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designated according to Article 29 of the Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment, www.eota.eu)

European Technical Assessment

**ETA 16/0566
of 17/04/2019**

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: UL International (UK) Ltd

Trade name of the construction product

MULCOL® MULTIMORTAR

Product family to which the construction product belongs

Fire Stopping and Sealing Product:
 • Penetration Seals

Manufacturer

Mulcol International BV
 Arnesteinweg 18
 4338 PD Middelburg
 The Netherlands



Manufacturing plant(s)

A/003

This European Technical Assessment contains

53 pages including 1 Annex which forms an integral part of this assessment.

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

EAD 350454-00-1104

This version replaces

ETA 16/0566 dated 23/08/2016

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I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

- 1) Mulcol® Multimortar is a gypsum based mortar material, used to reinstate the fire resistance performance of wall and floor constructions where they have been provided with apertures for the penetrations of multiple services.
- 2) Mulcol® Multimortar is supplied as a dry material, and is mixed with water to the required ratio prior to installation.
- 3) Mulcol® Multimortar when mixed is self-supporting in a wall and floor orientation, and may be used with or without a permanent mineral fibre backing material depending upon the required application and classification (see Annex A).
- 4) Mulcol® Multiwraps are required to be used in conjunction with Mulcol® Multimortar depending upon the required application and classification (see Annex A). Mulcol® Multiwraps are the subject of ETA 16/0564.
- 5) The applicant has submitted a written declaration that Mulcol® Multimortar 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.

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.

- 6) The use category of Mulcol® Multimortar 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 Mulcol® Multimortar is to reinstate the fire resistance performance of flexible wall, rigid wall and floor constructions where they are penetrated by various cables, trays and metallic, plastic and composite pipes.
- 2) The specific elements of construction that the system Mulcol® Multimortar may be used to provide a penetration seal in, are as follows:
 - a. Flexible walls: The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs* lined on both faces with minimum 2 layers of 12.5 mm thick boards.
 - b. Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³.

- 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/m³.

* 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 Mulcol® Multimortar may be used to provide a penetration seal with cables, cable trays, plastic pipes, composite pipes and metallic pipes with and without insulation, with mixed services in the same seal/aperture (for details see Annex A).
- 4) The system Mulcol® Multimortar may be used to seal apertures in the separating element up to 2400mm wide by 1200mm high in a wall, and 2400mm by 1200 mm in a floor. The minimum permitted separation between adjacent seals/apertures is 200mm. Services within the system Mulcol® Multimortar seal do not require a minimum separation, except where specifically detailed in Annex A.
- 5) Services in floors shall be supported at 250 mm and 400 mm from the top face. Services in walls shall be supported at 270 mm and 470 mm from both faces of the wall.
- 6) The provisions made in this European Technical Assessment are based on an assumed working life of the Mulcol® Multimortar of 30 years, provided that the conditions laid down in sections 4.2/5.1/5.2 for the 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, 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 Z₂: 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: Mortar		Intended use: Penetration Seal
Basic requirement for construction work	Essential Characteristics	Performance
BWR 1 Mechanical resistance and stability		
-	None	Not relevant
BWR 2 Safety in case of fire		
EN 13501-1	Reaction to fire	Class 'A1'
EN 13501-2	Resistance to fire	Annex A
BWR 3 Hygiene, health and environment		
EN 1026:2000	Air permeability (material property)	No performance determined
EAD 350454-00-1104, Annex C	Water permeability (material property)	No performance determined
Declaration of manufacturer	Release of dangerous substances	Use categories: IA1, S/W3 Declaration of manufacturer
BWR 4 Safety in use		
EOTA TR 001:2003	Mechanical resistance and stability	Suitable for use in walls and floors in Zone Types I, II, III & IV
EOTA TR 001:2003	Resistance to impact/movement	
EOTA TR 001:2003	Adhesion	
BWR 5 Protection against noise		
EN 10140-2/ EN ISO 717-1	Airborne sound insulation	No performance determined
BWR 6 Energy economy and heat retention		
EN 12664, EN 12667 or EN 12939	Thermal properties	No performance determined
EN ISO 12572 EN 12086	Water vapour permeability	No performance determined
General aspects relating to fitness for use		
EOTA TR 024:2009, clause 3.1.11 & 3.1.12	Durability and serviceability	Z ₂
BWR 7 Sustainable use of natural resources		
-	-	No performance determined

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 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 Commission¹, 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

Tasks of the manufacturer:

Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this European technical Assessment.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the Control Plan of 8th April 2013 relating to the European Technical Assessment ETA 16/0566 issued on 17/04/2019 which is part of the technical documentation of this European Technical Assessment. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at UL International (UK) Ltd.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan.

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

Other tasks of the manufacturer

Additional information

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information:

(a) Technical data sheet:

- Field of application:
- Building elements for which the linear joint seal or penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions – the construction requirements.
- Limits in size, minimum thickness etc. of the joint or penetration seal
- Construction of the linear joint seal or penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific.
- Services which the penetration seal is suitable, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays)

(b) Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting
- Stipulations on maintenance, repair and replacement

6 Issued on:

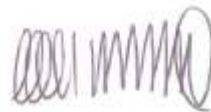
17th April 2019

Report by:



C. Johnson
Staff Engineer
Building and Life Safety Technologies


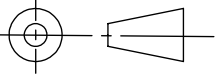
Reviewed by:

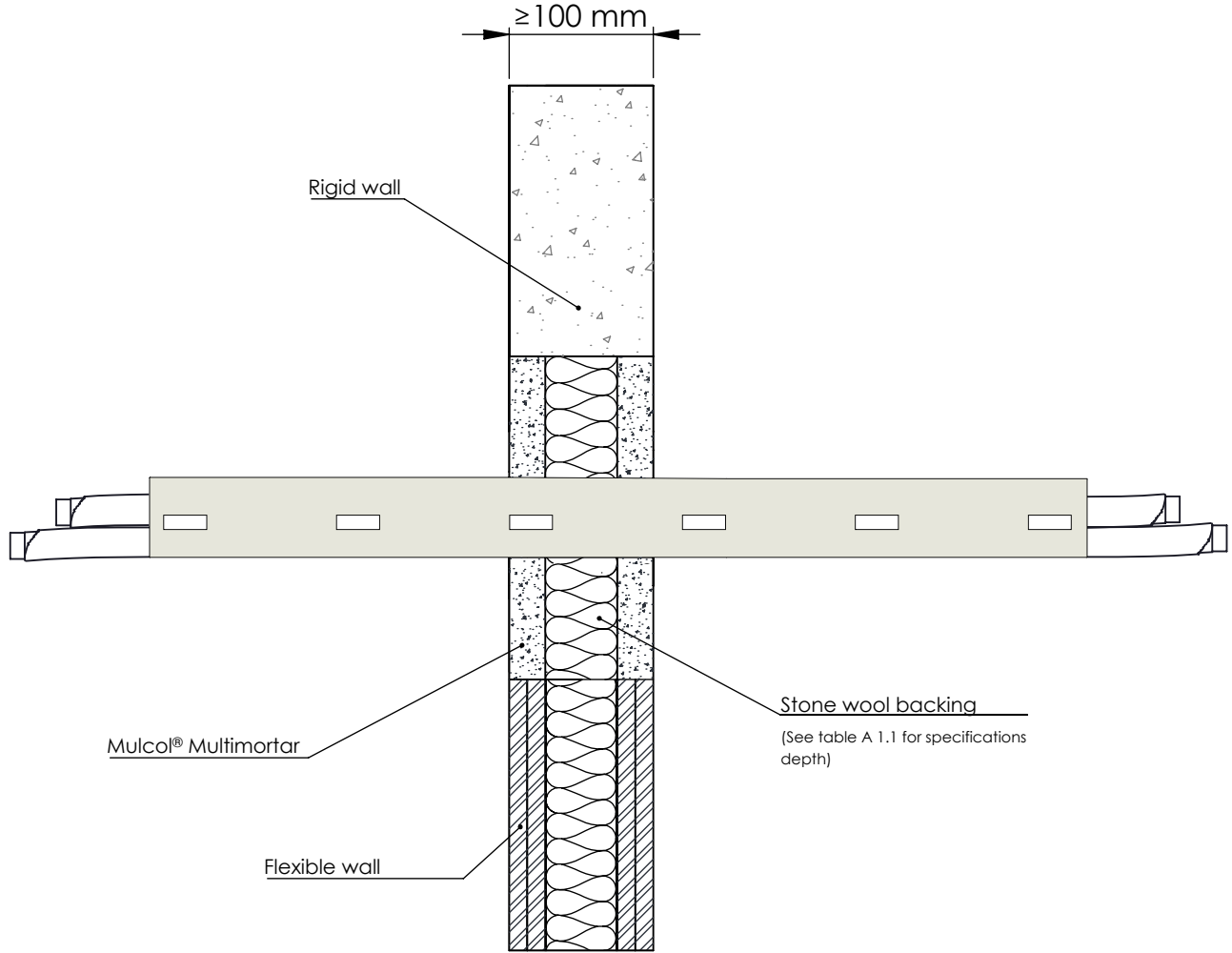


C. W. Miles
Business Manager – Europe & Latin America
Building and Life Safety Technologies

For and on behalf of UL International (UK) Ltd.

Annex A - Resistance to fire classification - Mulcol® Multimortar


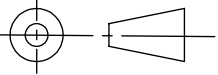
Fire test cable penetration seal Mulcol® Multimortar Rigid/Flexible wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	FW-CT-MM1.4.10
	Unit of measure : mm	Department : Research & Development	
	Date : 19-5-2016	Draftsman : R.M.	A4

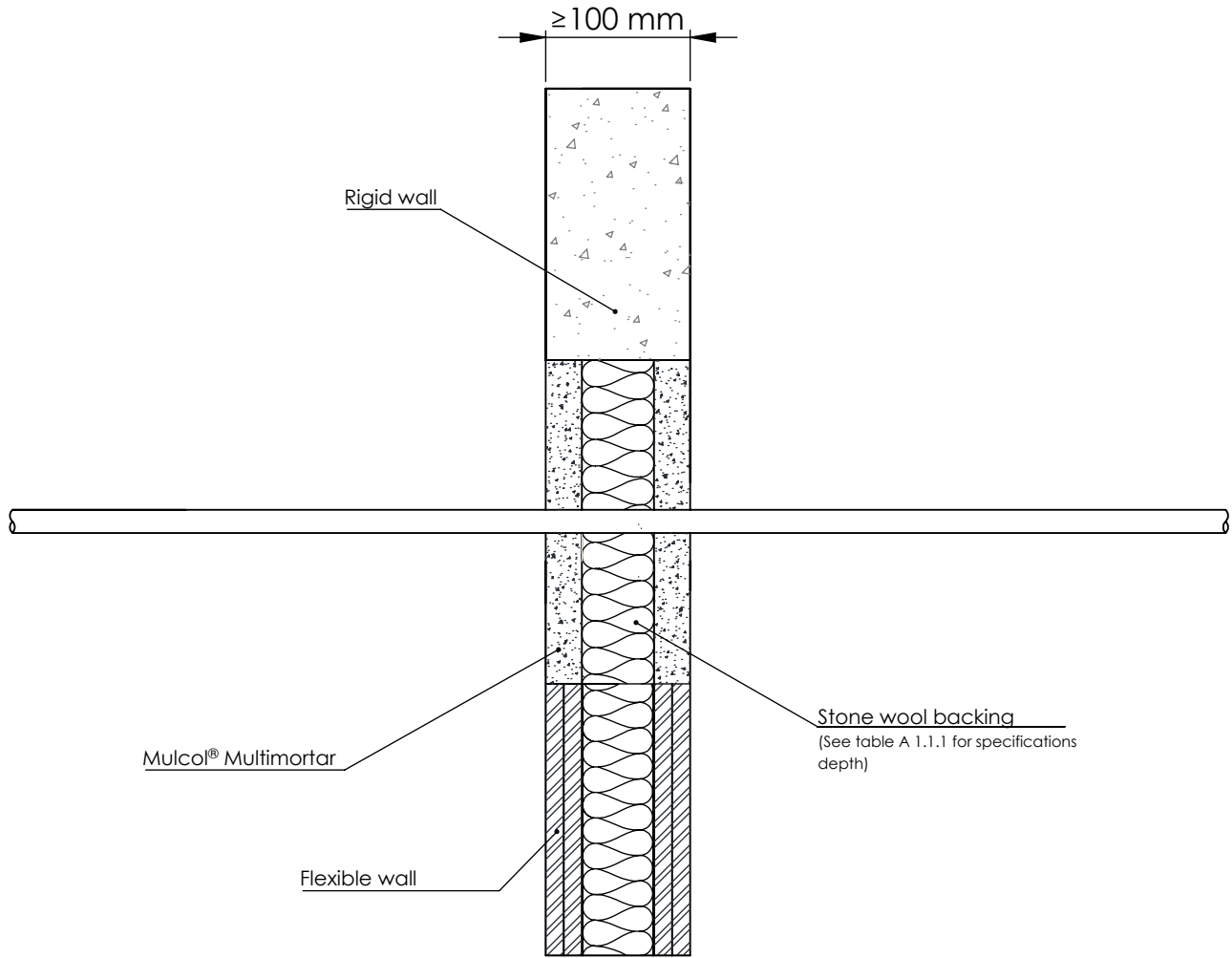


A 1.1 Double side penetration seal with cables, trays and conduits

Services	Classification	Position Mulcol® Multimortar	Backing	Maximum seal	Position services
Blank seals	EI 120	Both sides of the wall 25 mm thick	50 mm Stone wool insulation, 150 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 25 mm from seal edges and 100 mm from other services)
Electrical cables up to \varnothing 21 mm (min. 100 separation from other services)	E 120, EI 90				
Electrical cables up to \varnothing 80 mm (single, bundled and on trays)	E 120, EI 60				
Telecommunication cables up to \varnothing 21 mm (single or bundles up to \varnothing 100mm)					
Steel cable trays and ladders (perforated or none perforated)					
Non-sheathed wires up to \varnothing 24 mm	E 120, EI 45				
PVC conduit up to \varnothing 16 mm	EI 120 C/U				

