutzgewebe" (Fire protection texture), "Brandschutzfüllstein Kombi" (Fire protection block) and "Brandschutzmanschette BS" (Fire protection collar BS) were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are given in the following table.

$D_{n,e,w}$ in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
66	-1	-6	47	-1	-6

The airborne sound insulation of "Brandschutzfüllstein Kombi" (Fire protection block) with a thickness of 144 mm was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The aperture was lined with 1 layers of ≥ 25 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 350 mm x 350 mm (width x height), resp. 0,123 m².

"System Brandschutzschaum Kombi" (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.10. The components "Brandschutzgewebe" (Fire protection texture), "Brandschutzschaum Kombi" (Fire protection foam combo) and "Brandschutzmanschette BS" (Fire protection collar BS) were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are given in the following table.

$D_{n,e,w}$ in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
64	-1	-6	44	-1	-6

The airborne sound insulation of "Brandschutzfüllstein Kombi" (Fire protection block) with a thickness of 200 mm was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The aperture was lined with 1 layers of ≥ 20 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 360 mm x 360 mm (width x height), resp. 0,130 m².

"System Brandschutzschaum Kombi" (System fire protection foam combo) was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.10. The components "Brandschutzgewebe" (Fire protection texture), "Brandschutzschaum Kombi" (Fire protection foam combo) and "Brandschutzmanschette BS" (Fire protection collar BS) were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are given in the following table.

$D_{n,e,w}$ in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
68	-4	-11	49	-4	-11

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties

The thermal properties of “Brandschutzschaum Kombi” (Fire protection foam combo) and “Brandschutzfüllstein Kombi” (Fire protection block) were tested according to EN 12667:2001.

Component	$\lambda_{10,23/50}$ in W/(m*K)
Brandschutzschaum Kombi (Fire protection foam combo)	0,088
Brandschutzfüllstein Kombi (Fire protection block)	0,103

The thermal properties of “Brandschutzgewebe” (Fire protection texture) were tested according to EN 12664:2001.

Component	λ_{10} in W/(m*K)
Brandschutzgewebe (Fire protection texture)	0,396

3.5.2 Water vapour permeability

No performance assessed.

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

4.1 AVCP system

According to the Decision 1999/454/EC[6], amended by Decision 2001/596/EC[7] of the European Commission the system of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

Product(s)	**Intended use(s)**	**Level(s) or class(es)** (resistance to fire)	**System** of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for fire compartmentation and/or fire protection or fire performance	any	1

In addition, according to the Decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission the system(s) of assessment and verification of constancy of performance, with regard to reaction to fire, is given in the following table.

Product(s)	**Intended use(s)**	**Level(s) or class(es)** (reaction to fire)	**System** of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		A1**, A2**, B**, C**, D, E	3
		(A1 to E)***, F	4

* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)

** Products/materials not covered by footnote (*)

*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of class A1 according to Commission Decision 96/603/EC, as amended)

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

The notified product certification body shall visit the factory at least twice a year for surveillance of the manufacturer.

Issued in Vienna on 17.09.2018
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

[6] Official Journal of the European Communities no. L 178, 14.7.1999, p. 52
[7] Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

1 General

> "System Brandschutzschaum Kombi" (System fire protection foam combo) can be used in apertures in walls (vertical separating element) and floors (horizontal separating element) according to clause 2.1 of the ETA.

> The penetration of cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions according to clause 2.1 of the ETA is permitted.

> The total cross section of the installations (including insulation and cable support constructions) must not be more than 60 % of the opening size of the penetration seal.

> Each cable, conduit / tube, metal pipe and plastic pipe which is to be sealed off has to be protected by the appropriate precaution as described in clause 2 of Annex A-2 to A-6 of the ETA.

1.1 Pipe end configuration

> For plastic pipes classified with pipe end configuration U/C the pipe end configuration can be U/C and C/C.

> For plastic pipes classified with pipe end configuration U/U the pipe end configuration can be U/U, C/U, U/C, C/C.

> For metal pipes classified with pipe end configuration C/U the pipe end configuration can be C/U and C/C.

> Plastic conduits were tested U/C resp. U/U.

> Steel conduits / tubes were tested U/C resp. U/U.

1.2 Orientation of the penetrating elements

> Conduits / tubes, metal pipes and plastic pipes have to be installed perpendicular to the surface of the penetration seal.

> Metal pipes insulated with prefabricated pipe shells (e.g. "Rockwool 800") according to clause 1 of the ETA can be installed in all angles between 90° and 45°.

1.3 Service support constructions

> All types of cables, conduits / tubes, metal pipes and plastic pipes – in flexible walls and rigid walls – have to be supported on both side of the separating element by steel cable trays (perforated or non-perforated), steel ladders or alternative service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 902 °C for EI 45, or 945 °C for EI 60, or 1006 °C for EI 90, or 1049 °C for EI 120 (e.g. stainless steel or galvanized steel) according to the ETA-holder's installation instructions.

> All types of cables, conduits / tubes, metal pipes and plastic pipes – in rigid floors – have to be supported at least on the top side of the separating element by steel cable trays (perforated or non-perforated), steel ladders or alternative service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 842 °C for EI 30, or 945 °C for EI 60, or 1006 °C for EI 90, or 1049 °C for EI 120 (e.g. stainless steel or galvanized steel) according to the ETA-holder's installation instructions.

System Brandschutzschaum Kombi **(System fire protection foam combo)** **- Details for installation -**	**ANNEX A-1**

> Steel cable trays (perforated or non-perforated) or steel ladders can pass through or end at the surface of the penetration seal.

> Lidded cable trays / trunkings must not pass through the penetration seal.

> The first support (service support construction) for cables and conduits / tubes in flexible walls, rigid walls and rigid floors has to be at maximum 200 mm (measured from the surface of the penetration seal).

> The first support (service support construction) for plastic pipes and metal pipes in flexible walls and rigid walls has to be at maximum 750 mm (measured from the surface of the penetration seal).

> The first support (service support construction) for plastic pipes and metal pipes in rigid floors has to be at maximum 1200 mm (measured from the surface of the penetration seal).

> All types of cables, conduits / tubes, metal pipes and plastic pipes have to be fixed according to the ETA-holder's installation instructions to the service support construction.

> Conduit bundles have to be fixed (bound together) on both sides of the penetration seal with at least one winding of e.g. steel wire (minimum diameter 1 mm) at maximum 200 mm (measured from the surface of the penetration seal).

2 Details for installation of "System Brandschutzschaum Kombi" (System fire protection foam combo) (see Annex B-1 to J-1 of the ETA)

> "System Brandschutzschaum Kombi" (System fire protection foam combo) has to be installed according to the ETA-holder's installation instructions.

> "System Brandschutzschaum Kombi" (System fire protection foam combo) will be formed by filling "Brandschutzschaum Kombi" (Fire protection foam combo) in the opening of the separating element so that all interstices and voids are carefully sealed. Alternatively the remaining space around penetrating elements can be closed with "Brandschutzfüllstein Kombi" (Fire protection block).

> It is possible to use formwork for the installation of "System Brandschutzschaum Kombi" (System fire protection foam combo) in walls and floors. If the formwork consists of cardboard (thickness 3 mm) or adhesive tape, it may remain on the mixed penetration seal / cable penetration seal.

> For tied cable bundles (see clause 2.1 of the ETA) the space between the cables needs not be filled with "Brandschutzschaum Kombi" (Fire protection foam combo).

> Copper pipes with an outer diameter > 28 mm have to be insulated with prefabricated pipe shells (e.g. "Rockwool 800") according to clause 1 of the ETA or "AF/Armaflex".

> Steel pipes with an outer diameter > 35 mm have to be insulated with prefabricated pipe shells (e.g. "Rockwool 800") according to clause 1 of the ETA or "AF/Armaflex".

> Copper pipes with an outer diameter ≤ 28 mm can be insulated with prefabricated pipe shells (e.g. "Rockwool 800") according to clause 1 of the ETA or "AF/Armaflex".

> Steel pipes with an outer diameter ≤ 35 mm can be insulated with prefabricated pipe shells (e.g. "Rockwool 800") according to clause 1 of the ETA or "AF/Armaflex".

System Brandschutzschaum Kombi **(System fire protection foam combo)** **- Details for installation -**	**ANNEX A-2**

> Metal pipes insulated with prefabricated pipe shells (e.g. “Rockwool 800”) according to clause 1 of the ETA can be cladded with sheet steel with a thickness of 0,4 mm to 1,0 mm or plastic with a thickness of 0,35 mm to 1,0 mm.

> In some cases (see Annex J-1 of the ETA) – for fire resistance class EI 120 of cable penetration seals – “Brandschutzgewebe” (Fire protection texture) has to be wrapped on both sides of the penetration seal according to the ETA-holder’s installation instructions around the cables, and cable support constructions (see Annex I-1 of the ETA).

> “WICU® Eco” pipes have to be wrapped with “Brandschutzgewebe” (Fire protection texture) on both sides of the penetration seal according to the ETA-holder’s installation instructions (see Annex E-4 of the ETA).

> “WICU® Flex”, “WICU® Frio” and “WICU® Clim” pipes in vertical separating elements have to be wrapped with “Brandschutzgewebe” (Fire protection texture) on both sides of the penetration seal according to the ETA-holder’s installation instructions (see Annex E-4 of the ETA).

> “WICU® Flex”, “WICU® Frio” and “WICU® Clim” pipes in horizontal separating elements have to be wrapped with “Brandschutzgewebe” (Fire protection texture) on the top side of the penetration seal according to the ETA-holder’s installation instructions (see Annex E-4 of the ETA).

> PVC-U pipes and PE-HD pipes with a diameter > 50 mm in vertical separating elements have to be equipped with “Brandschutzmanschette BS” (Fire protection collar BS) on both sides of the penetration seal according to the ETA-holder’s installation instructions (see Annex E-7 of the ETA).

> PVC-U pipes and PE-HD pipes with a diameter > 50 mm in horizontal separating elements have to be equipped with “Brandschutzmanschette BS” (Fire protection collar BS) on the bottom side of the penetration seal according to the ETA-holder’s installation instructions (see Annex E-7 of the ETA).

> The smallest pipe collar corresponding to the relevant outer diameter of the pipe to be sealed off has to be used (see Annex E-6 of the ETA).

2.1 Details for installation in flexible wall constructions (see Annex B-1 and G-1 of the ETA)

> For walls thinner than the minimum thickness of the penetration seal (144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA)) the aperture within the wall shall be lined with minimum 2 layers of ≥ 12,5 mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of 450 kg/m³ and a minimum thickness of 25 mm. The boards shall be at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex B-1 and F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex G-1 and J-1 of the ETA) wide. The boards have to be installed and fixed according to the ETA-holder’s installation instructions.

System Brandschutzschaum Kombi **(System fire protection foam combo)** **- Details for installation -**	**ANNEX A-3**

> Alternatively the thickness of the wall can be increased to at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-1 and G-1 of the ETA). Minimum 1 layer of ≥ 12,5 mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of 450 kg/m³ can be used. The board frame has to be installed and fixed according to the ETA-holder's installation instructions.

> When no aperture lining is necessary (in case the thickness of the wall is equal to the thickness of penetration seal) or a board frame is used, the whole cavity within the wall has to be filled with material wool (stone wool with classification A1 according to EN 13501-1, a minimum apparent density of 40 kg/m³ and a melting point ≥ 1000 °C according to DIN 4102-17) minimum 100 mm around the aperture.

> If the aperture is greater than 320 mm x 320 mm it has to be lined additionally with two horizontal steel studs with a thickness of minimum 0,6 mm (construction and installation according to the ETA-holder's installation instructions).

> Joints between the aperture lining and the aperture have to be filled with "Brandschutzschaum Kombi" (Fire protection foam combo) or gypsum joint filler (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder's installation instructions.

2.2 Details for installation in rigid walls (see Annex B-2 to B-3 and G-2 to G-3 of the ETA)

> For walls thinner than the minimum thickness of the penetration seal (144 mm or 200 mm; mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) the aperture within the wall shall be lined with minimum 2 layers of ≥ 12,5 mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of 450 kg/m³ and a minimum thickness of 25 mm. The boards shall be at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex B-3 and F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex G-3 and J-1 of the ETA) wide. The boards have to be installed and fixed according to the ETA-holder's installation instructions.

System Brandschutzschaum Kombi **(System fire protection foam combo)** **- Details for installation -**	**ANNEX A-4**

> Alternatively the thickness of the wall can be increased to at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-3 and G-3 of the ETA). Minimum 1 layer of ≥ 12,5 mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of 450 kg/m³ can be used. The board frame has to be installed and fixed according to the ETA-holder's installation instructions.

> Joints between the aperture lining and the aperture have to be filled with "Brandschutzschaum Kombi" (Fire protection foam combo), or gypsum joint filler or mineral mortar (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder's installation instructions.