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test cable penetration seal Mulcol® Multimortar Rigid/Flexible wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	FW-PP-MM1.4.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

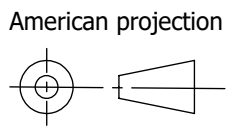


A 1.1.1 Double side penetration seal with copper and steel conduits

Services	Classification	Position Mulcol® Multimortar	Backing	Maximum seal	Position services
Steel conduit up to \varnothing 16 mm	E 120 C/U, EI 60 C/U	Both sides of the wall 25 mm thick	50 mm Stone wool insulation, 150 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 25 mm from seal edges and 100 mm from other services)
Copper conduit up to \varnothing 16 mm	E 120 C/U, EI 45 C/U				

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
Mulcol® Multimortar
Rigid/Flexible wall construction according to I.2.2

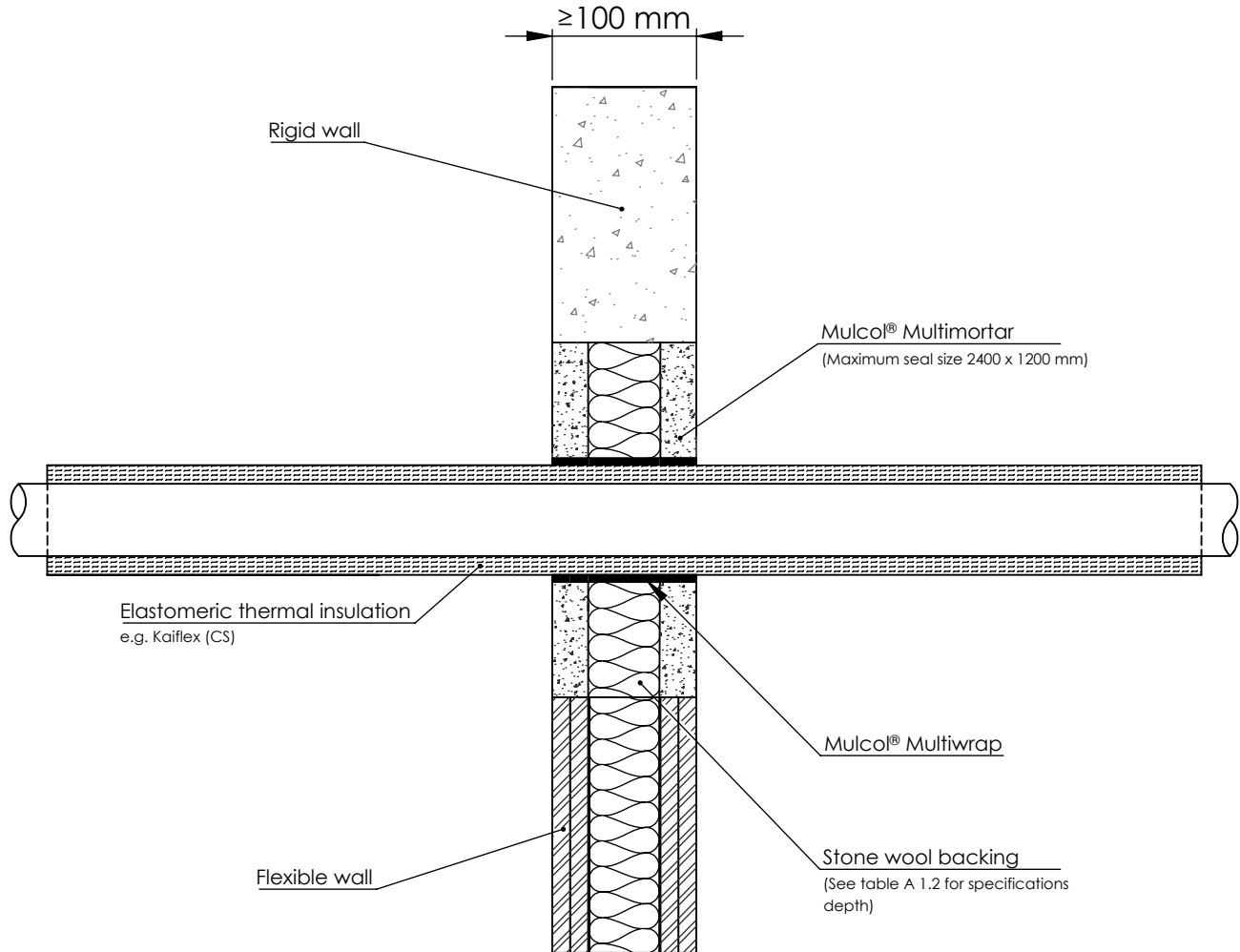


Scale : 1:5
Unit of measure : mm
Date : 6-4-2016

Company : Mulcol International B.V.
Department : Research & Development
Draftsman : R.M.

FW-ST-MM1.4.20

A4



A 1.2 Double side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Mulcol® Multiwrap	Position services
Steel pipe Ø 40 mm / 1-14.2 mm wall th.	EI 120 C/U	Both sides of the wall 25 mm thick backed with 50 mm stone wool insulation, 150 kg/m ³	13 mm Kaiflex ST insulation	50 x 1.8 mm (1 layer) one fitted flush to each face of seal	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Steel pipe Ø 40 mm / 1-14.2 mm wall th.	E 120 C/U, EI 60 C/U			50 x 3.6 mm (2 layers) one fitted flush to each face of seal	
Steel pipe Ø 50 mm / 1.3-14.2 mm wall th.					
Steel pipe Ø 60 mm / 1.6-14.2 mm wall th.					
Steel pipe Ø 75 mm / 2.-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2.4-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.7-14.2 mm wall th.					
Steel pipe Ø 115 mm / 3.1-14.2 mm wall th.					
Steel pipe Ø 140 mm / 3.8-14.2 mm wall th.					
Steel pipe Ø 165 mm / 4.5-14.2 mm wall th.					

See graph on page 11 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid/Flexible wall construction according to I.2.2

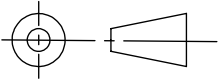


American projection

Scale : 1:5

Company : Mulcol International B.V.

FW-ST-MM1.2.20



Unit of measure : mm

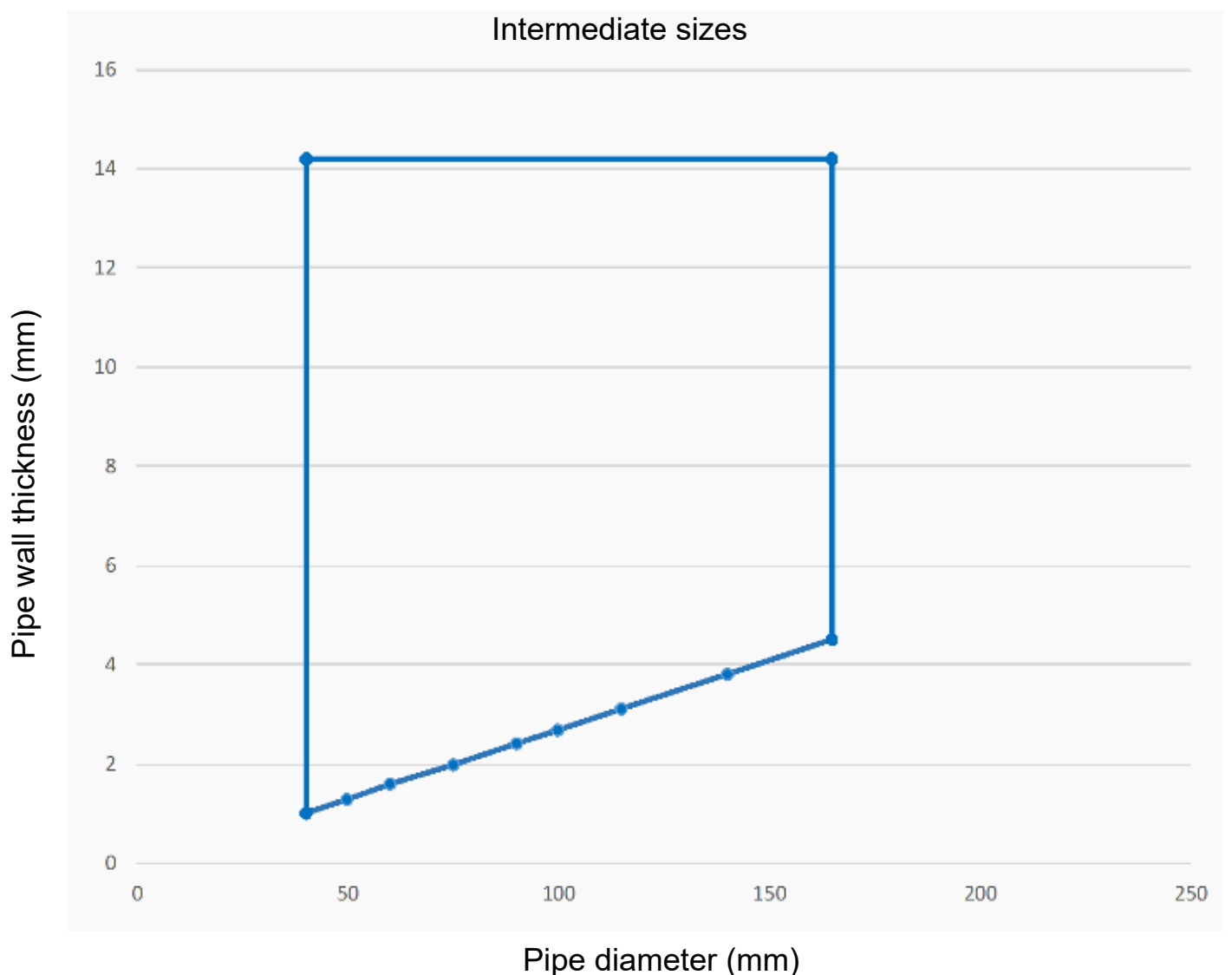
Department : Research & Development

Date : 6-4-2016


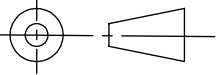
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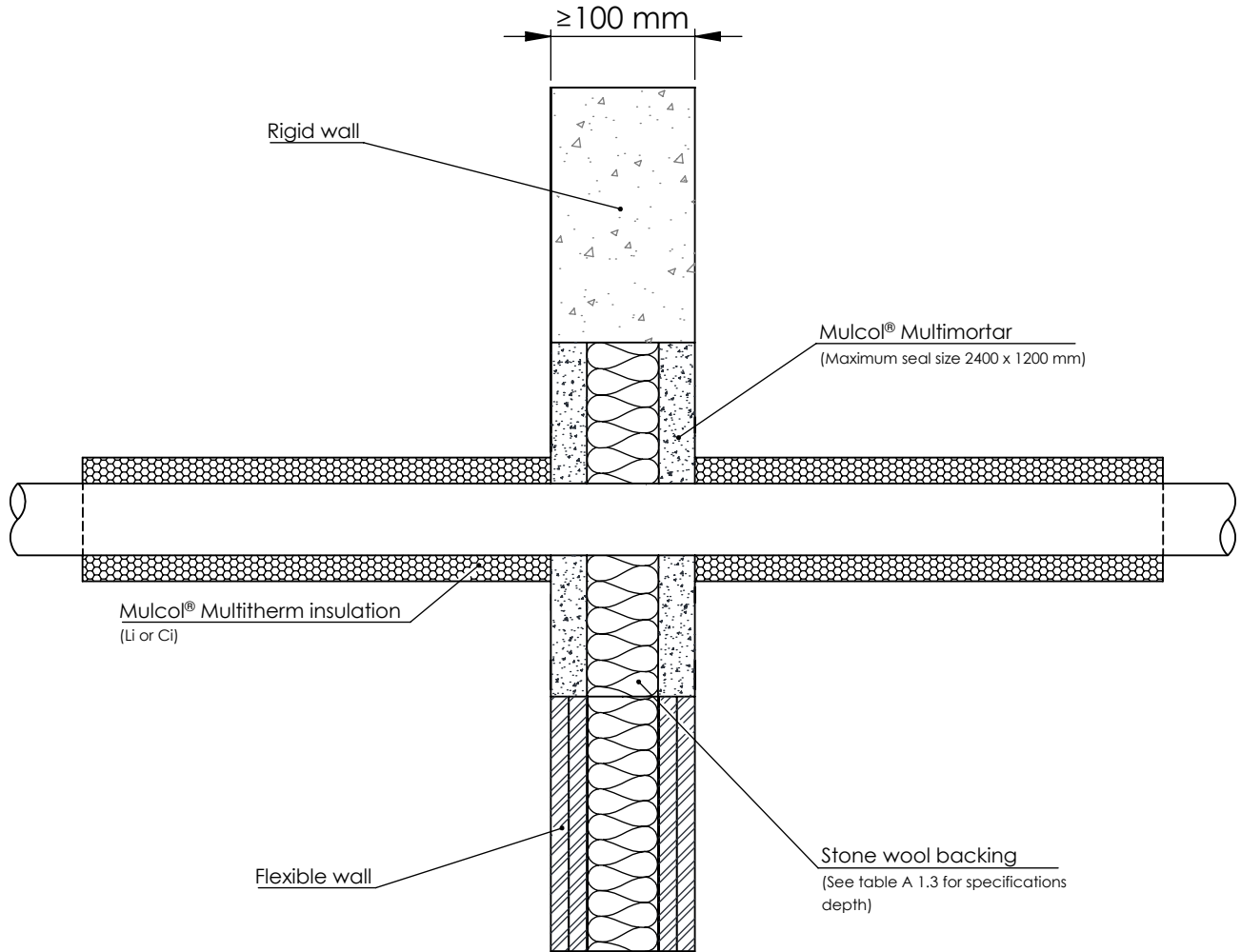
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Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar


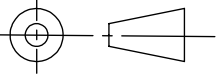
Fire test pipe penetration seal Mulcol® Multimortar Rigid/Flexible wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	FW-MLA-MM1.4.20
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

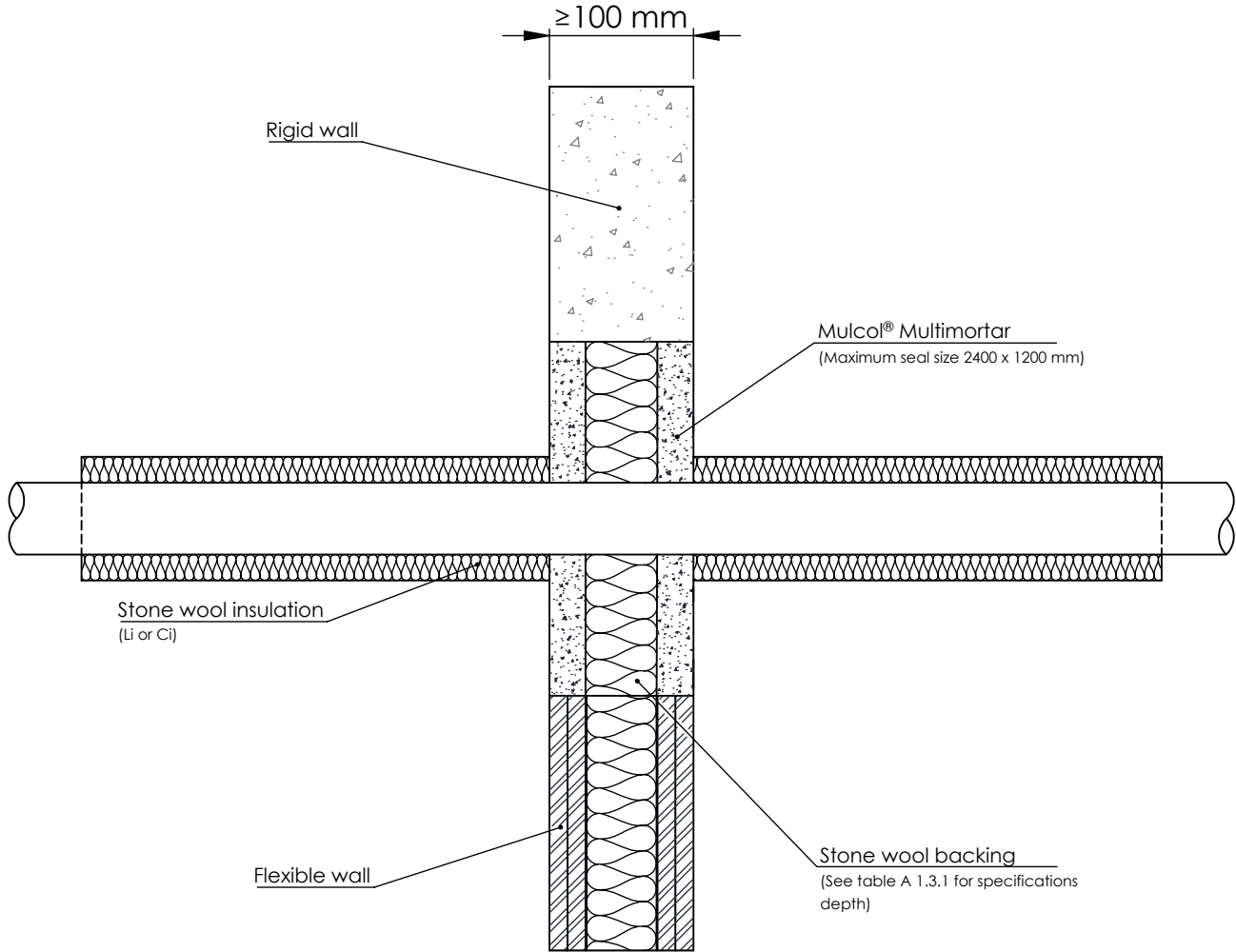


A 1.3 Double side penetration seal with composite pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Position services
Alupex composite pipe \varnothing 75 mm / 7.5 mm wall th.	EI 60 U/U, EI 60 C/U, EI 60 U/C	To both sides of the wall 25mm thick	50 mm Stone wool insulation, 150 kg/m ³	600 mm length of 25 mm Mulcol® multitherm insulation, 80 kg/m ³	Service fitted at any position within the aperture (min. separation 40 mm from seal edges and 100 mm from other services)

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid/Flexible wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	FW-ST-MM1.4.20
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4



A 1.3.1 Double side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Position services
Steel pipe Ø 40 mm / 1-14.2 mm wall th.	EI 120 C/U	To both sides of the wall 25mm thick	50 mm Stone wool insulation, 150 kg/m ³	500 mm length of 20 mm Stone wool insulation, 80 kg/m ³	Service fitted at any position within the aperture (min. separation 40 mm from seal edges and 100 mm from other services)
Steel pipe Ø 40 mm / 1-14.2 mm wall th.	E 120 C/U, EI 90 C/U			500 mm length of 30 mm Stone wool insulation, 80 kg/m ³	
Steel pipe Ø 50 mm / 1.2-14.2 mm wall th.					
Steel pipe Ø 60 mm / 1.4-14.2 mm wall th.					
Steel pipe Ø 75 mm / 1.7-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.2-14.2 mm wall th.					
Steel pipe Ø 115 mm / 2.5-14.2 mm wall th.					
Steel pipe Ø 140 mm / 3.-14.2 mm wall th.					
Steel pipe Ø 165 mm / 3.5-14.2 mm wall th.					
Steel pipe Ø 180 mm / 3.8-14.2 mm wall th.					
Steel pipe Ø 200 mm / 4.2-14.2 mm wall th.					
Steel pipe Ø 219 mm / 4.5-14.2 mm wall th.					

See graph on page 14 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimastic FB2
 Rigid/Flexible wall construction according to I.2.2

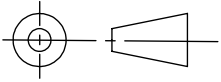


American projection

Scale : 1:5

Company : Mulcol International B.V.

FW-ST-MM1.4.20



Unit of measure : mm

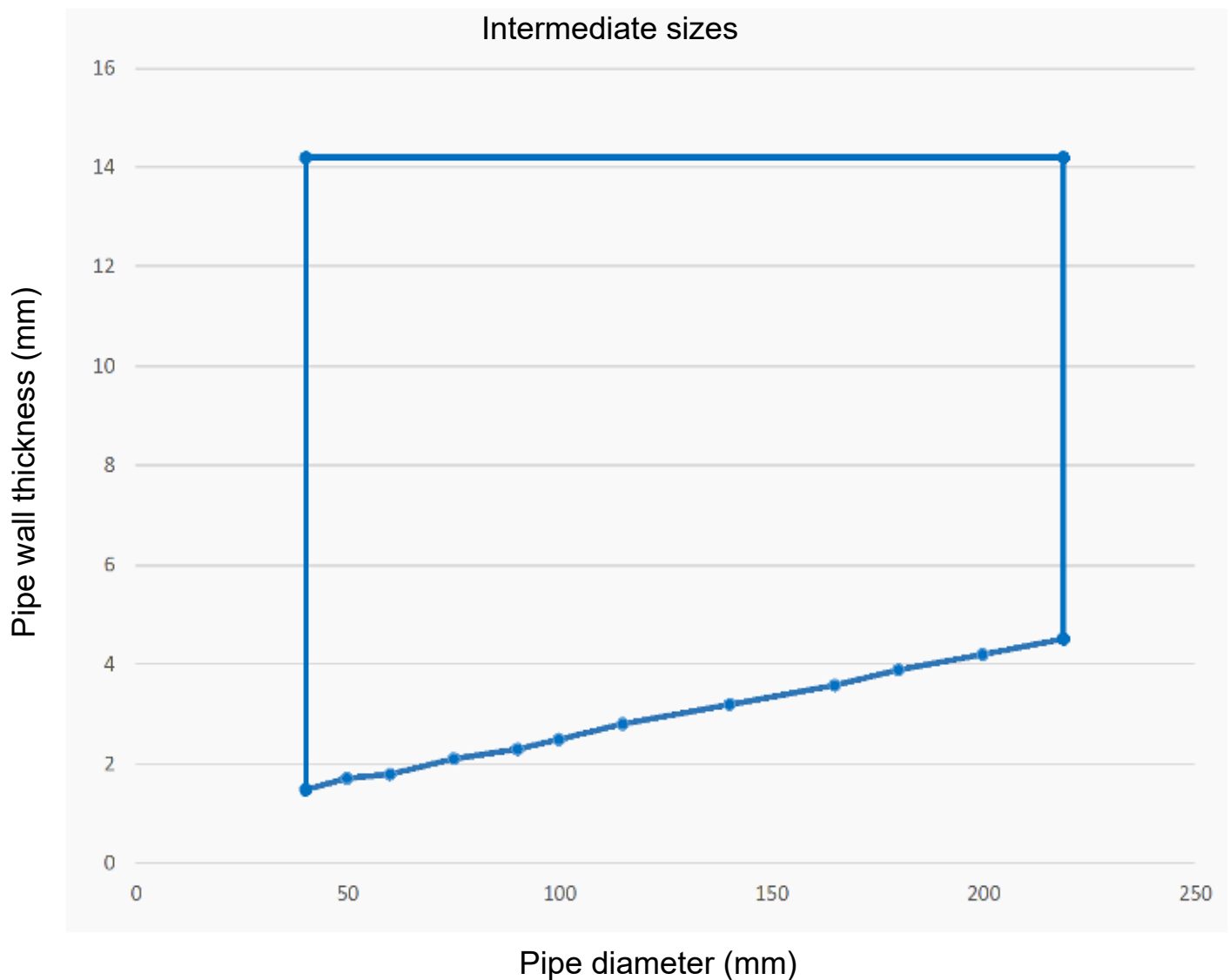
Department : Research & Development

Date : 6-4-2016

Draftsman : R.M.

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Intermediate sizes

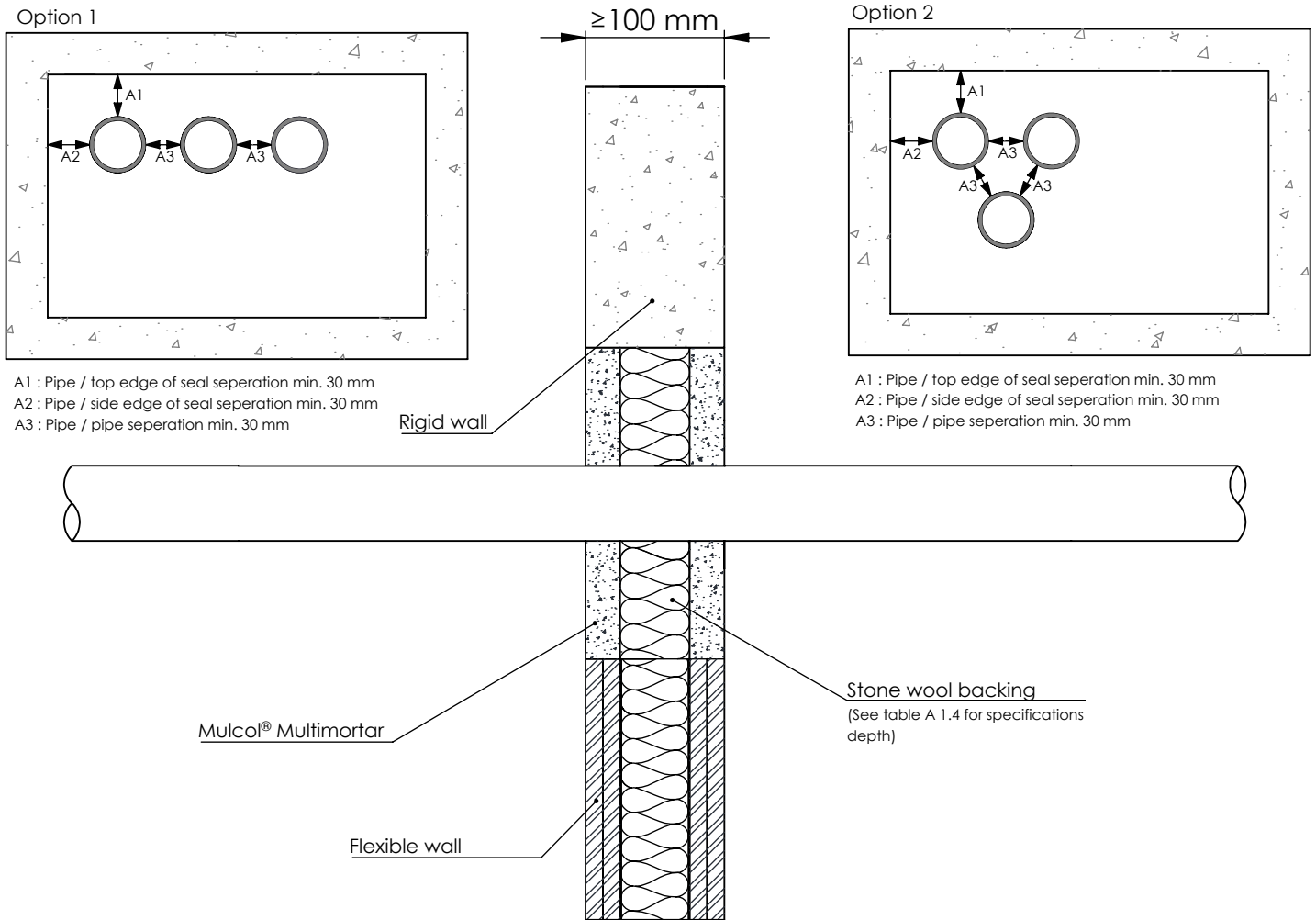


Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
Mulcol® Multimortar
Rigid/Flexible wall construction according tot I.2.2



American projection 	Scale	: 1:5	Company	: Mulcol International B.V.	FW-ST-MM2.2.20
	Unit of measure	: mm	Department	: Research & Development	
	Date	: 6-4-2016	Draftsman	: R.M.	A4



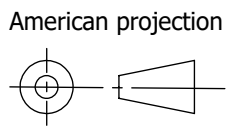
A 1.4 Double side penetration seal with combustible pipes