2.3 Details for installation in rigid floors (see Annex C-1 to C-2 and H-1 to H-2 of the ETA)

> For floors thinner than the minimum thickness of the penetration seal (200 mm; mixed penetration seal) and 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) the aperture within the floor shall be lined with minimum 2 layers of ≥ 12,5 mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of 450 kg/m³ and a minimum thickness of 25 mm. The boards shall be at least 200 mm (mixed penetration seal; see Annex C-2 of the ETA) and 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex H-2 and J-1 of the ETA) wide. The boards have to be installed and fixed according to the ETA-holder's installation instructions.

> Alternatively the thickness of the floor can be increased to at least 200 mm (mixed penetration seal) and 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex C-2 and H-2 of the ETA). Minimum 1 layer of ≥ 12,5 mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of 450 kg/m³ can be used. The board frame has to be installed and fixed according to the ETA-holder's installation instructions.

> Joints between the aperture lining and the aperture have to be filled with "Brandschutzschaum Kombi" (Fire protection foam combo), or gypsum joint filler or mineral mortar (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder's installation instructions.

System Brandschutzschaum Kombi **(System fire protection foam combo)** **- Details for installation -**	**ANNEX A-5**

3 Minimum working clearances

> The minimum working clearances (a1, a2, a3; for pipes only linear arrangement is permitted, no clusters) and the minimum clearance between the penetration seals are specified in Annex B-1 to D-2 (mixed penetration seal) and G-1 to H-2 (cable penetration seal) of the ETA.

4 Subsequent addition (retrofitting) and removal

> Subsequent addition (retrofitting) and removal of cables, conduits / tubes, pipes and cable support constructions according to the ETA holder's installation instructions is permitted.

> Retrofitting and removal without addition of cables, conduits / tubes, pipes and cable support constructions shall be done according to the ETA holder's installation instructions and the regulations of Annex A-2, clause 2 of the ETA.

> After removal without addition of cables, conduits / tubes, pipes and cable support constructions the remaining opening (hole) has to be closed with "Brandschutzschaum Kombi" (Fire protection foam combo) according to the ETA-holder's installation instructions.

5 Transport and storage

> The indications of the manufacturer regarding transport and storage (minimum and maximum storing temperature, maximum duration of storage) have to be followed.

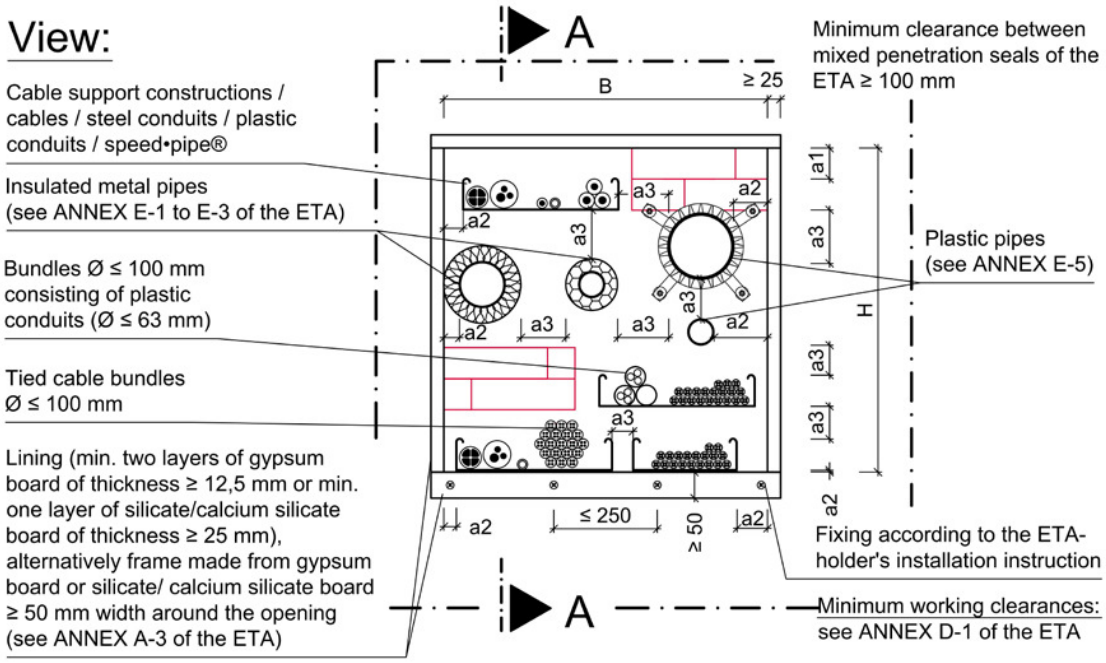
6 Use, maintenance and repair

> The fire resistance of the penetration seal shall not be negatively affected by future changes to buildings or building elements.

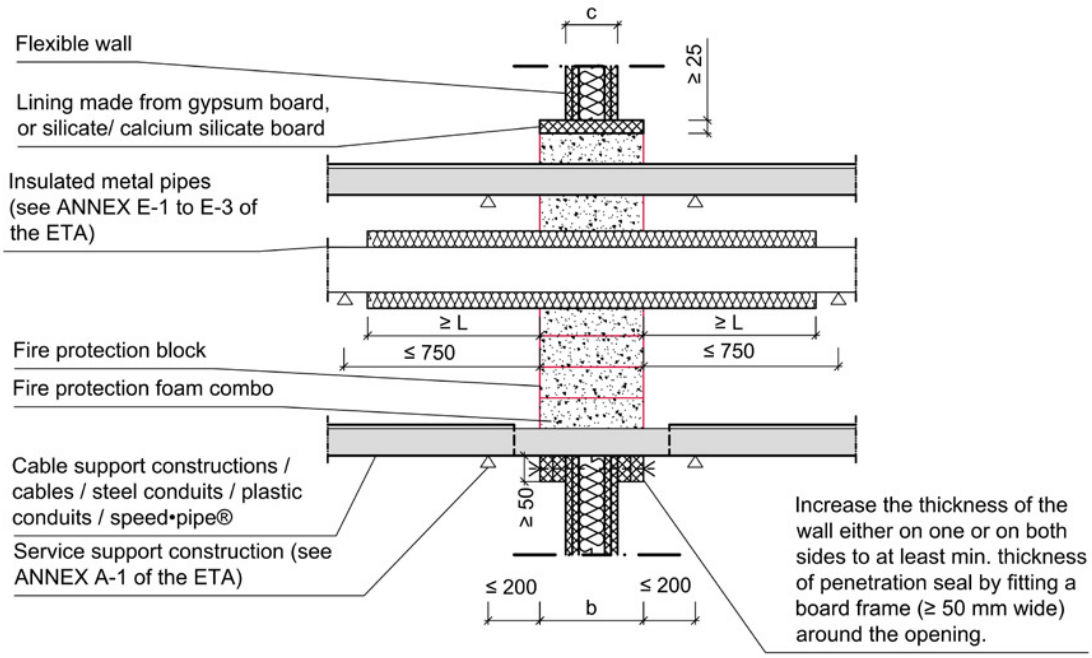
> The assessment of the fitness for use is based on the assumption that necessary maintenance and repair if required is carried out in accordance with the manufacturer's instructions during the assumed intended working life.

System Brandschutzschaum Kombi **(System fire protection foam combo)** **- Details for installation -**	**ANNEX A-6**

View:



Cross Section A-A:



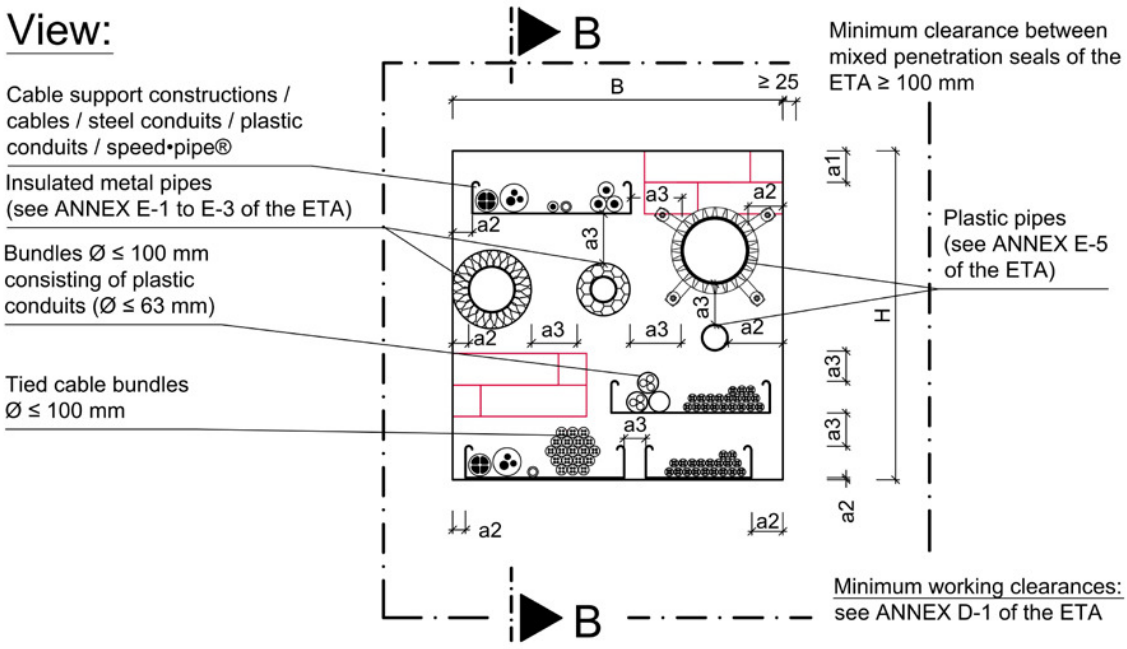
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Flexible wall	see ANNEX F-1 of the ETA	≥ 94	≤ 500	≤ 450	see ANNEX F-1 of the ETA

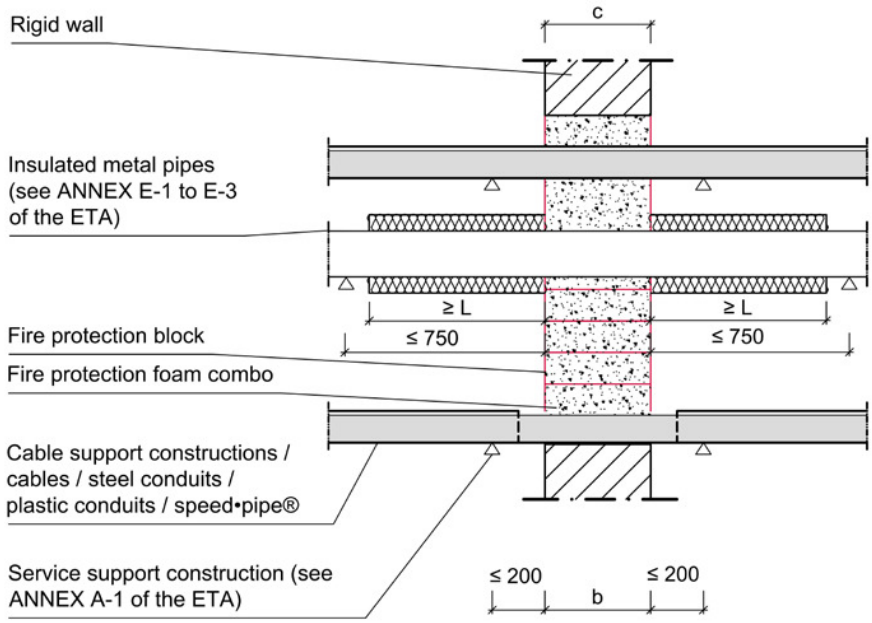
System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Installation in flexible wall, thickness c ≥ 94 mm -

ANNEX B-1

View:



Cross Section B-B:



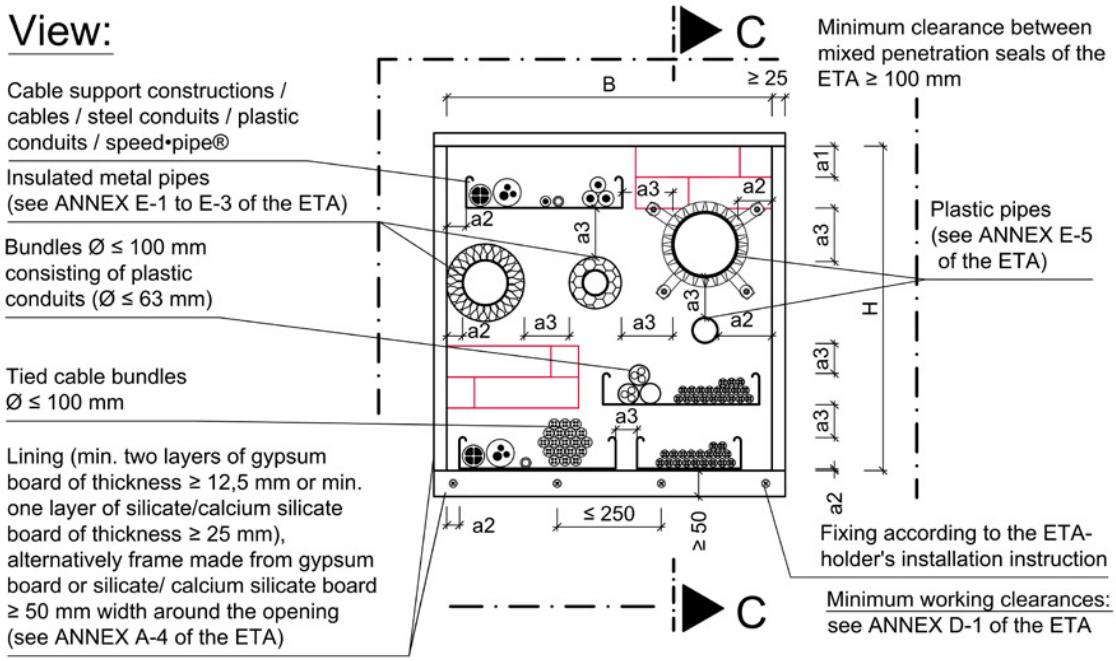
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX F-1 of the ETA	≥ b	≤ 500	≤ 450	see ANNEX F-1 of the ETA

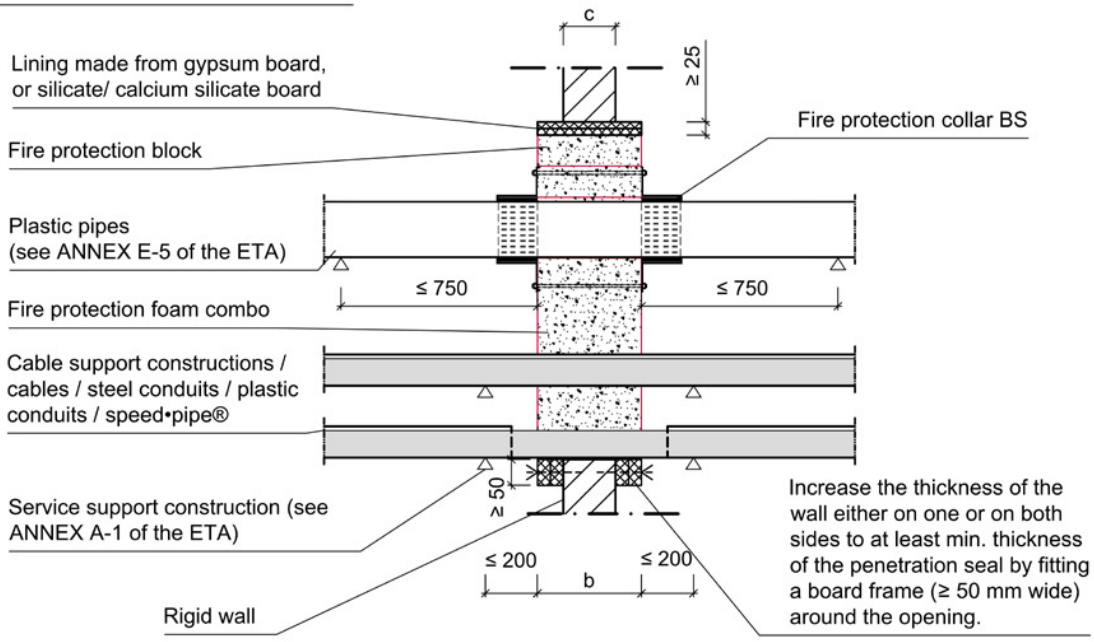
System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Installation in rigid wall, thickness c ≥ b -

ANNEX B-2

View:



Cross Section C-C:



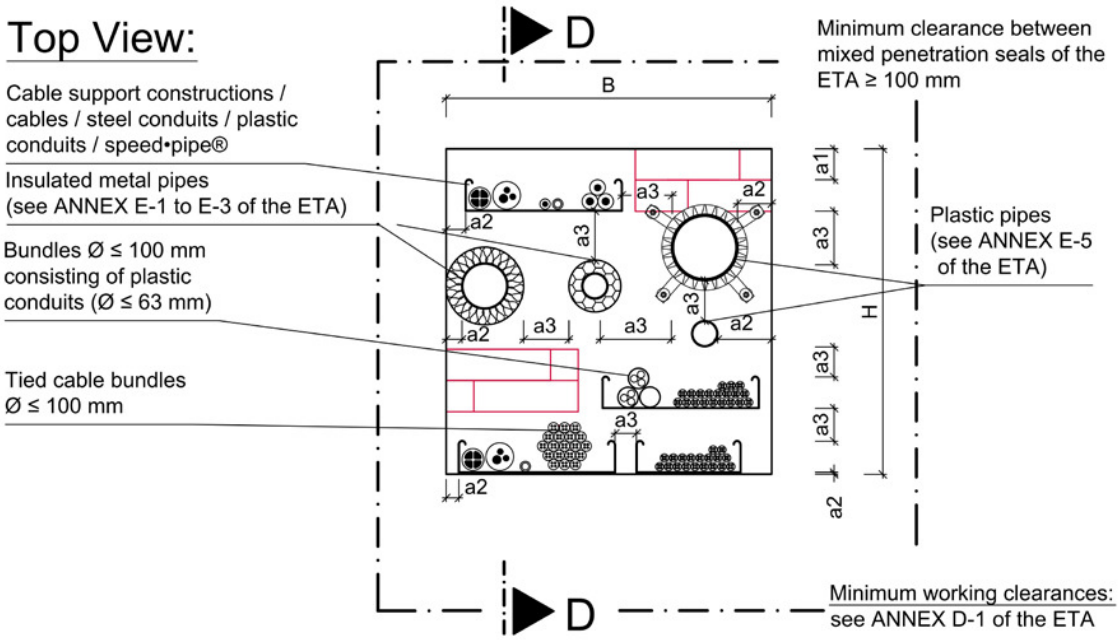
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX F-1 of the ETA	100 ≤ c < b	≤ 500	≤ 450	see ANNEX F-1 of the ETA

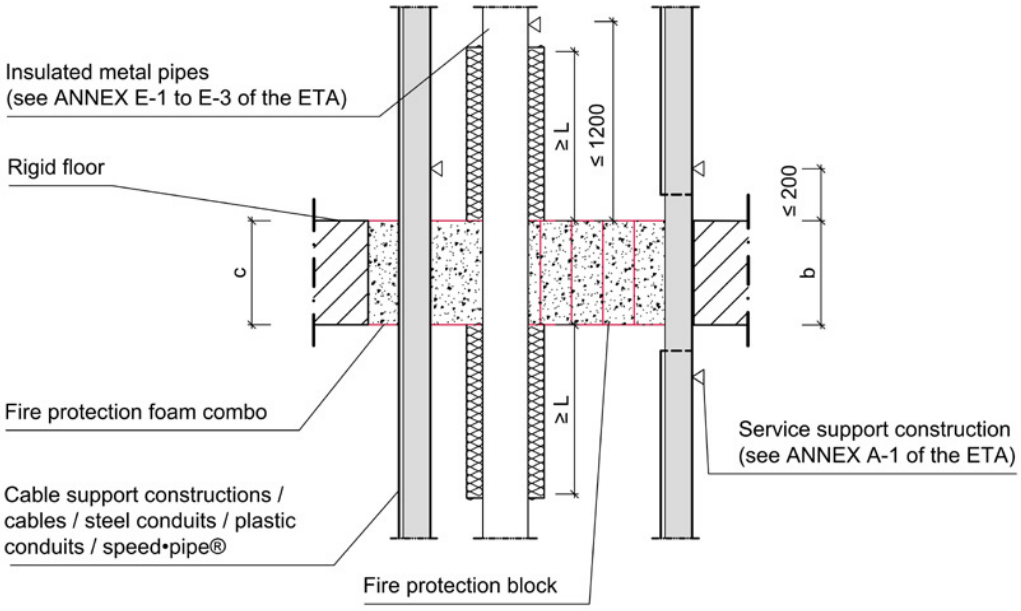
System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Installation in rigid wall, thickness 100 mm ≤ c < b -

ANNEX B-3

Top View:



Cross Section D-D:



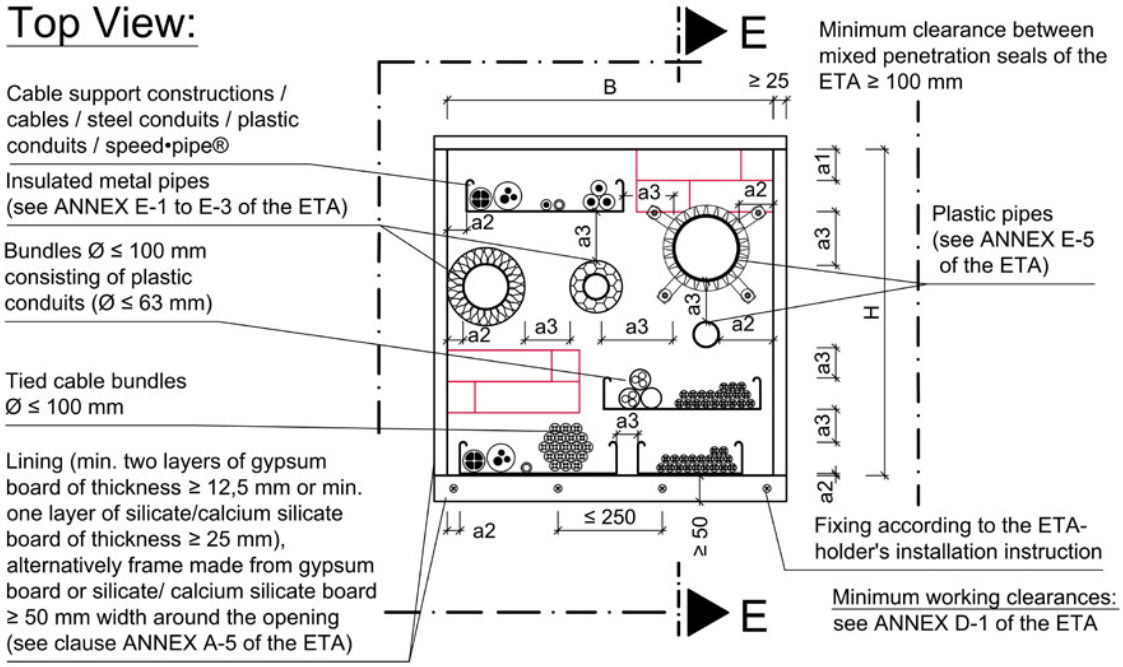
All dimensions in mm

Separating element	Fire resistance classification	Floor thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid Floor	see ANNEX F-1 of the ETA	≥ b (min. 150 mm)	≤ 450	≤ 450	see ANNEX F-1 of the ETA

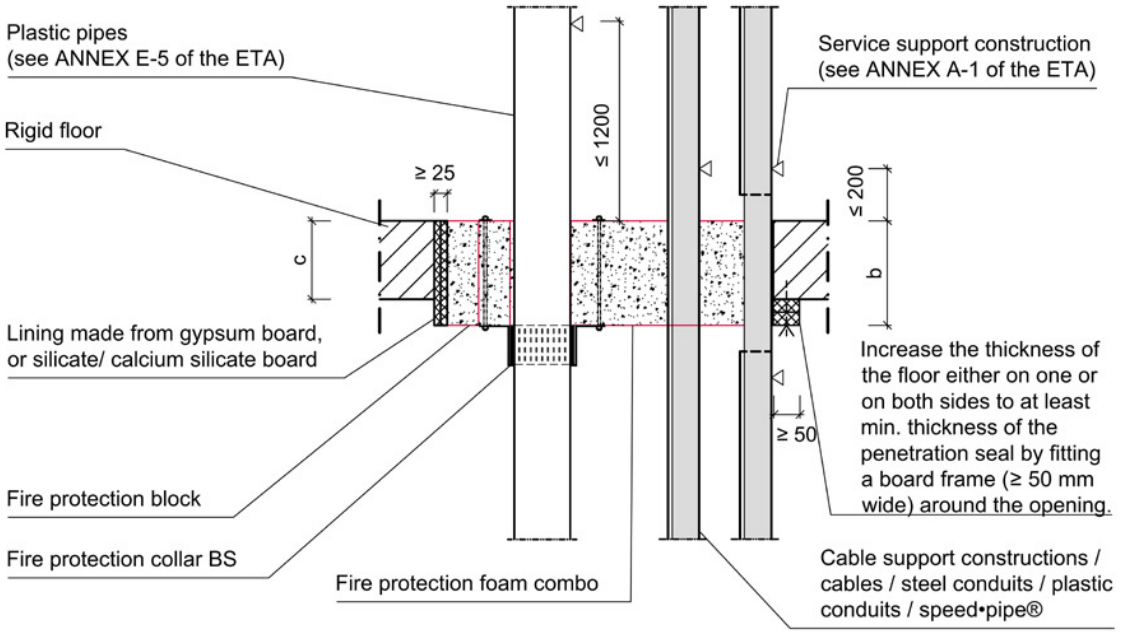
System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Installation in rigid floor, thickness c ≥ b -