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Configuration
PVC-U pipe according to EN 1329-1, EN 1452 and EN 1453-1**, PVC-C according to EN 1566-1				
up to Ø 32 mm / 1.6 - 2.4 mm wall th.	EI 120 U/C	Both sides of the wall 25 mm thick backed with 50 mm stone wool insulation, 140 kg/m ³	2400 x 1200 mm	1 & 2 between all specified pipes
PE (PE-HD) pipe according to EN 1519-1, EN 12201-2 and EN 12006-1*, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1				
up to Ø 32 mm / 1.8 - 3.0 mm wall th.	EI 120 U/C	Both sides of the wall 25 mm thick backed with 50 mm stone wool insulation, 140 kg/m ³	2400 x 1200 mm	1 & 2 between all specified pipes
PP pipe according to EN 1852-1: 2009				
up to Ø 32 mm / 1.9 - 4.4 mm wall th.	EI 120 U/C	Both sides of the wall 25 mm thick backed with 50 mm stone wool insulation, 140 kg/m ³	2400 x 1200 mm	1 & 2 between all specified pipes

* In germany the pipes have additionally to comply with DIN 19535-10
** In germany the pipes have additionally to comply with DIN 19531-10

Annex A - Resistance to fire classification - Mulcol® Multimortar

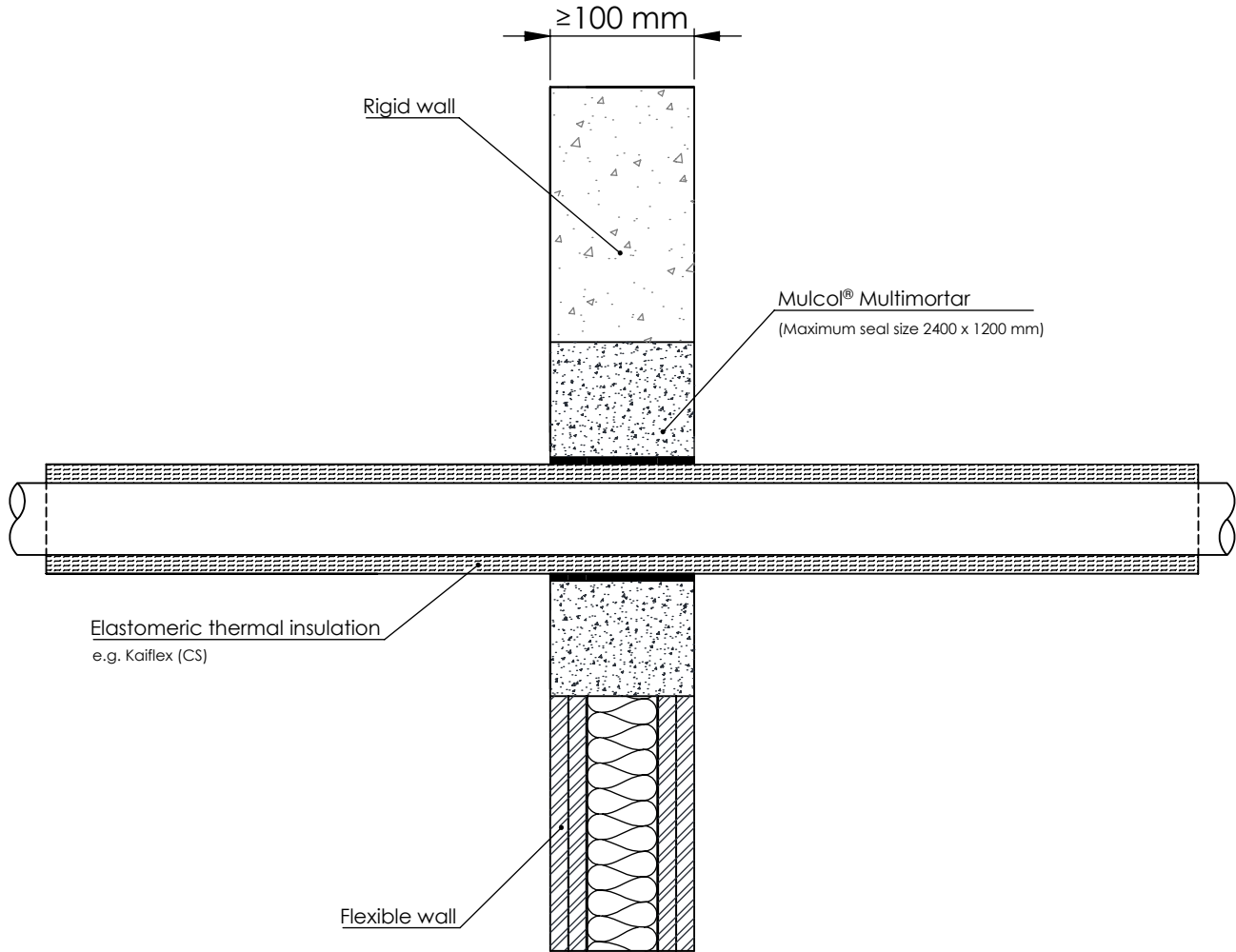
Fire test cable penetration seal
Mulcol® Multimortar
Rigid/Flexible wall construction according to I.2.2



Scale : 1:5
Unit of measure : mm
Date : 6-4-2016

Company : Mulcol International B.V.
Department : Research & Development
Draftsman : R.M.

FW-ST-MM2.2.20
A4



A 1.5 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Mulcol® Multiwrap	Position services
Steel pipe Ø40 mm / 1-14.2 mm wall th.	E 120 C/U, EI 60 C/U	Entire wall thickness 100 mm	13-32 mm KKaiflex ST insulation	50 x 3.6 mm (2 layers) one fitted flush to each face of seal	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Steel pipe Ø50 mm / 1.3-14.2 mm wall th.					
Steel pipe Ø60 mm / 1.6-14.2 mm wall th.					
Steel pipe Ø75 mm / 2.-14.2 mm wall th.					
Steel pipe Ø90 mm / 2.4-14.2 mm wall th.					
Steel pipe Ø100 mm / 2.7-14.2 mm wall th.					
Steel pipe Ø115 mm / 3.1-14.2 mm wall th.					
Steel pipe Ø140 mm / 3.8-14.2 mm wall th.					
Steel pipe Ø165 mm / 4.5-14.2 mm wall th.					

See graph on page 17 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimastic FB2
 Rigid/Flexible wall construction according to I.2.2

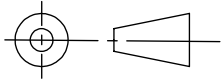


American projection

Scale : 1:5

Company : Mulcol International B.V.

FW-ST-MFB2.2.20



Unit of measure : mm

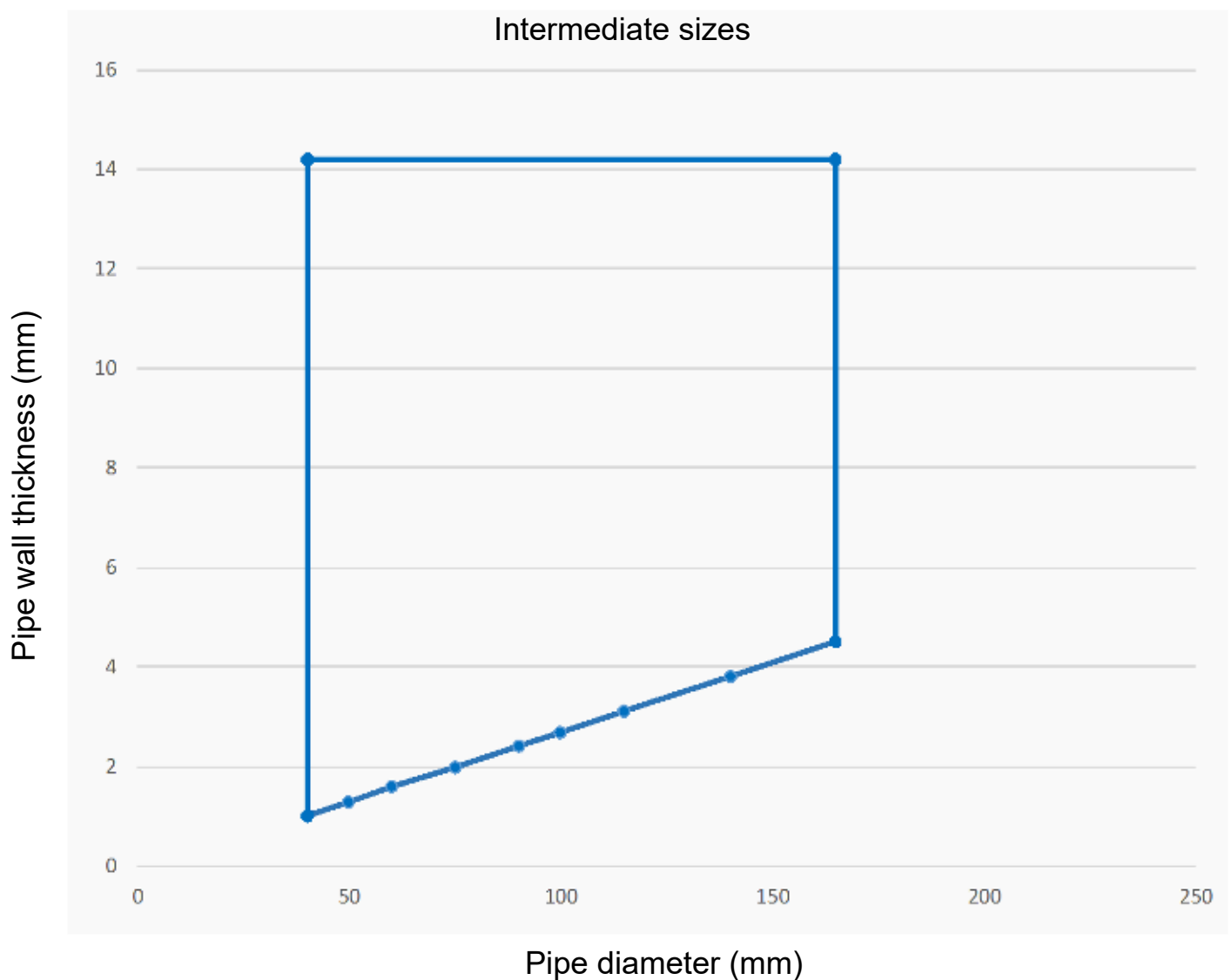
Department : Research & Development

Date : 6-4-2016


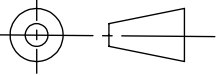
Draftsman : R.M.

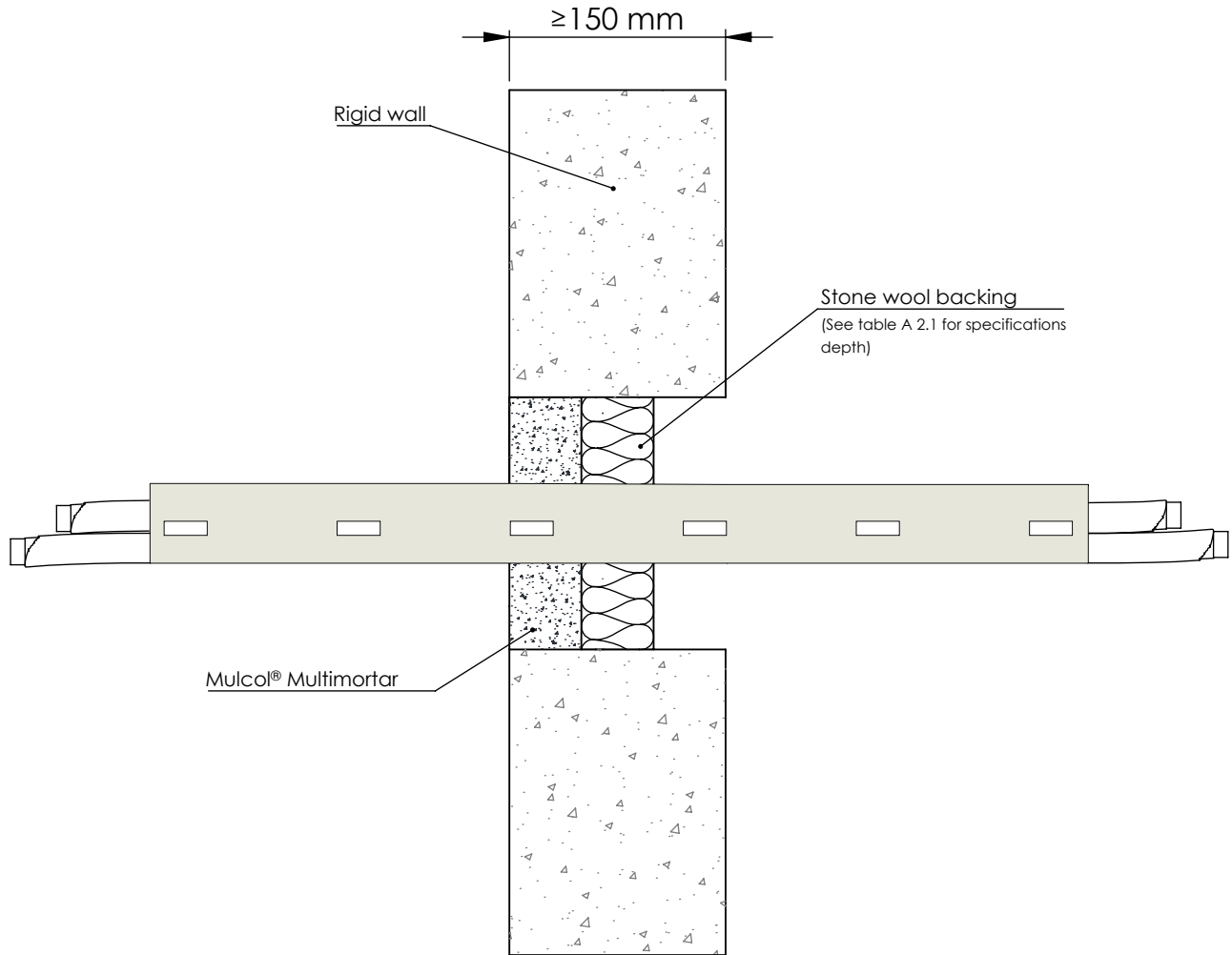
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar


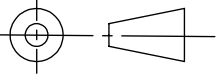
Fire test cable penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RW-EC-MM1.5.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

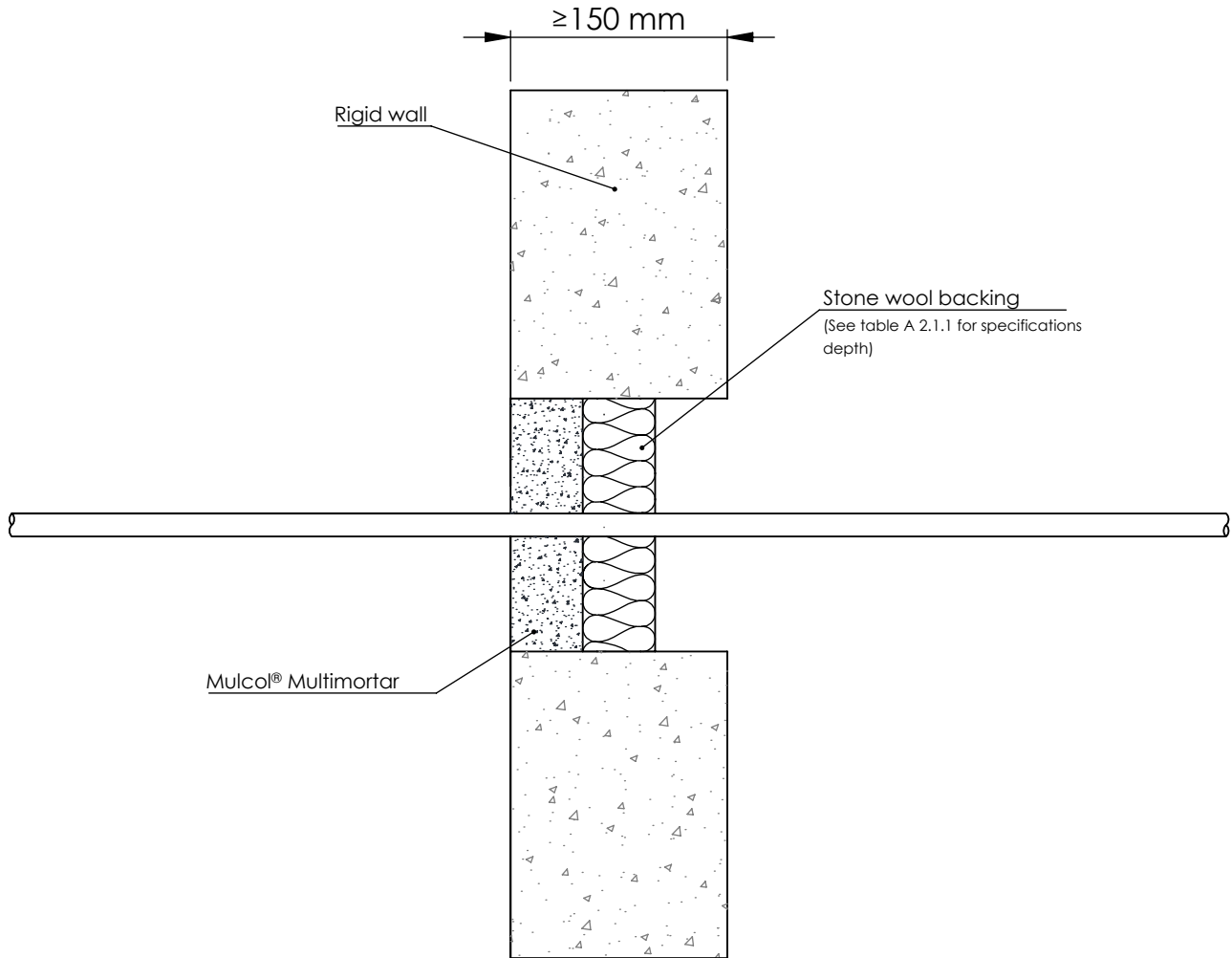


A 2.1 Single side penetration seal with cables, trays and conduits

Services	Classification	Position Mulcol® Multimortar	Backing	Maximum seal	Position Services
Blank seals	E 180, EI 120	Either side of the wall (or anywhere in between) 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 25 mm from seal edges and 0 mm from other services)
Single electrical cables up to \varnothing 21 mm	E 180, EI 60			80 x 80 mm	
Single electrical cables up to \varnothing 21 mm	E 240, EI 60			2400 x 1200 mm	
Electrical cables up to \varnothing 21 mm (single, bundled and on trays)	E 180, EI 60				
Electrical cables up to \varnothing 50 mm (single, bundled and on trays)	E 180, EI 45				
Electrical cables up to \varnothing 80 mm (single, bundled and on trays)	E 120, EI 45				
Telecommunication cables up to \varnothing 21 mm (single or bundles up to \varnothing 100mm)	E 180, EI 90				
Steel cable trays & ladders (perforated and none-perforated)	E 180, EI 60				
None-Sheated wires up to \varnothing 17 mm	E 180, EI 45				
None-Sheated wires up to \varnothing 24 mm	E 180, EI 30				
PVC conduit up to \varnothing 16 mm	E 180 C/U, EI 60 C/U				

Annex A - Resistance to fire classification - Mulcol® Multimortar


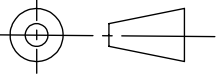
Fire test cable penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RW-EC-MM1.5.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

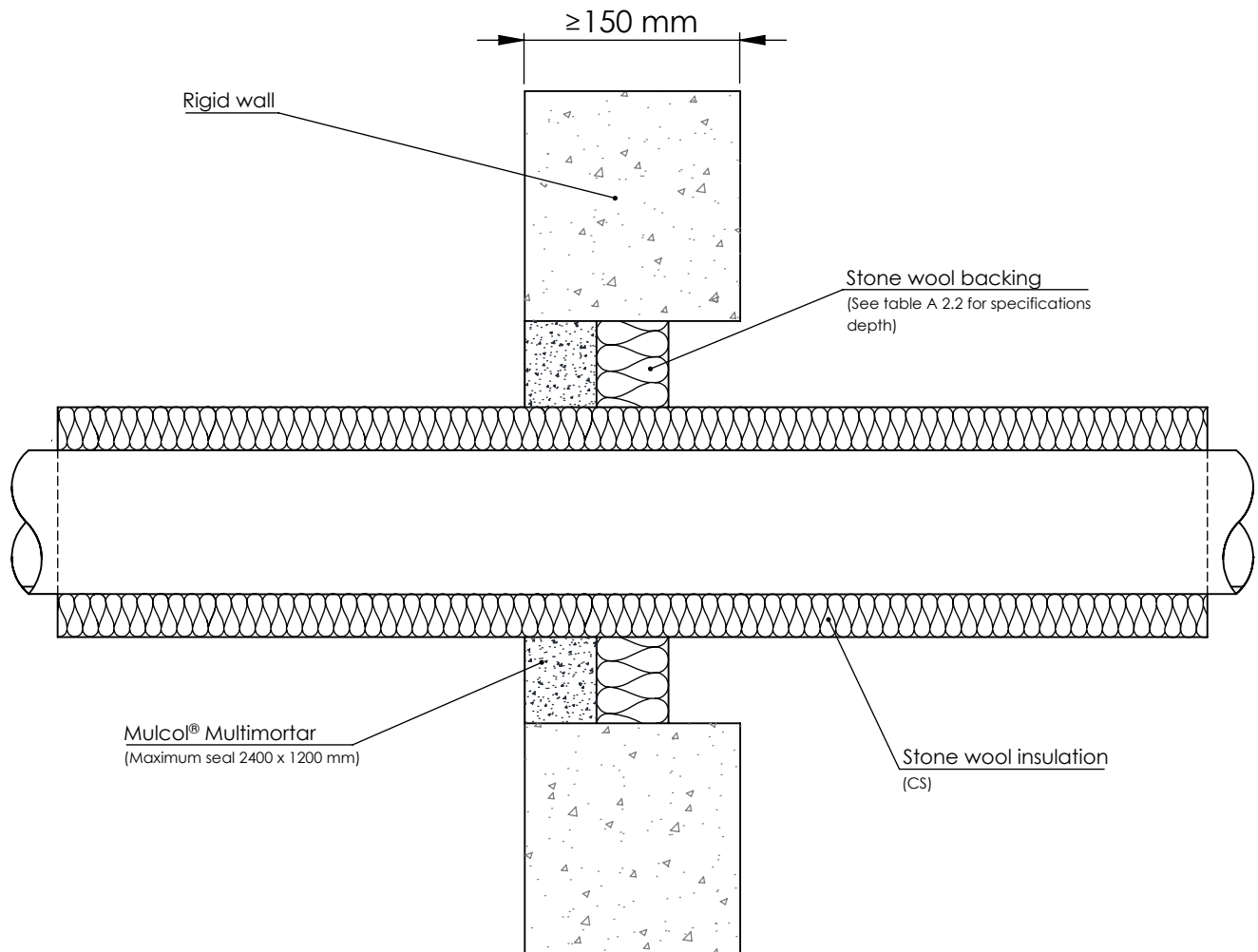


A 2.1.1 Single side penetration seal with copper and steel conduits

Services	Classification	Position Mulcol® Multimortar	Backing	Maximum seal	Position Services
Copper conduit up to \varnothing 16 mm	E 180 C/U, EI 30 C/U	Either side of the wall (or anywhere in between) 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 25 mm from seal edges and 0 mm from other services)
Steel conduit up to \varnothing 16 mm	E 180 C/U, EI 60 C/U				

Annex A - Resistance to fire classification - Mulcol® Multimortar


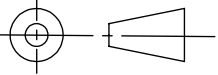
Fire test cable penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RW-ST-MM1.5.20
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

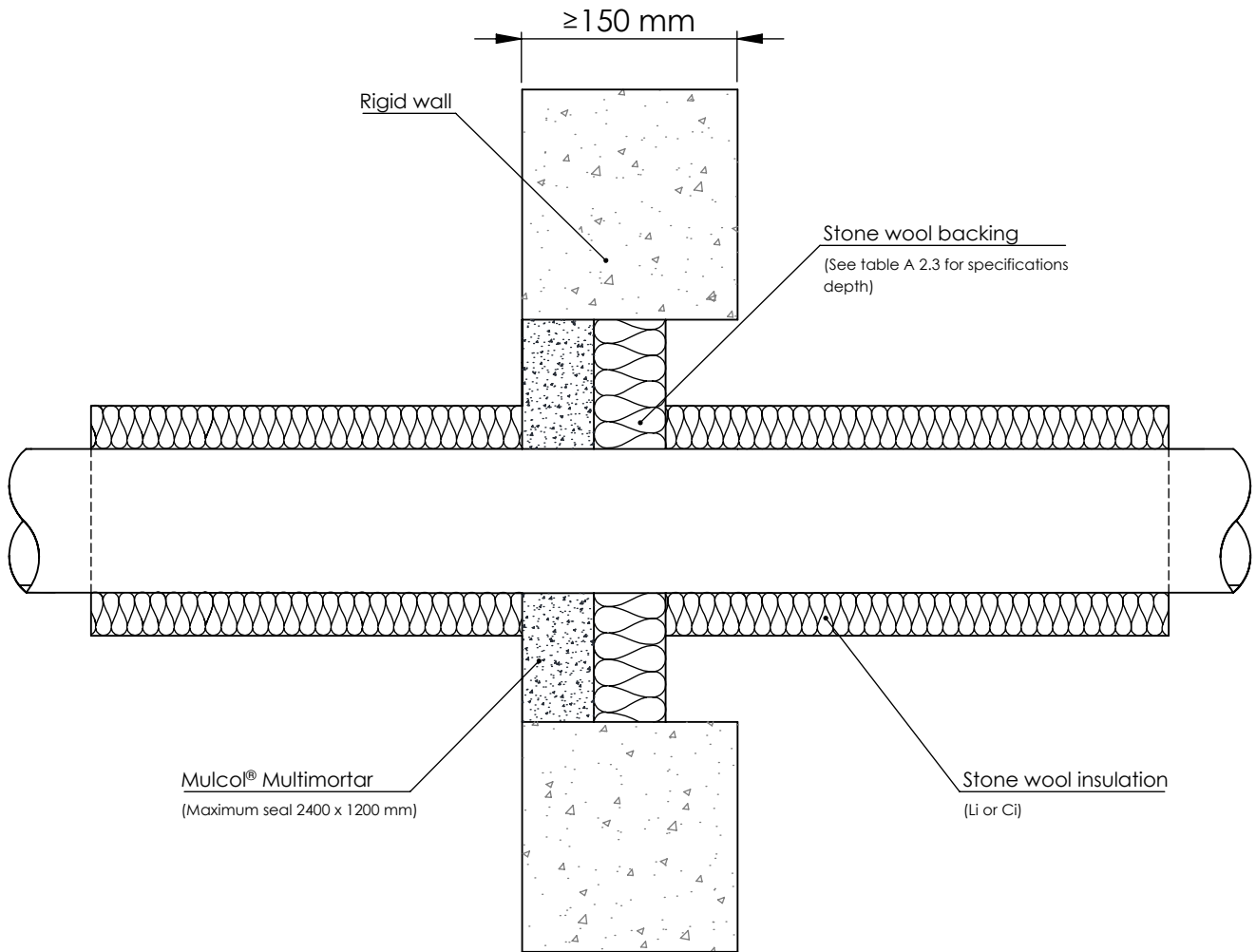


A 2.2 Single side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Position services
Steel pipe \varnothing 219 mm / 5.0-14.2 mm wall th.	E 120 C/U, EI 90 C/U	Either side of the wall (or anywhere in between) 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	30 mm Stone wool insulation, 80 kg/m ³	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test cable penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RW-ST-MMM1.2.20
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4



A 2.3 Single side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Maximum seal	Position services
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	EI 240 C/U	Either side of the wall (or anywhere in between) 50 mm thick backed with 50 mm stone wool insulation, 150 kg/m ³	1000 mm length of 20 mm Stone wool insulation, 80 kg/m ³	100 x 100 mm	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	E 180 C/U, EI 120 C/U			2400 x 1200 mm	
Steel pipe Ø 50 mm / 1.7-14.2 mm wall th.	E 120 C/U, EI 90 C/U		1000 mm length of 30 mm Mineral wool insulation, 80 kg/m ³	2400 x 1200 mm	
Steel pipe Ø 60 mm / 1.9-14.2 mm wall th.					
Steel pipe Ø 75 mm / 2.2-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2.5-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.7-14.2 mm wall th.					
Steel pipe Ø 115 mm / 3.0-14.2 mm wall th.					
Steel pipe Ø 140 mm / 3.5-14.2 mm wall th.					
Steel pipe Ø 165 mm / 3.9-14.2 mm wall th.					
Steel pipe Ø 180 mm / 4.2-14.2 mm wall th.					
Steel pipe Ø 200 mm / 4.6-14.2 mm wall th.					
Steel pipe Ø 219 mm / 5.0-14.2 mm wall th.					

See graph on page 22 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid wall construction according to I.2.2

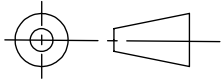


American projection

Scale : 1:5

Company : Mulcol International B.V.

RW-ST-MM1.2.20



Unit of measure : mm

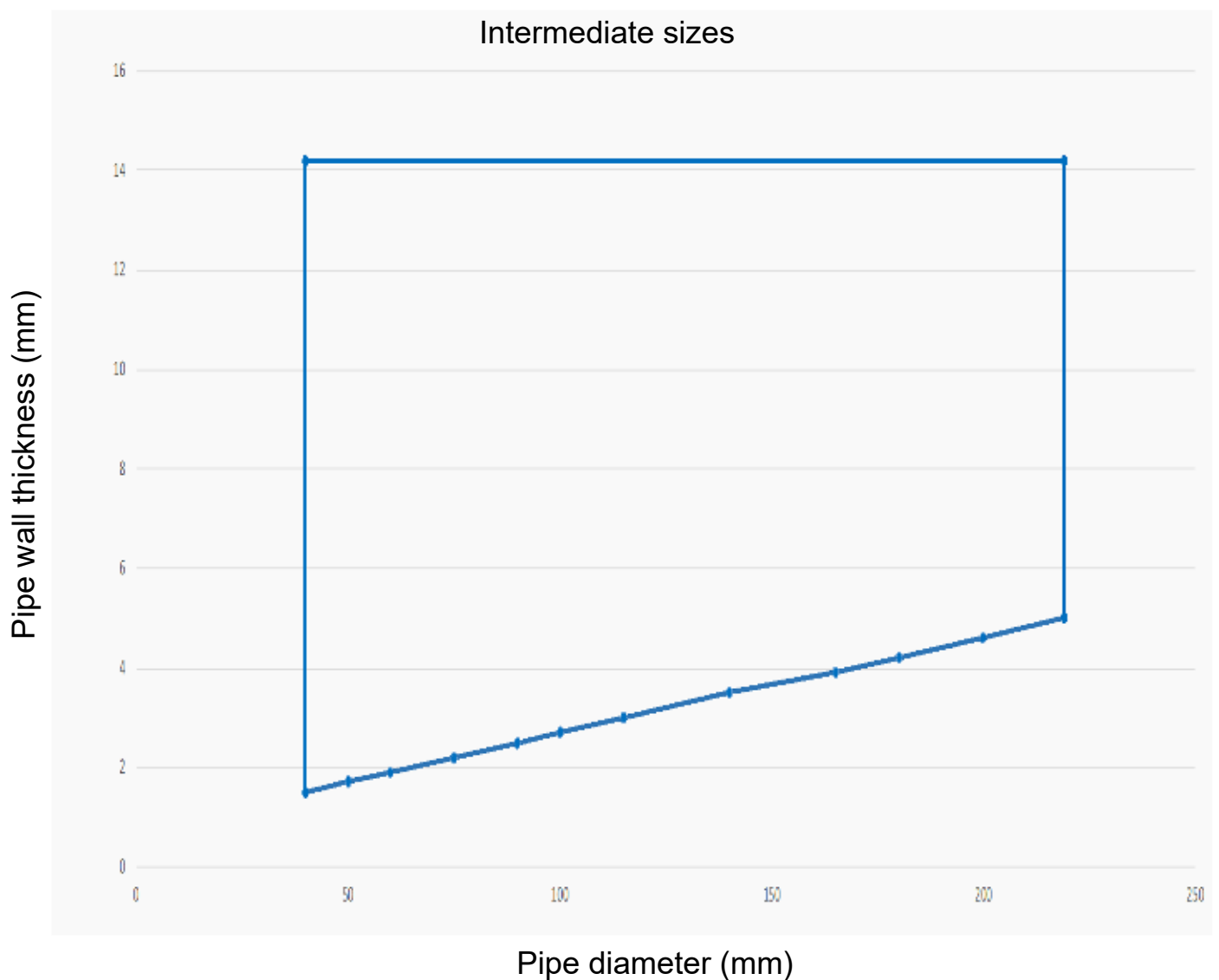
Department : Research & Development

Date : 6-4-2016


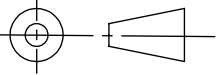
Draftsman : R.M.

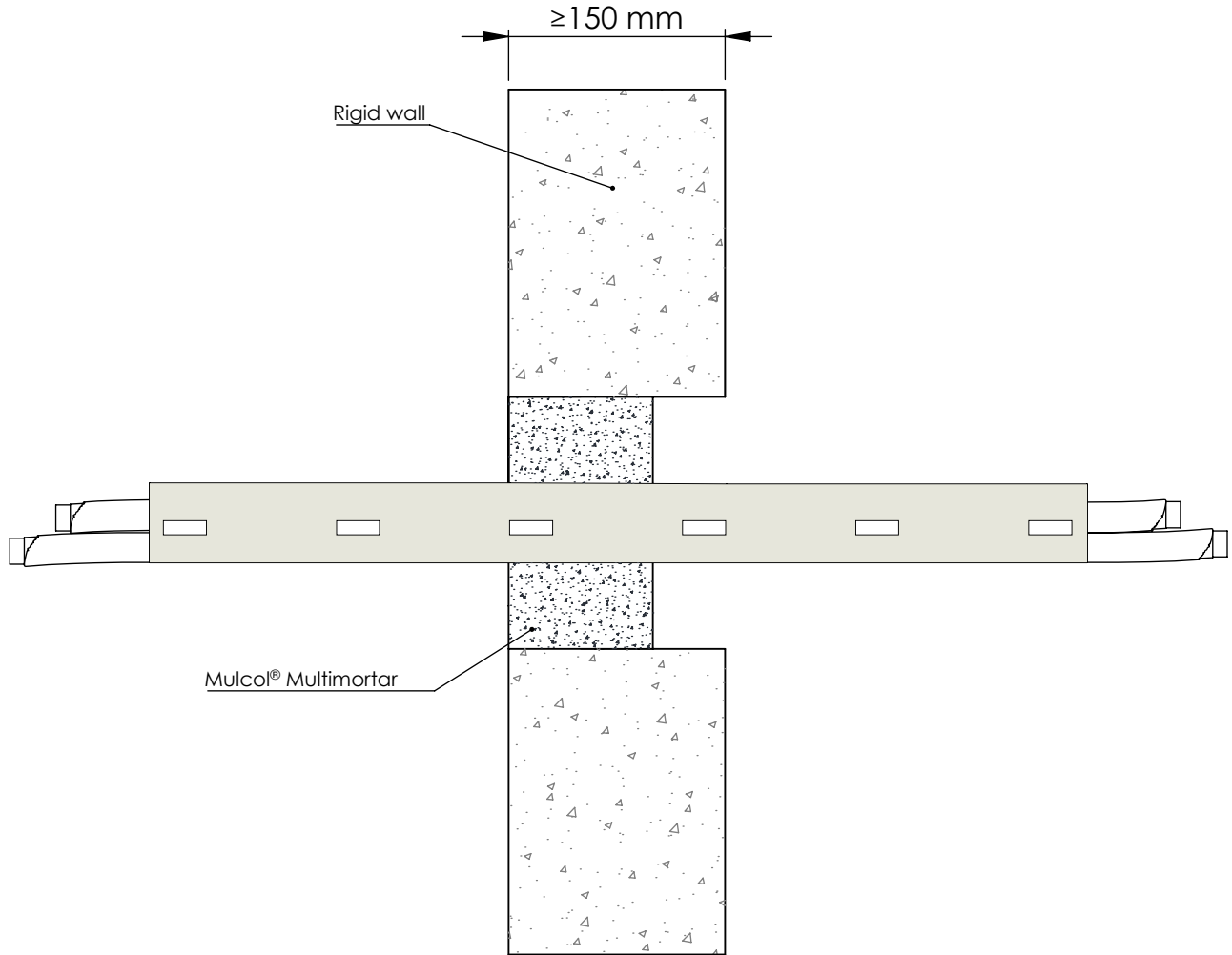
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar


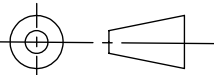
Fire test cable penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RW-EC-MM1.2.10 A4

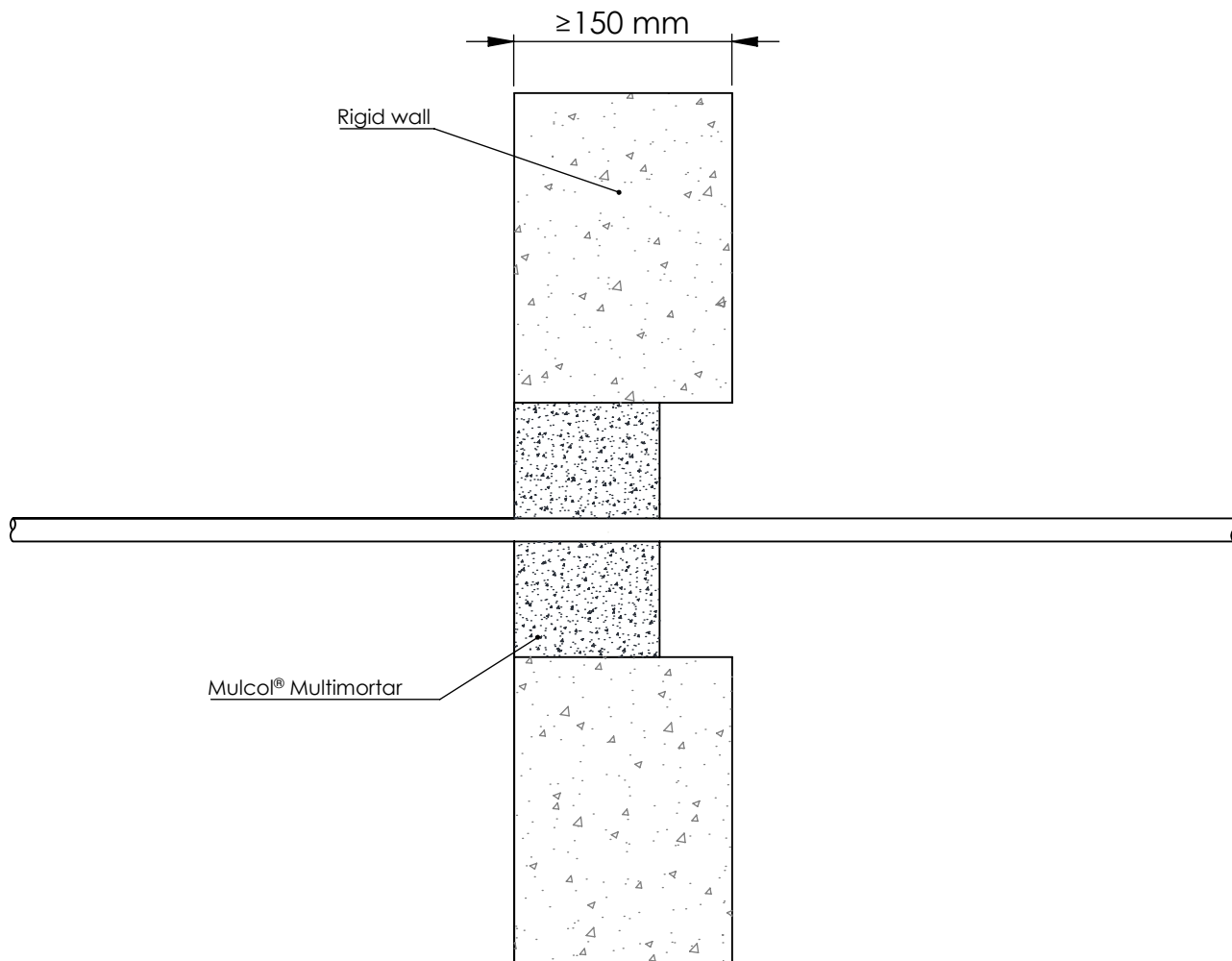


A 2.4 Penetration seal with cables, trays and conduits

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Position services
Blank seals	EI 240	Either side of the wall (or anywhere in between) 100 mm thick	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 25 mm from seal edges and 0 mm from other services)
Electrical cables up to Ø 21 mm (single, bundled and on trays)	E 240, EI 60			
Electrical cables up to Ø 80 mm (single, bundled and on trays)	E 240, EI 60			
Telecommunication cables up to Ø 21 mm (single or bundles up to Ø 100mm)	EI 120			
Steel cable trays & ladders (perforated and none-perforated)	E 120, EI 60			
None-Sheated cables up to Ø 24 mm	E 120, EI 60			
PVC conduit up to Ø 16 mm	EI 240 C/U			

Annex A - Resistance to fire classification - Mulcol® Multimortar


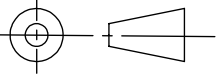
Fire test pipe penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RW-ST-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