ANNEX C-1

Top View:



Cross Section E-E:



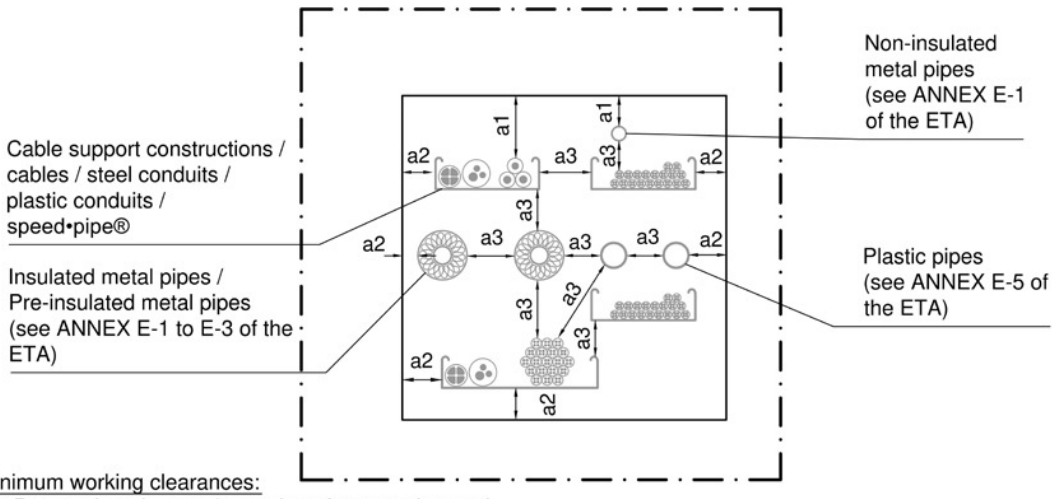
All dimensions in mm

Separating element	Fire resistance classification	Floor thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid Floor	see ANNEX F-1 of the ETA	150 ≤ c < b	≤ 450	≤ 450	see ANNEX F-1 of the ETA

System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Installation in rigid floor, thickness 150 mm ≤ c < b -

ANNEX C-2

View:



Minimum working clearances:
a1: Penetrating element / top edge of penetration seal
a2: Penetrating element / side or lower edge of penetration seal
a3: Penetrating element / Penetrating element

Minimum working clearances

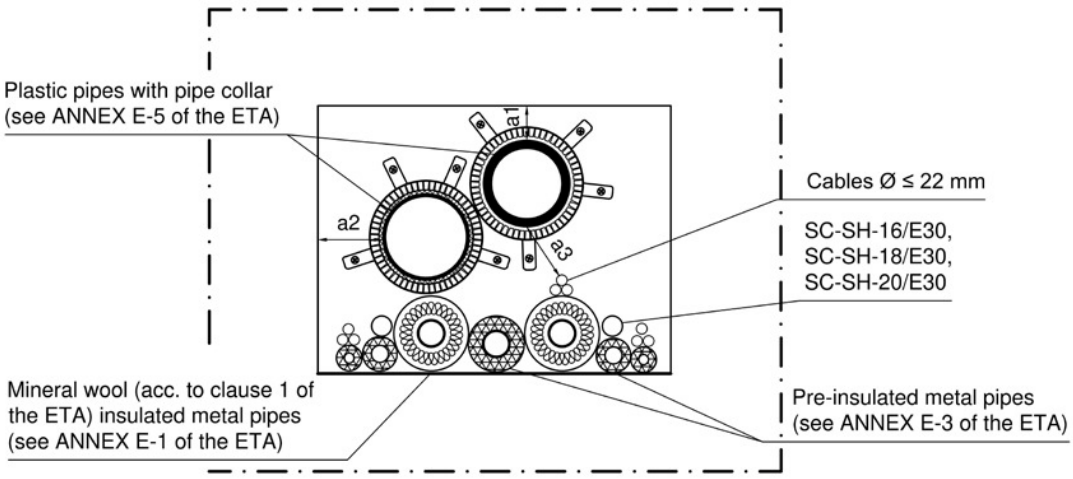
Penetrating element	a1	a2	a3	
Cables/ Cable trays/ Conduits (incl. speed•pipe®)	50 mm (speed•pipe® = 0 mm)	0 mm	• Cables/ Cable trays/ Conduits • Cable trays (vertical) • Non-insulated metal pipes • Other penetrating elements	0 mm 50 mm 60 mm 50 mm
Mineral wool (see clause 1 of the ETA) insulated metal pipes	0 mm	0 mm	• Mineral wool insulated metal pipes • Plastic pipes with pipe collar • Non-insulated metal pipes • Other penetrating elements	0 mm 0 mm 60 mm 50 mm
AF/Armaflex insulated metal pipes	35 mm	35 mm	• AF/Armaflex (thickness > 9 mm) insulated metal pipes • AF/Armaflex (thickness 9 mm) insulated metal pipes • Non-insulated metal pipes • Other penetrating elements	35 mm 50 mm 60 mm 50 mm
Non-insulated metal pipes	35 mm	35 mm	• Non-insulated metal pipes • Other penetrating elements	60 mm 60 mm
Pre-insulated metal pipes	0 mm	0 mm	• Pre-insulated metal pipes • Non-insulated metal pipes • Other penetrating elements	0 mm 60 mm 50 mm
Plastic pipes (without pipe collar)	50 mm	50 mm	• Plastic pipes (without pipe collar) • Non-insulated metal pipes • Other penetrating elements	50 mm 60 mm 50 mm
Plastic pipes (with pipe collar)	50 mm*	0 mm*	• Plastic pipes (with pipe collar) • Mineral wool insulated metal pipes • Non-insulated metal pipes • Other penetrating elements	0 mm 0 mm 60 mm 50 mm

*Measured from the surface of the pipe

System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Minimum working clearances -

ANNEX D-1

View: Penetrating elements in a distance of 0 mm



Min. working clearances:
a1: Penetrating element / top edge of penetration seal
a2: Penetrating element / side or lower edge of penetration seal
a3: Penetrating element / Penetrating element

Minimum working clearances

Penetrating element	a1	a2	a3	
Cables Ø ≤ 22 mm	50 mm	0 mm	• Cables Ø ≤ 22 mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements	0 mm 0 mm 0 mm 0 mm 0 mm 50 mm
Mineral wool (see clause 1 of the ETA) insulated metal pipes	0 mm	0 mm	• Cables Ø ≤ 22 mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements	0 mm 0 mm 0 mm 0 mm 0 mm 50 mm
SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 (Drain hose)	50 mm	0 mm	• Cables Ø ≤ 22 mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements	0 mm 0 mm 0 mm 0 mm 0 mm 50 mm
Pre-insulated metal pipes	0 mm	0 mm	• Cables Ø ≤ 22 mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements	0 mm 0 mm 0 mm 0 mm 0 mm 50 mm
Plastic pipes (with pipe collar)	50 mm*	0 mm*	• Cables Ø ≤ 22 mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements	0 mm 0 mm 0 mm 0 mm 0 mm 50 mm

*Measured from the surface of the pipe

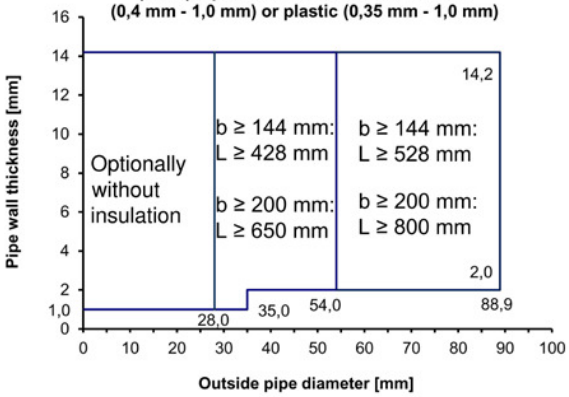
System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Minimum working clearances -

ANNEX D-2

Field of application of metal pipes

Mineral wool (acc. to clause 1 of the ETA) insulated metal pipes acc. to clause 2.1 of the ETA (C/U) and (C/C)

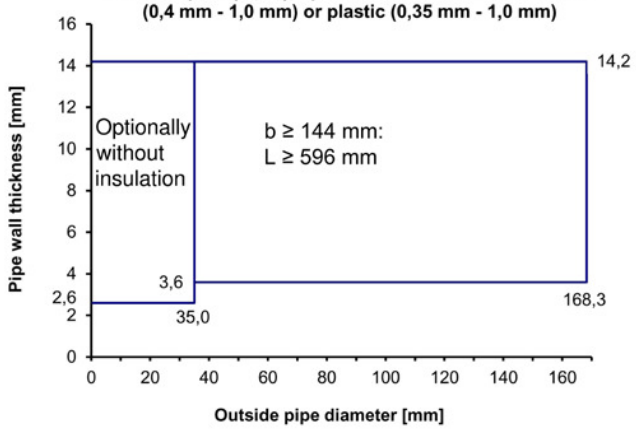
Metal pipes made of copper, steel, stainless steel, cast iron insulated with mineral wool, insulation optional sustained (LS, CS) or interrupted (LI, CI), optional cladded with sheet steel (0,4 mm - 1,0 mm) or plastic (0,35 mm - 1,0 mm)



L measured from the surface of the penetration seal (see ANNEX B-1 to C-2 of the ETA).

Case	Density of mineral wool	Thickness of mineral wool
LI (local-interrrupted)	≥ 90 kg/m³	30 mm
LS (local-sustained)		30 mm
CI (continued-interrupted)		≥ 30 mm
CS (continued-sustained)		≥ 30 mm

Metal pipes made of steel, stainless steel, cast iron insulated with mineral wool, insulation optional sustained (LS, CS) or interrupted (LI, CI), optional cladded with sheet steel (0,4 mm - 1,0 mm) or plastic (0,35 mm - 1,0 mm)



L measured from the surface of the penetration seal (see ANNEX B-1 to C-2 of the ETA).

Case	Density of mineral wool	Thickness of mineral wool
LI (local-interrrupted)	≥ 90 kg/m³	50 mm
LS (local-sustained)		50 mm
CI (continued-interrupted)		≥ 50 mm
CS (continued-sustained)		≥ 50 mm

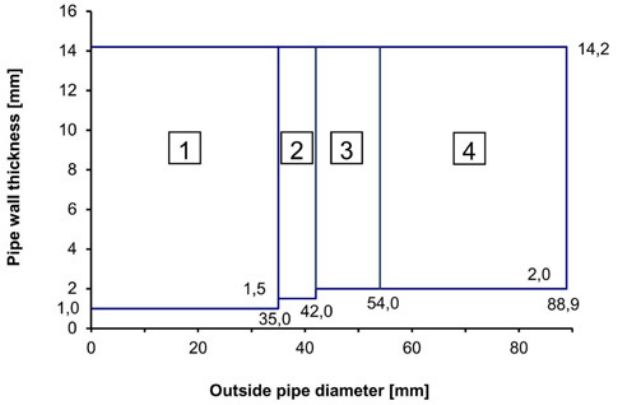
Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal

ANNEX E-1

Field of application of metal pipes

AF/Armaflex insulated metal pipes (C/U) and (C/C)

Metal pipes made of copper, steel, stainless steel, cast iron insulated with AF/Armaflex, insulation sustained (LS or CS), minimum length 500 mm on both sides of mixed penetration seal



1 Insulation thickness 9,0 mm to 35,0 mm, L ≥ 500 mm
2 Insulation thickness 9,0 mm to 36,5 mm, L ≥ 500 mm
3 Insulation thickness 9,0 mm to 38,0 mm, L ≥ 500 mm
4 Insulation thickness 41,5 mm, L ≥ 500 mm

L measured from the surface of the penetration seal (see ANNEX B-1 to C-2 of the ETA).

Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal	**ANNEX E-2**

Field of application of metal pipes

Pre-insulated (CS) metal pipes used for air conditioning, heating and sanitary systems (C/U) and (C/C)

Penetrating element*	**Outer diameter of the pipe** (mm)	**Pipe wall thickness** (mm)	**Insulation type**	**Insulation thickness** (mm)	**Additional precaution: Fire protection texture**
WICU® Eco	12,0	1,0	PUR	11,0	one layer on both sides of the penetration seal (length** ≥ 150 mm, nominal thickness 3 mm)
	15,0	1,0		11,5	
	18,0	1,0		12,0	
	22,0	1,0		12,5	
	28,0	1,5		17,5	
	35,0	1,5		18,0	
	42,0	1,5		24,0	
	54,0	2,0		27,5	
WICU® Flex	12,0	1,0	PE	6	wall: one layer on both sides of the penetration seal (length** ≥ 150 mm, nominal thickness 3 mm) floor: one layer on the top side of the penetration seal (length** ≥ 150 mm, nominal thickness 3 mm)
	15,0	1,0		6	
	18,0	1,0		6	
	22,0	1,0		6	
WICU® Frio	6,0	1,0	PE	8	
	10,0	1,0		10	
	12,0	1,0		10	
	14,0	1,0		10	
	15,0	1,0		10	
	16,0	1,0		10	
	18,0	1,0		10	
	22,0	1,0		10	
WICU® Clim	6,35	0,762	PE	6	
	9,52	0,813		8	
	12,70	0,813		10	
	15,87	0,889		10	
	19,05	0,889		10	
	22,22	0,889		10	
Tubolit® Split / Tubolit® DuoSplit	6,35	0,8	PE	9	no additional precaution
	9,52	0,8		9	
	12,70	0,8		9	
	15,88	1,0		9	
	19,05	1,0		9	
	22,22	1,0		9	

* copper pipes
** measured from the surface of the penetration seal

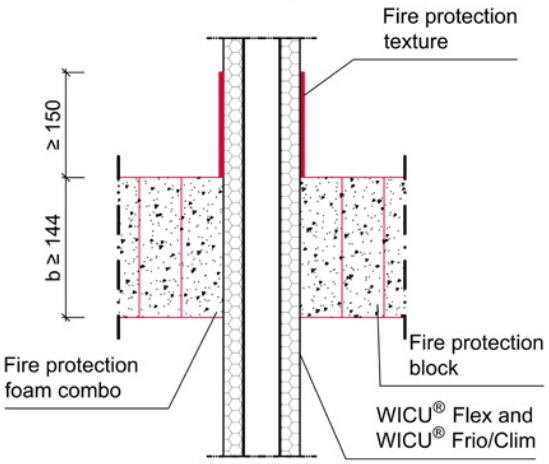
Pipe diameters and wall thicknesses for pre-insulated metal pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal

ANNEX E-3

Arrangement of Fire protection texture for pre-insulated (CS) metal pipes used for air conditioning, heating and sanitary systems (C/U) and (C/C) (see ANNEX F-1 of the ETA):

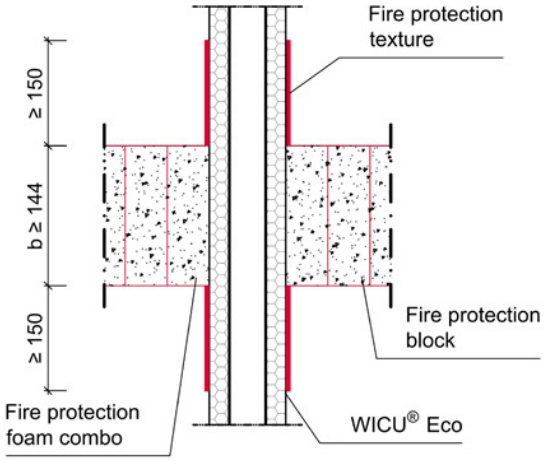
Additional precaution for WICU® Flex and WICU® Frio/Clim

Installation in floor:



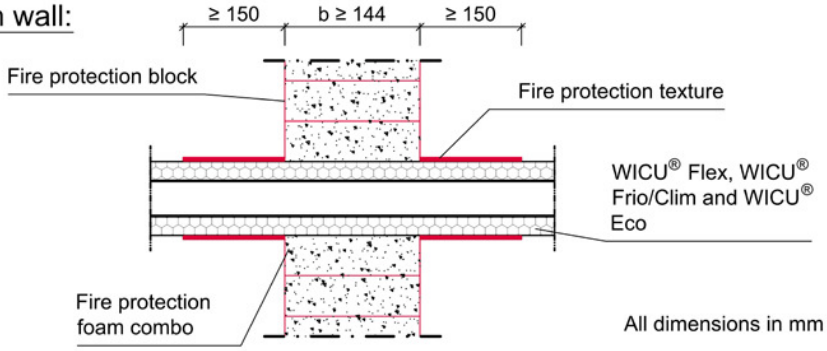
Additional precaution for WICU® Eco

Installation in floor:



Additional precaution for WICU® Flex, WICU® Frio/Clim and WICU® Eco

Installation in wall:

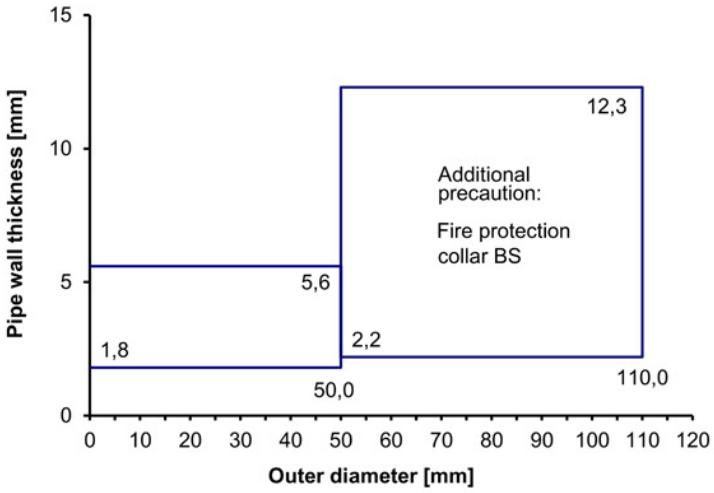


The pre-insulated metal pipes have to be wrapped with strips of Fire protection texture of at least 150 mm width. The glass fabric reinforcement fixed to one side of the wrap has to be on the outside. The ends of the wrap have to be fixed with two steel clips or steel wire according to the ETA-holder's installation instruction. Strips have to overlap each other at least 45 mm. Two pre-insulated metal pipes of type WICU® Flex and WICU® Frio/Clim in a distance of 0 mm can be wrapped with one concerted Fire protection texture.

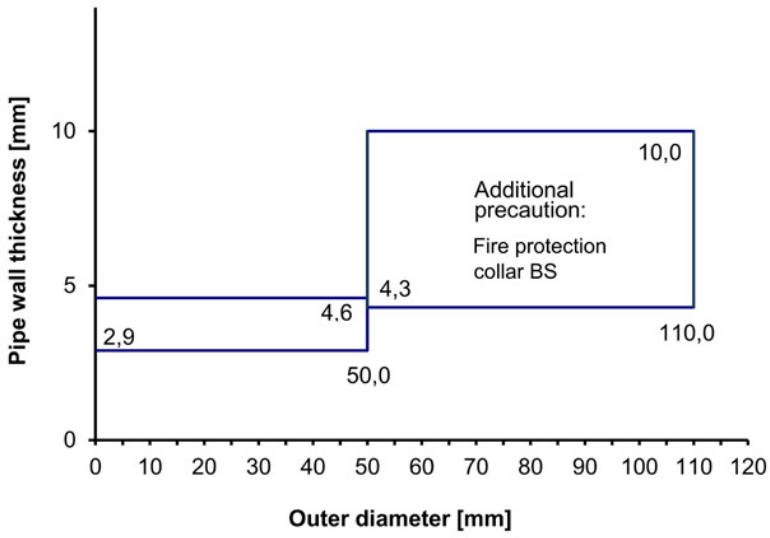
System Brandschutzschaum Kombi (System fire protection foam combo) - mixed penetration seal - Arrangement of "Brandschutzgewebe" (Fire protection texture) for pre-insulated metal pipes -	**ANNEX E-4**

Field of application of plastic pipes (U/U), (C/U), (U/C) and (C/C):

Plastic pipes made of PVC-U acc. to clause 2.1 of the ETA

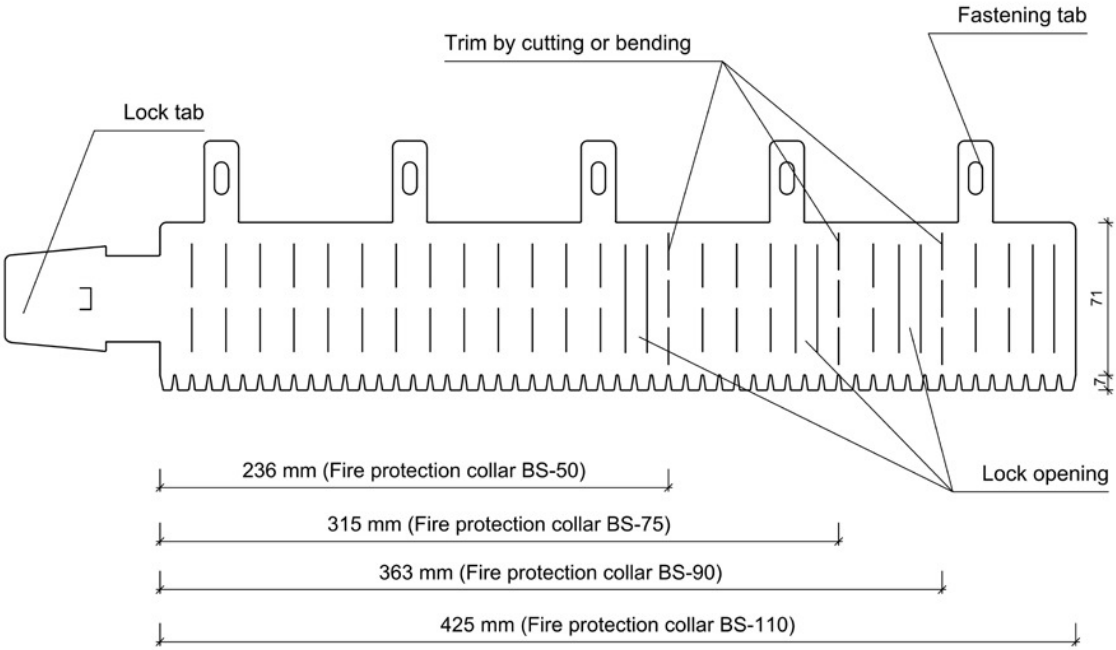


Plastic pipes made of PE-HD acc. to clause 2.1 of the ETA



Interpolation between pipe diameters and wall thicknesses for plastic pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal	**ANNEX E-5**

Material: stainless steel (1.4301) acc. to EN 10088
Sheet thickness: 0,6 mm +/- 0,1 mm



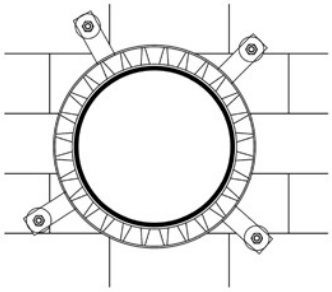
All dimensions in mm

Pipe outer diameter (mm)	Size of "Fire protection collar BS"	Thickness of intumescent inlay (mm)	Width of intumescent inlay (mm)	Minimum number of fixing lugs to be fastened (pcs)
50	**Fire protection collar BS-50**	**7**	**70**	**3**
75	**Fire protection collar BS-75**	**7**	**70**	**3**
90	**Fire protection collar BS-90**	**7**	**70**	**3**
110	**Fire protection collar BS-110**	**7**	**70**	**4**

Description of "Brandschutzmanschette BS" (Fire protection collar BS) - mixed penetration seal

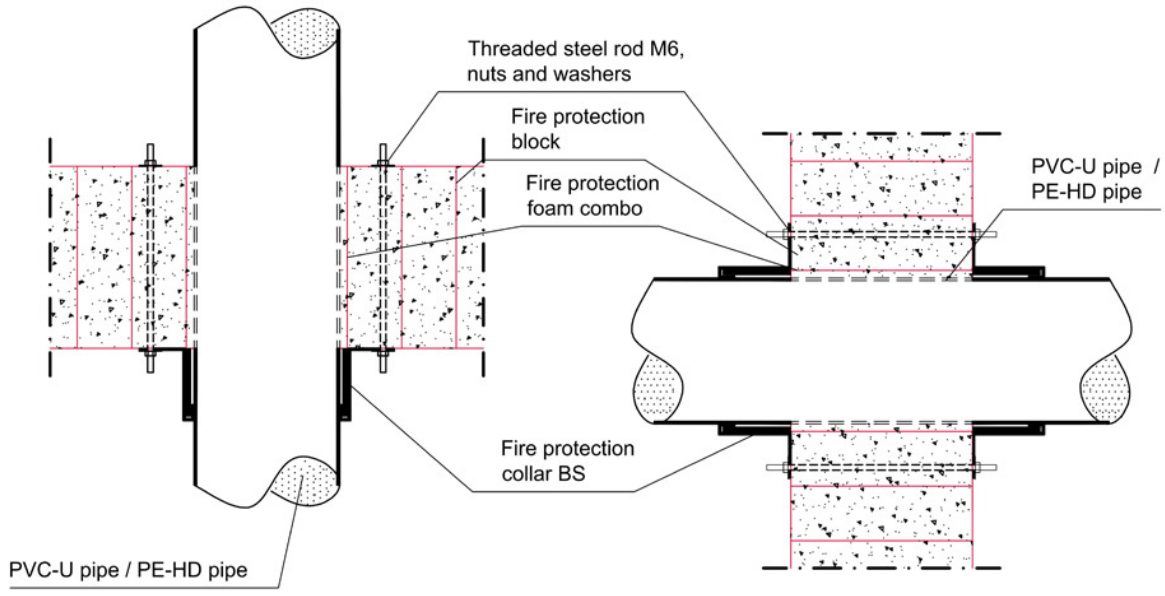
ANNEX E-6

Installation of Fire protection collar BS for plastic pipes acc. to clause 2.1 of the ETA with a diameter of > 50 mm (see ANNEX F-1 of the ETA):



Installation in floor:

Installation in wall:



All dimensions in mm

The threaded steel rods (thread size M6; length ≥ thickness of the penetration seal) can be pushed through Fire protection foam combo / Fire protection block and have to be fixed on both sides of the penetration seal with washers and nuts (corresponding to the outer diameter of the threaded steel rods).