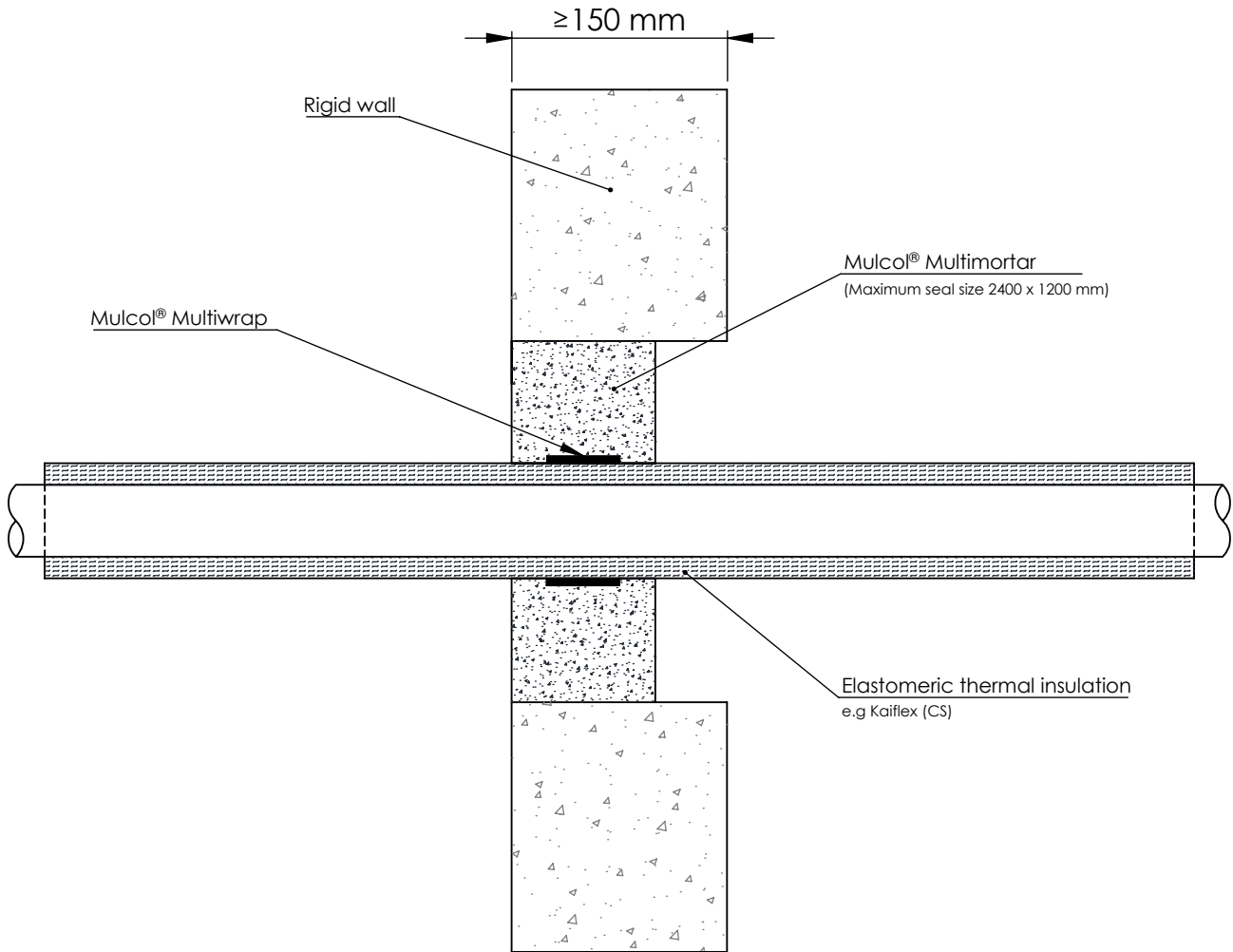


A 2.4.1 Penetration seal with copper and steel conduits

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Position services
Copper conduit up to \varnothing 16 mm	E 180 C/U, EI 30 C/U	Either side of the wall (or anywhere in between) 100 mm thick	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 25 mm from seal edges and 0 mm from other services)
Steel conduit up to \varnothing 16 mm	E 180 C/U, EI 60 C/U			

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RW-ST-MM1.2.20 A4



A 2.5 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Mulcol® Multiwrap	Position services
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	EI 240 C/U	To either side of the wall 100 mm thick	13 mm Kaiflex insulation	50 x 3.6 mm (2 layers) centrally fitted	Service fitted at any position within the aperture (min. separation 10 mm from seal edges and 0 mm from other services)
Steel pipe Ø 165 mm / 4.5-14.2 mm wall th.	E 240 C/U, EI 30 C/U		9 mm Kaiflex insulation		
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	E 240 C/U, EI 60 C/U		13 - 19 mm Kaiflex insulation	50 x 1.8 mm (1 layer) centrally fitted	
Steel pipe Ø 50 mm / 1.6-14.2 mm wall th.					
Steel pipe Ø 60 mm / 1.7-14.2 mm wall th.					
Steel pipe Ø 75 mm / 1.9-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2.0-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.1-14.2 mm wall th.					
Steel pipe Ø 115 mm / 2.3-14.2 mm wall th.					
Steel pipe Ø 140 mm / 2.6-14.2 mm wall th.					
Steel pipe Ø 165 mm / 2.8-14.2 mm wall th.					

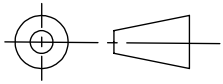
See graph on page 26 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid wall construction according to I.2.2



American projection



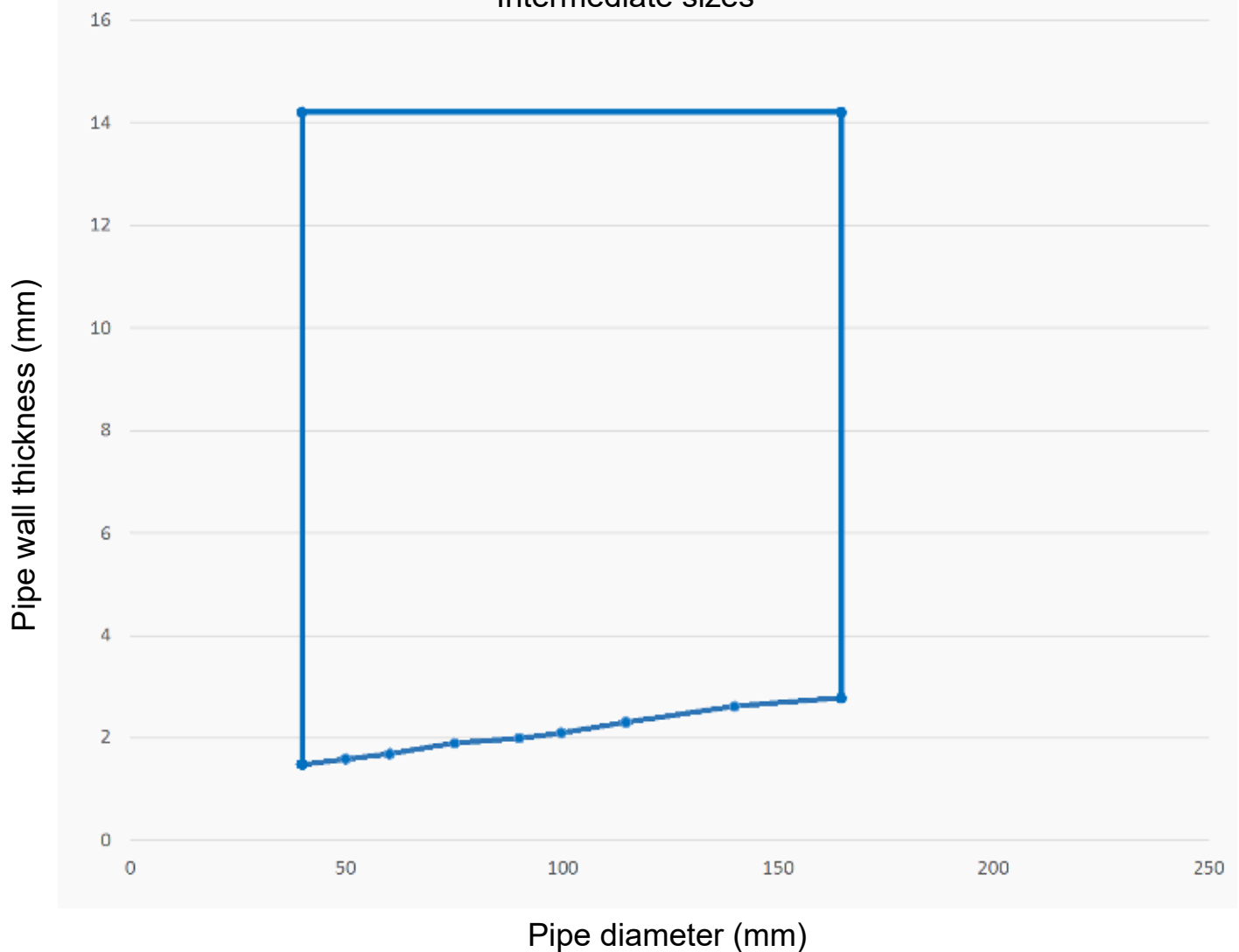
Scale : 1:5
 Unit of measure : mm
 Date : 6-4-2016

Company : Mulcol International B.V.
 Department : Research & Development
 Draftsman : R.M.


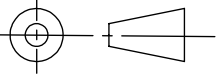
RW-ST-MM1.2.20

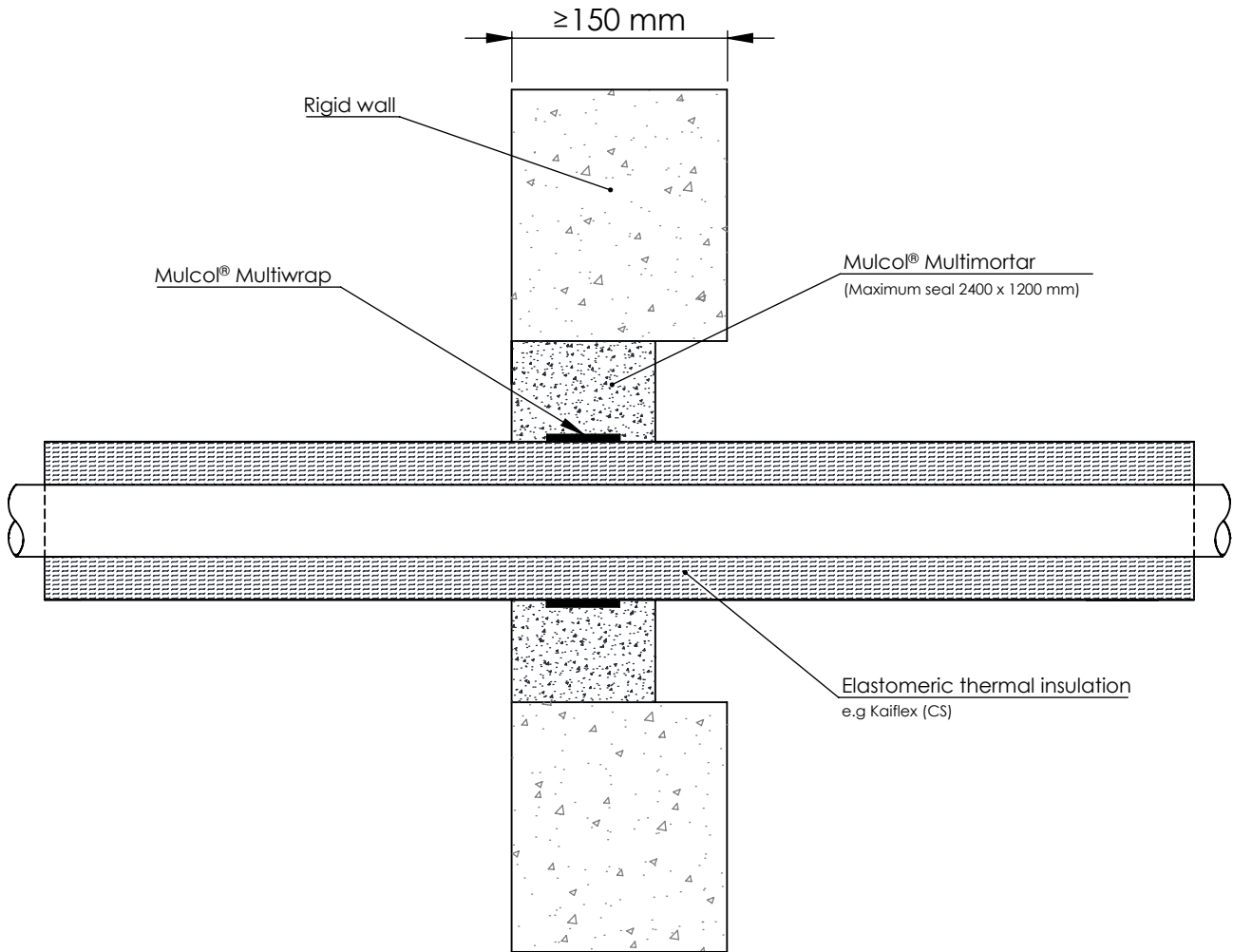
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RW-ST-MM1.2.20 A4



A 2.5.1 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Mulcol® Multiwrap	Insulation	Position of services
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th. Steel pipe Ø 50 mm / 1.8-14.2 mm wall th. Steel pipe Ø 60 mm / 2.0-14.2 mm wall th. Steel pipe Ø 75 mm / 2.3-14.2 mm wall th. Steel pipe Ø 90 mm / 2.7-14.2 mm wall th. Steel pipe Ø 100 mm / 2.9-14.2 mm wall th. Steel pipe Ø 115 mm / 3.3-14.2 mm wall th. Steel pipe Ø 140 mm / 3.9-14.2 mm wall th. Steel pipe Ø 165 mm / 4.5-14.2 mm wall th.	E 180 C/U, EI 60 C/U	To either side of the wall 100 mm thick	50 x 3.6 mm (2 layers) centrally fitted	20-25 mm Kaiflex insulation	Service fitted at any position within the aperture (min. separation 10 mm from seal edges and 0 mm from other services)

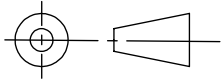
See graph on page 28 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid wall construction according to I.2.2



American projection



Scale : 1:5

Unit of measure : mm

Date : 6-4-2016

Company : Mulcol International B.V.