System Brandschutzschaum Kombi (System fire protection foam combo) - mixed penetration seal - Installation of "Brandschutzmanschette BS" (Fire protection collar BS) for plastic pipes with a diameter > 50 mm -	**ANNEX E-7**

Fire resistance classification of mixed penetration seals:

Installation in flexible walls of at least 94 mm thickness and rigid walls of at least 100 mm thickness (max. opening size of 450 mm x 500 mm) or rigid floors of at least 150 mm thickness (max. opening size of 450 mm x 450 mm)

Penetrating element		Min. thickness of Mixed penetration seal	
		b ≥ 144 mm	b ≥ 200 mm
Cables	Sheathed electrical/ telecommunication /optical fibre cables up to a maximum outer diameter of 80 mm	wall: E 120 / EI 60 floor: E 60 / EI 60	wall and floor: E 120 / EI 90
	Tied bundles up to 100 mm overall diameter containing sheathed electrical/ telecommunication /optical fibre cables up to a max. outer diameter of 21 mm	wall: E 120 / EI 60 floor: E 60 / EI 60	wall and floor: E 120 / EI 90
	Non-sheathed cables up to a maximum outer diameter of 24 mm	wall: E 120 / EI 45 floor: E 60 / EI 30	wall and floor: E 120 / EI 60
Conduits / tubes	Steel conduits/ tubes up to Ø 16 mm with/ without cables	wall: E 120-U/C / EI 60-U/C floor: E 60-U/C / EI 60-U/C	wall and floor: E 120-U/U / EI 90-U/U
	Plastic conduits up to Ø 16 mm with/ without cables	wall: E 120-U/C / EI 90-U/C floor: E 60-U/C / EI 60-U/C	wall and floor: E 120-U/U / EI 120-U/U
	Plastic conduits up to Ø 40 mm and bundles up to Ø 80 mm consisting of plastic counduits (Ø ≤ 40 mm) with/ without cables	wall: E 120-U/C / EI 90-U/C floor: E 60-U/C / EI 60-U/C	wall: E 120-U/C / EI 120-U/C floor: E 120-U/U / EI 120-U/U
	Plastic conduits up to Ø 63 mm and bundles up to Ø 100 mm consisting of plastic counduits (Ø ≤ 63 mm) with/ without cables	wall: E 120-U/C / EI 120-U/C floor: E 60-U/C / EI 60-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C
	speed•pipe® up to Ø 12 mm and bundles up to Ø 80 mm consisting of speed•pipe® (Ø ≤ 12 mm) with/ without optical fibre cables	wall: E 120-U/C / EI 120-U/C floor: E 60-U/C / EI 60-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C
Non-insulated metal pipes	Copper pipes up to a max. outer diameter of 28 mm*	wall: E 120-C/U / EI 60-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
	Steel pipes up to a max. outer diameter of 35 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall: E 120-C/U / EI 90-C/U floor: E 90-C/U / EI 90-C/U
Pre-insulated metal pipes	WICU® Frio pipes up to a max. outer diameter of 22 mm*	wall: E 120-C/U[1] / EI 90-C/U[1] floor: E 60-C/U[1] / EI 60-C/U[1]	wall and floor: E 120-C/U[1] / EI 90-C/U[1]
	WICU® Clim pipes up to a max. outer diameter of 22,22 mm*	wall: E 120-C/U[1] / EI 90-C/U[1] floor: E 60-C/U[1] / EI 60-C/U[1]	wall and floor: E 120-C/U[1] / EI 90-C/U[1]
	WICU® Flex pipes up to a max. outer diameter of 22 mm*	wall: E 120-C/U[1] / EI 90-C/U[1] floor: E 60-C/U[1] / EI 60-C/U[1]	wall and floor: E 120-C/U[1] / EI 90-C/U[1]
	WICU® Eco pipes up to a max. outer diameter of 35 mm*	wall: E 120-C/U[2] / EI 60-C/U[2] floor: E 60-C/U[2] / EI 60-C/U[2]	wall: E 120-C/U[2] / EI 60-C/U[2] floor: E 90-C/U[2] / EI 90-C/U[2]
	Tubolit® Split / Duosplit pipes up to a max. outer diameter of 12,7 mm*	wall: E 120-C/U / EI 60-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 120-C/U
	Tubolit® Split / Duosplit pipes up to a max. outer diameter of 22,22 mm*	wall: E 120-C/U / EI 60-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
Insulated metal pipes	Mineral wool insulated metal pipes up to a max. outer diameter of 54 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
	Mineral wool insulated metal pipes up to a max. outer diameter of 88,9 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall: E 120-C/U / EI 90-C/U floor: E 120-C/U / EI 120-C/U
	Mineral wool insulated steel pipes up to a max. outer diameter of 168,3 mm*	wall: E 120-C/U / EI 120-C/U floor: E 60-C/U / EI 60-C/U	wall: E 120-C/U / EI 120-C/U floor: E 90-C/U / EI 90-C/U
	AF/Armaflex (thickness 9 mm) insulated metal pipes up to a max. outer diameter of 54 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
	AF/Armaflex (thickness > 9 mm) insulated metal pipes up to a max. outer diameter of 88,9 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 120-C/U
Plastic pipes / -tubes	SC-SH-16/E30, SC-SH-18/E30 and SC-SH-20/E30 (drain hose) up to a max. outer diameter of 28 mm	wall: E 120-U/U / EI 60-U/U floor: E 60-U/U / EI 60-U/U	wall: E 120-U/U / EI 60-U/U floor: E 90-U/U / EI 90-U/U
	Plastic pipes up to a max. outer diameter of 50 mm*	wall: E 120-U/C / EI 120-U/C floor: E 60-U/C / EI 60-U/C	wall and floor: E 120-U/U / EI 120-U/U
	Plastic pipes up to a max. outer diameter of 110 mm*	wall: E 120-U/U[3] / EI 120-U/U[3] floor: E 60-U/U[3] / EI 60-U/U[3]	wall: E 120-U/U[3] / EI 120-U/U[3] floor: E 90-U/U[3] / EI 90-U/U[3]

***)** **For permitted pipe wall thickness and insulation see ANNEX E-1 to E-3 and E-5 of the ETA**

1) **Fire protection texture has to be applied on both surfaces of wall or top surface of floor (For details see ANNEX E-4 of the ETA)**

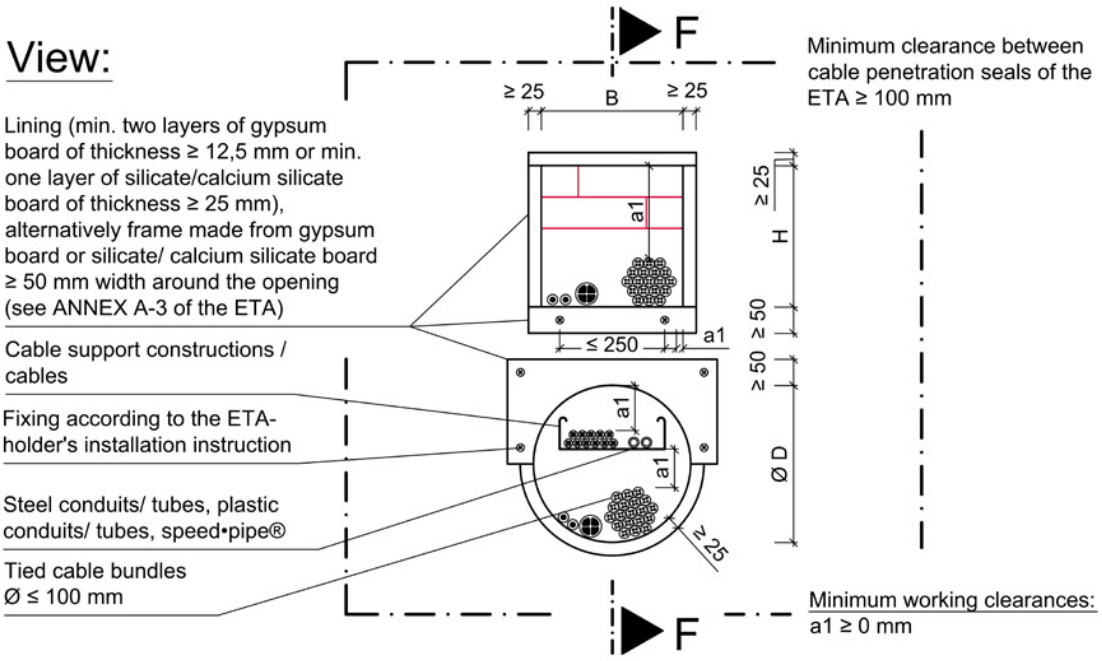
2) **Fire protection texture has to be applied on both surfaces of wall or floor (For details see ANNEX E-4 of the ETA)**

3) **Fire protection collar BS has to be applied on both surfaces of wall or bottom surface of floor (For details see ANNEX E-7 of the ETA)**

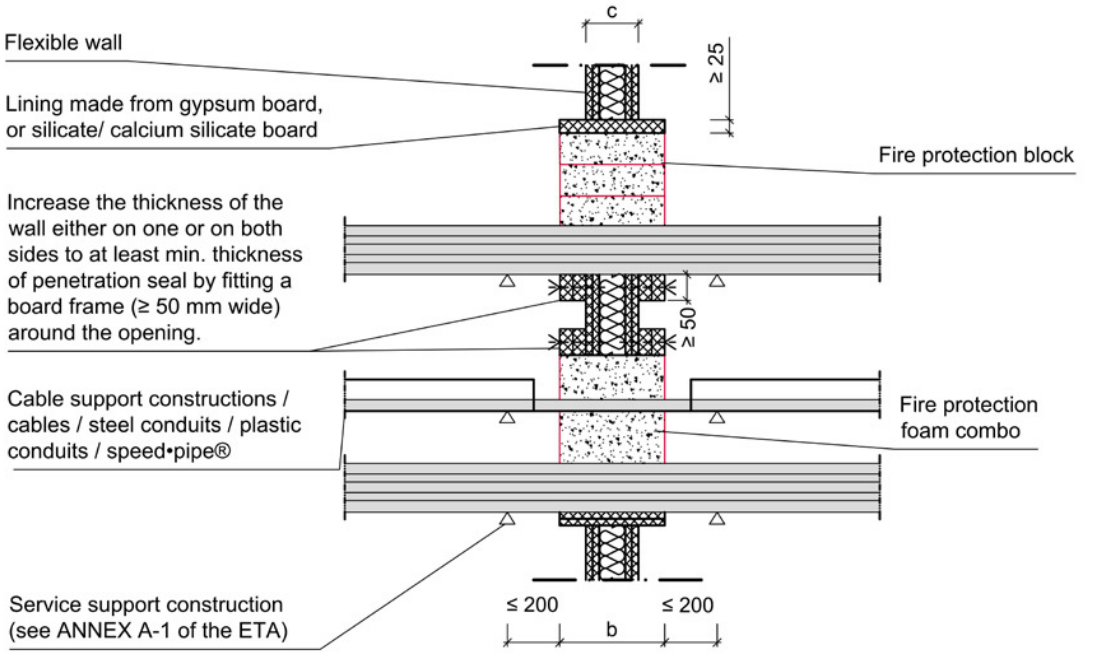
System Brandschutzschaum Kombi (System fire protection foam combo)
- mixed penetration seal
- Fire resistance classification -

ANNEX F-1

View:



Cross Section F-F:



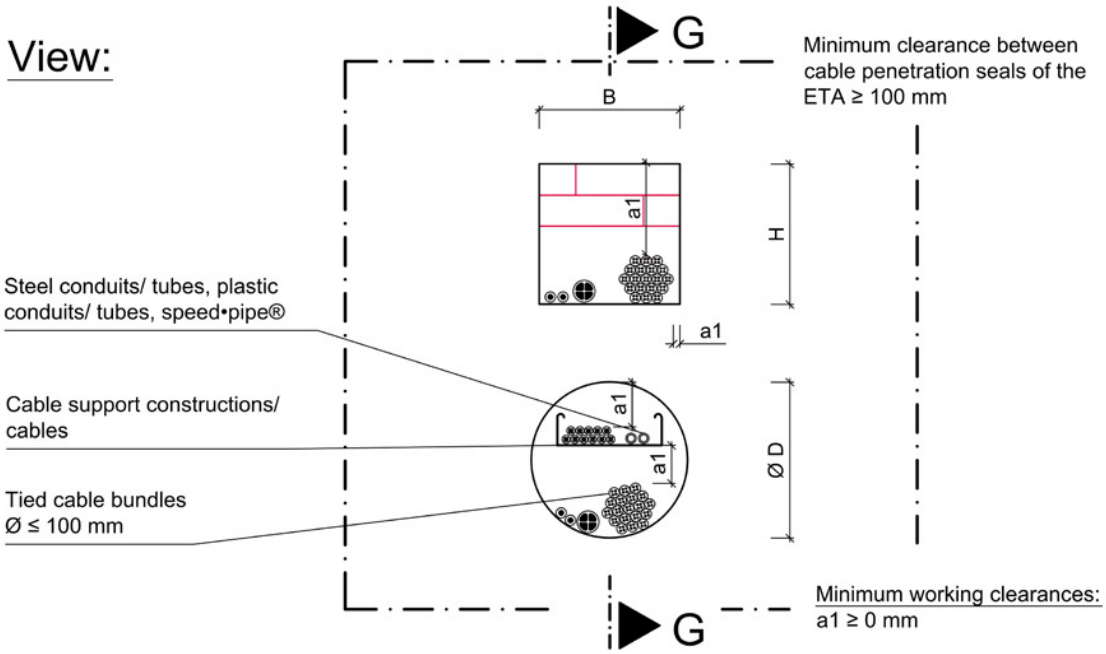
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Flexible wall	see ANNEX J-1 of the ETA	≥ 94	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

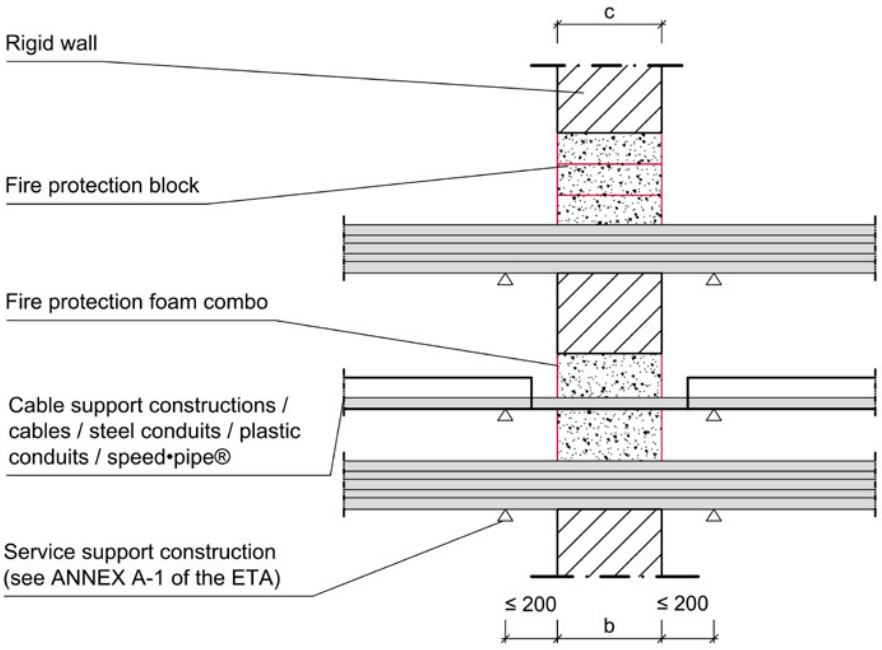
System Brandschutzschaum Kombi (System fire protection foam combo)
- cable penetration seal
- Installation in flexible wall, thickness c ≥ 94 mm -

ANNEX G-1

View:



Cross Section G-G:



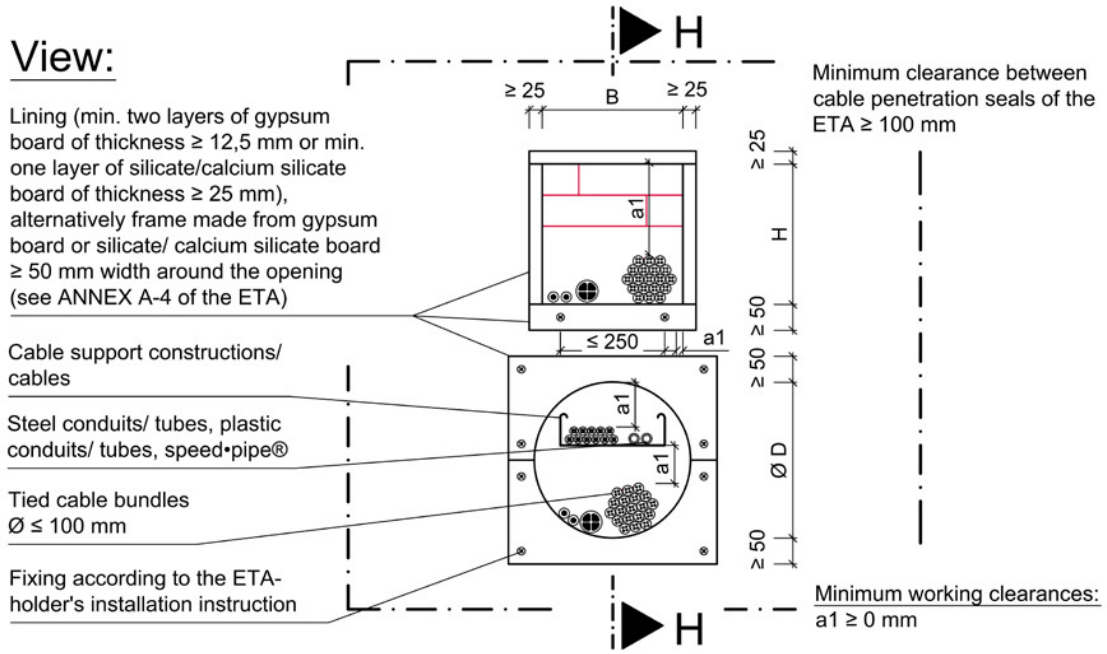
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX J-1 of the ETA	≥ b	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

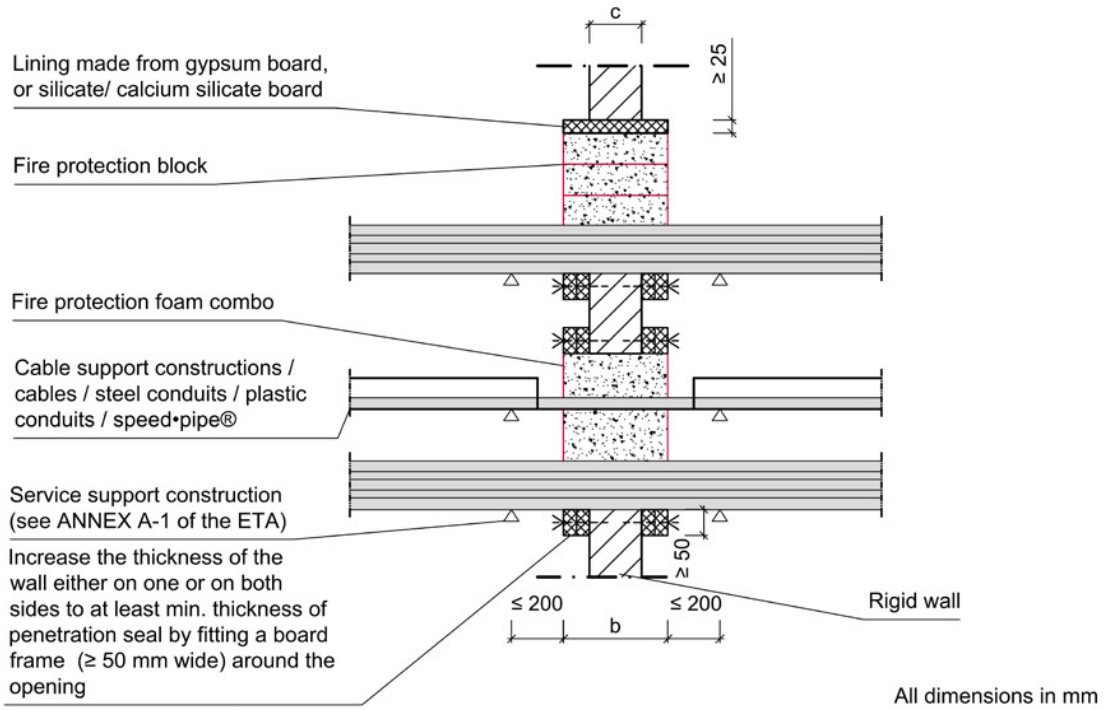
System Brandschutzschaum Kombi (System fire protection foam combo)
- cable penetration seal
- Installation in rigid wall, thickness c ≥ b -

ANNEX G-2

View:



Cross Section H-H:



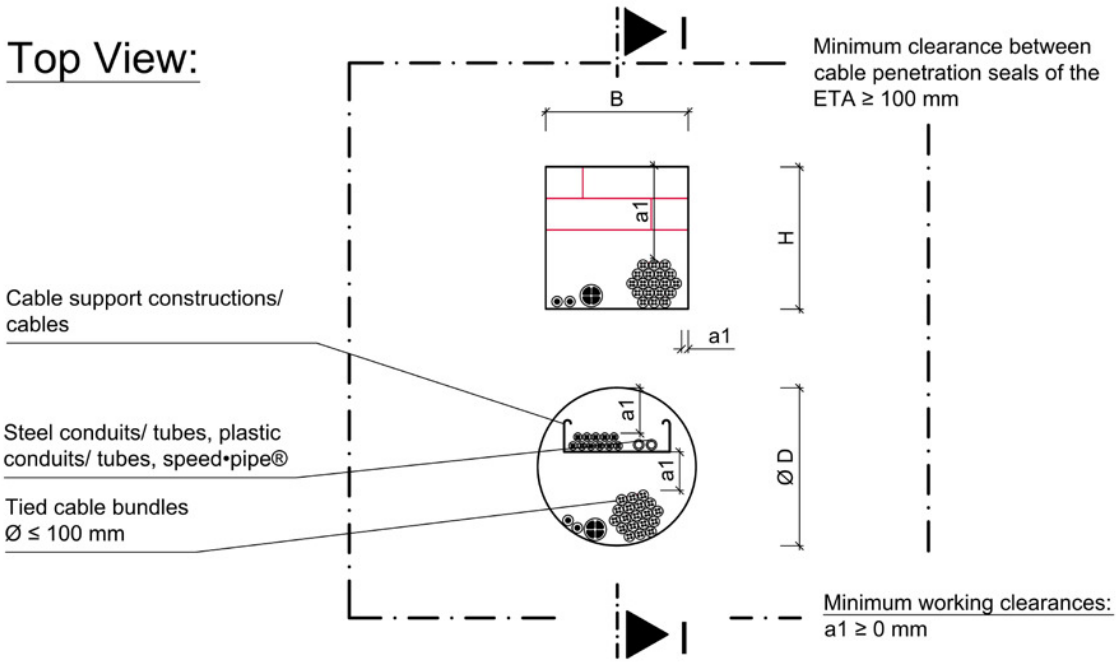
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX J-1 of the ETA	100 ≤ c < b	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

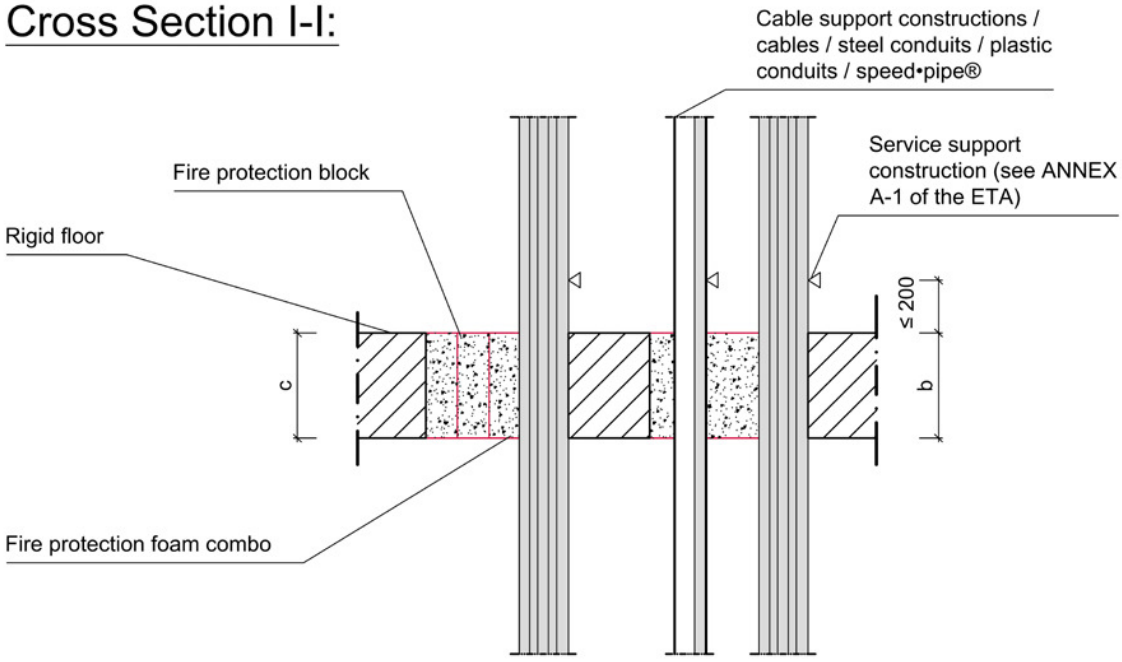
System Brandschutzschaum Kombi (System fire protection foam combo)
- cable penetration seal
- Installation in rigid wall, thickness 100 mm ≤ c < b -

ANNEX G-3

Top View:



Cross Section I-I:



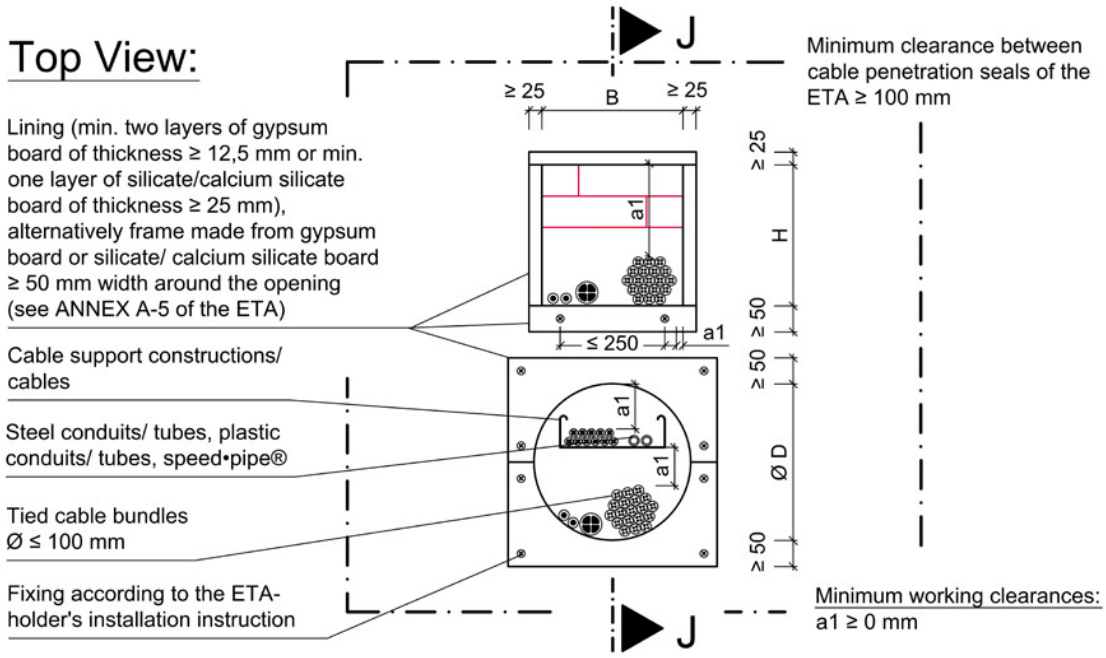
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Rigid floor	see ANNEX J-1 of the ETA	≥ b (min. 150 mm)	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

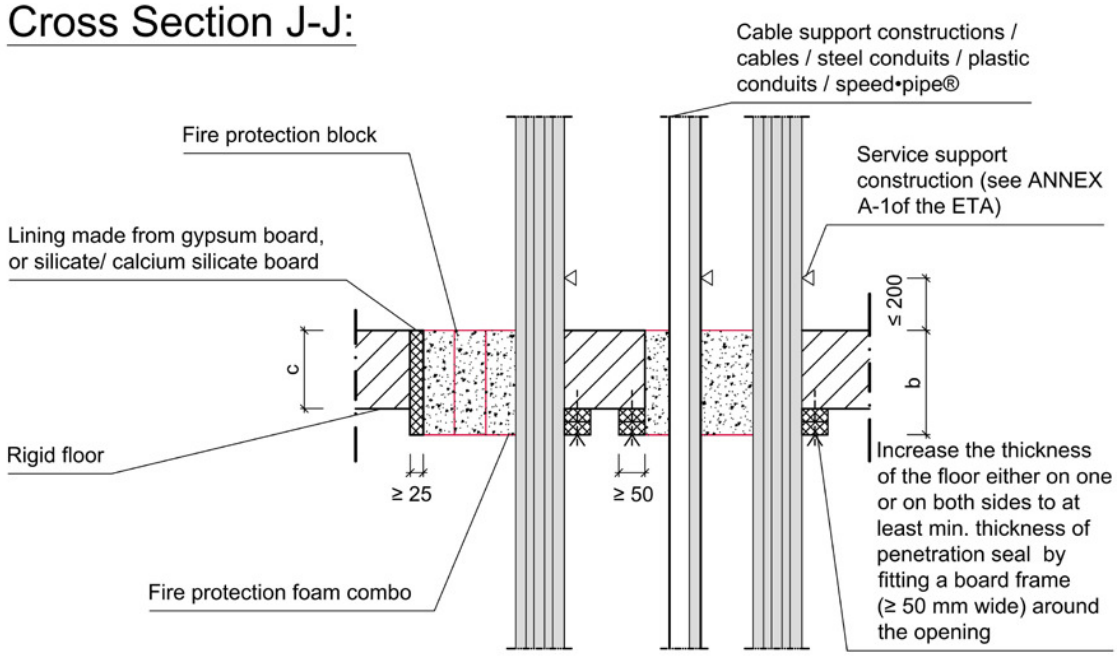
System Brandschutzschaum Kombi (System fire protection foam combo)
- cable penetration seal
- Installation in rigid floor, thickness c ≥ b -

ANNEX H-1

Top View:



Cross Section J-J:



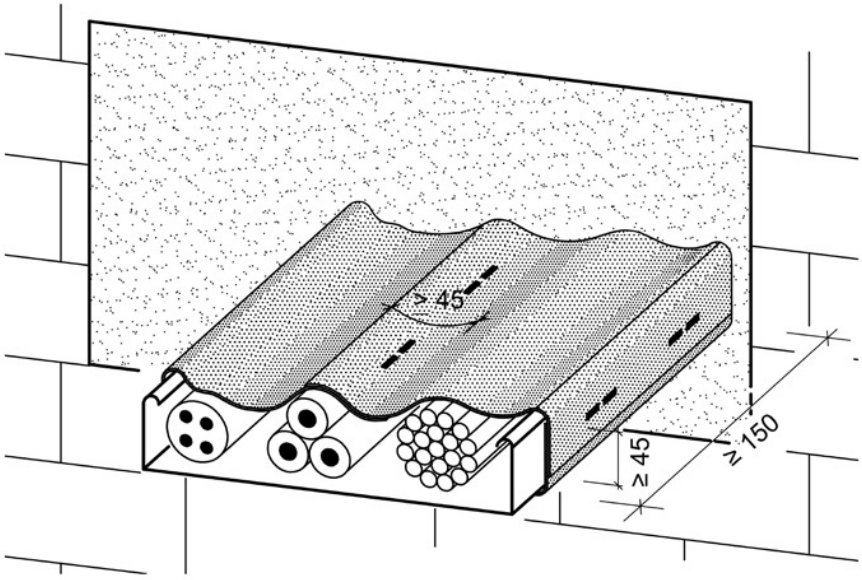
All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Rigid floor	see ANNEX J-1 of the ETA	150 ≤ c < b	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

System Brandschutzschaum Kombi (System fire protection foam combo)
- cable penetration seal
- Installation in rigid floor, thickness 150 mm ≤ c < b -

ANNEX H-2

Arrangement of Fire protection texture for fire resistance classification EI 120 (see ANNEX J-1 of the ETA):



For fire resistance classification EI120:
The cables or cable trays have to be wrapped with strips of Fire protection texture of at least 150 mm width on both sides.
The glass fabric reinforcement fixed to one side of the wrap has to be on the outside. The ends of the wrap have to be fixed with two steel clips or steel wire according to the ETA-holder's installation instruction.
Strips have to overlap each other at least 45 mm.

All dimensions in mm

System Brandschutzschaum Kombi (System fire protection foam combo) **- cable penetration seal** **- Arrangement of "Brandschutzgewebe" (Fire protection texture) -**	**ANNEX I-1**

Fire resistance classification of cable penetration seals:

Installation in flexible walls of at least 94 mm thickness and rigid walls of at least 100 mm thickness or rigid floors of at least 150 mm thickness (max. opening size of 270 mm x 270 mm or Ø 300 mm)

Penetrating element	Min. thickness of Cable penetration seal			
	b ≥ 100 mm	b ≥ 144 mm	b ≥ 200 mm	b ≥ 250 mm
Sheathed electrical/ telecommunication /optical fibre cables up to a maximum outer diameter of 21 mm	E 120 EI 60	wall: E 120 / EI 120 floor: E 120 / EI 90	E 120 EI 120	E 120 EI 120
Sheathed electrical/ telecommunication /optical fibre cables up to a maximum outer diameter of 21 mm < Ø ≤ 50 mm	wall: E 120 / EI 45 / EI 60 [1)]	E 120 EI 60	E 120 EI 90 / EI 120 [2)]	E 120 EI 120
Sheathed electrical/ telecommunication /optical fibre cables up to a maximum outer diameter of 50 mm < Ø ≤ 80 mm	---	E 120 EI 60	E 120 EI 90/ EI 120 [2)]	E 120 EI 90
Tied bundles up to 100 mm overall diameter containing sheathed electrical/ telecommunication /optical fibre cables of a max. diameter up to 21 mm	---	E 120 EI 60	E 120 wall: EI 90 floor: EI 90/ EI 120 [2)]	E 120 wall: EI 90 floor: EI 120
Non-sheathed cables up to a maximum outer diameter of 24 mm	---	E 120 wall: EI 45 floor: EI 30	E 120 wall: EI 90 floor: EI 60	E 120 wall: EI 90 floor: EI 60
Steel conduits/ tubes up to Ø 16 mm with/ without cables	---	E 120-U/C EI 60-U/C	E 120-U/U wall: EI 120-U/U floor: EI 90-U/U	E 120-U/U wall: EI 120-U/U floor: EI 120-U/U
Plastic conduits up to Ø 16 mm with/ without cables	---	E 120-U/C EI 120-U/C	E 120-U/U EI 120-U/U	E 120-U/U EI 120-U/U
Plastic conduits up to Ø 40 mm and bundles up to Ø 80 mm consisting of plastic counduits (Ø ≤ 40 mm) with/ without cables	---	E 120-U/C EI 120-U/C	wall: E 120-U/C / EI 120-U/C floor: E 120-U/U / EI 120-U/U	wall: E 120-U/C / EI 120-U/C floor: E 120-U/U / EI 120-U/U
Plastic conduits up to Ø 63 mm and bundles up to Ø 100 mm consisting of plastic counduits (Ø ≤ 63 mm) with/ without cables	---	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C
speed•pipe® up to Ø 12 mm and bundles up to Ø 80 mm consisting of speed•pipe® (Ø ≤ 12 mm) with/ without optical fibre cables	---	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C

1) A bead of Fire protection foam combo with min. dimension of 30 mm x 20 mm (length x thickness) has to be applied around the penetrating element on both sides of the penetration seal.

2) Fire protection texture (see ANNEX I-1 of the ETA) has to be wrapped around the penetrating element on both sides of the penetration seal.

System Brandschutzschaum Kombi (System fire protection foam combo)
- cable penetration seal
- Fire resistance classification -

ANNEX J-1