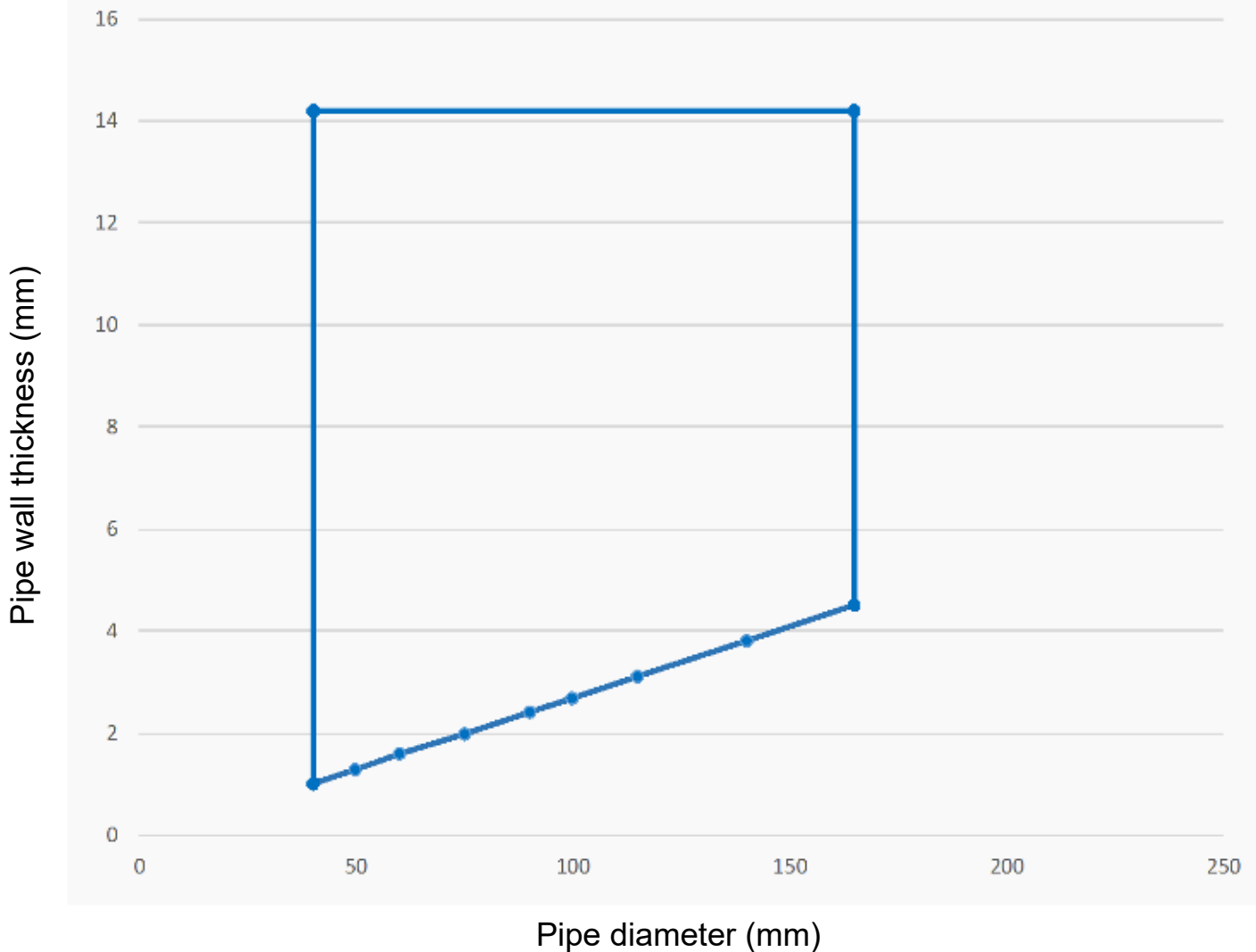
Department : Research & Development

Draftsman : R.M.


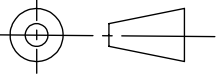
RW-ST-MM1.2.20

A4

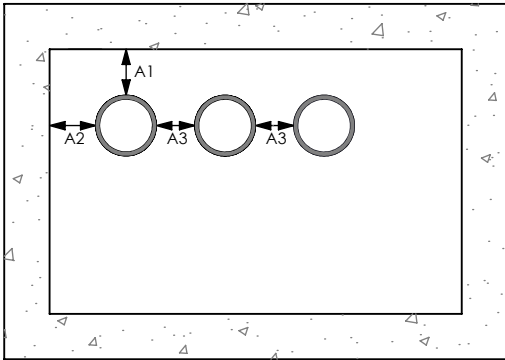
Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar

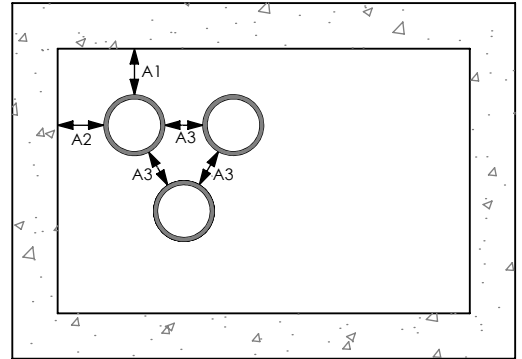
Fire test pipe penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RW-PP-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 9-2-2017	Draftsman : R.M.	A4

Option 1

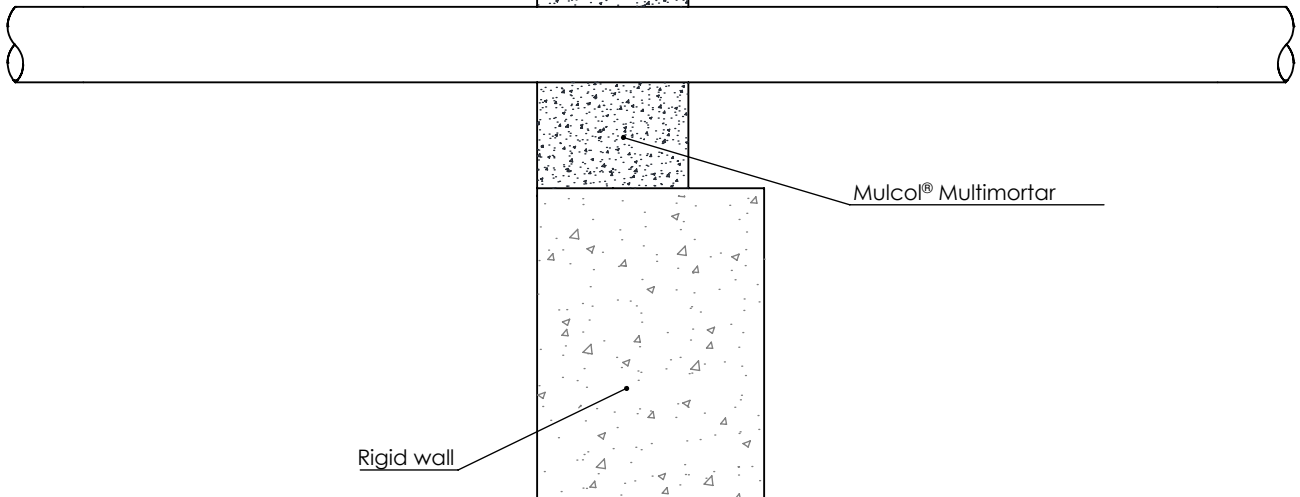
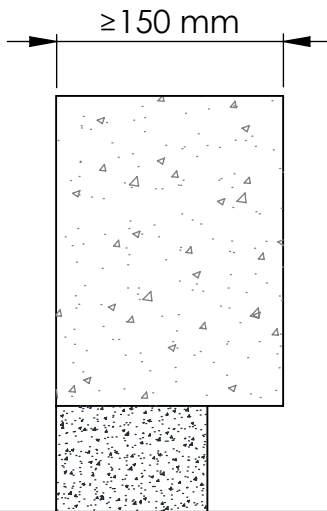


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2




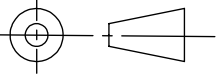
A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

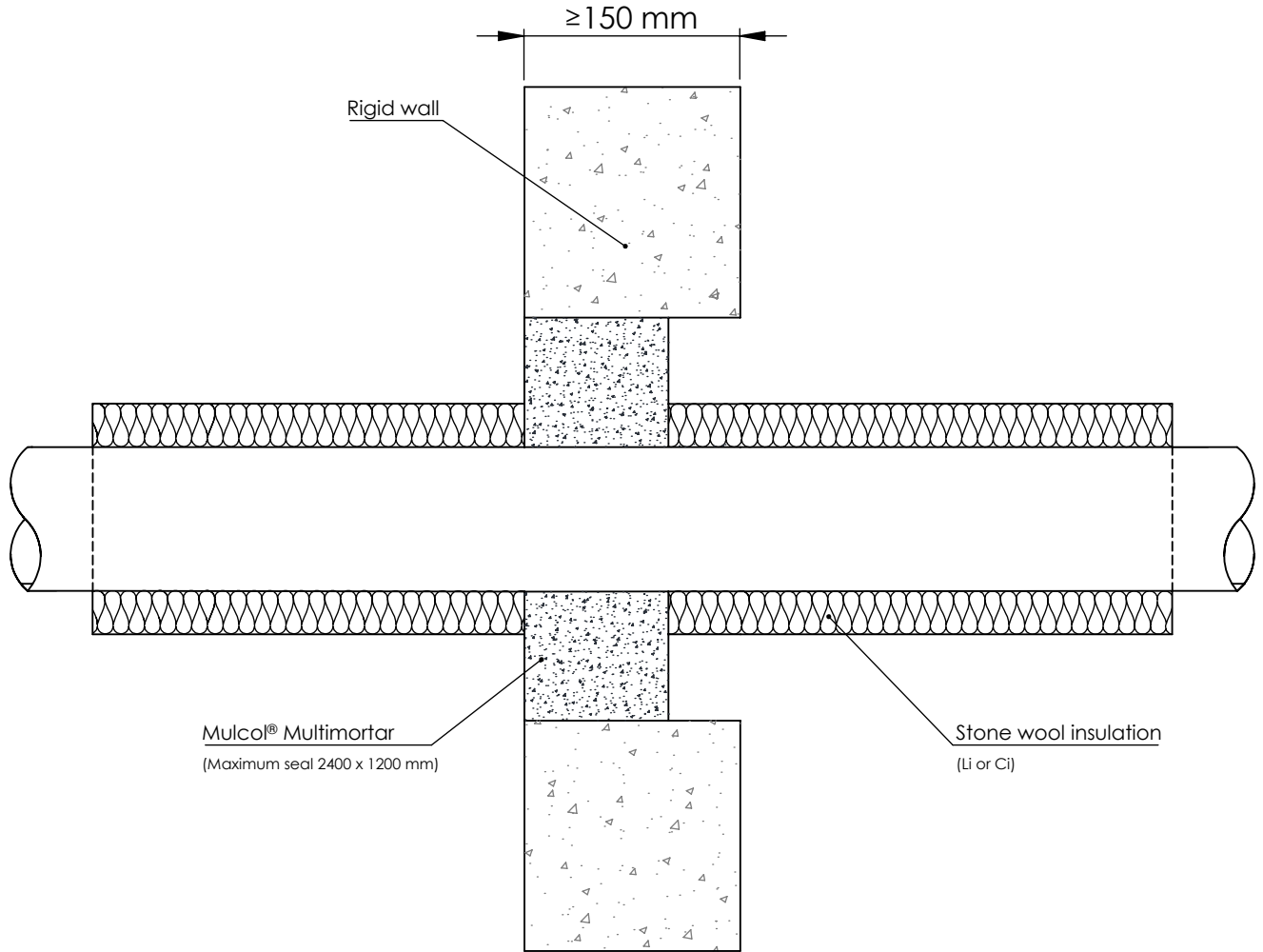


A 2.6 Penetration seal with combustible pipes

Services	Classification	Position Mulcol® Multimortar	Configuration	Maximum seal
PVC-U pipes according to EN 1329-1, EN 1452-2 or EN 1453-1, PVC-C according to EN 1566-1				
Up to \varnothing 32 mm / 1.6 - 2.4 mm wall th.	EI 120 U/C	To either side of the wall 100 mm thick	1 & 2 between all specified pipes	2400 x 1200 mm
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+pvc according to EN 1565-1				
Up to \varnothing 32 mm / 1.8 - 3.0 mm wall th.	EI 120 U/C	To either side of the wall 100 mm thick	1 & 2 between all specified pipes	2400 x 1200 mm
PP pipe according to EN 1852-1:2009				
Up to \varnothing 32 mm / 1.9 - 4.4 mm wall th.	EI 120 U/C	To either side of the wall 100 mm thick	1 & 2 between all specified pipes	2400 x 1200 mm

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RW-ST-MM1.2.20 A4



A 2.7 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Maximum seal	Position services
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	EI 240 C/U	Either side of the wall (or anywhere in between) 100 mm thick	1000 mm length of 20 mm Stone wool insulation, 80 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 20 mm from seal edges and 0 mm from other services)
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	E 240 C/U, EI 120 C/U				
Steel pipe Ø 50 mm / 1.7-14.2 mm wall th.	E 240 C/U, EI 120 C/U		1000 mm length of 30 mm Stone wool insulation, 80 kg/m ³		
Steel pipe Ø 60 mm / 1.9-14.2 mm wall th.					
Steel pipe Ø 75 mm / 2.2-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2.5-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.7-14.2 mm wall th.					
Steel pipe Ø 115 mm / 3.0-14.2 mm wall th.					
Steel pipe Ø 140 mm / 3.5-14.2 mm wall th.					
Steel pipe Ø 165 mm / 3.9-14.2 mm wall th.					
Steel pipe Ø 180 mm / 4.2-14.2 mm wall th.					
Steel pipe Ø 200 mm / 4.6-14.2 mm wall th.					
Steel pipe Ø 219 mm / 5.0-14.2 mm wall th.					

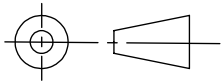
See graph on page 31 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid wall construction according to I.2.2



American projection



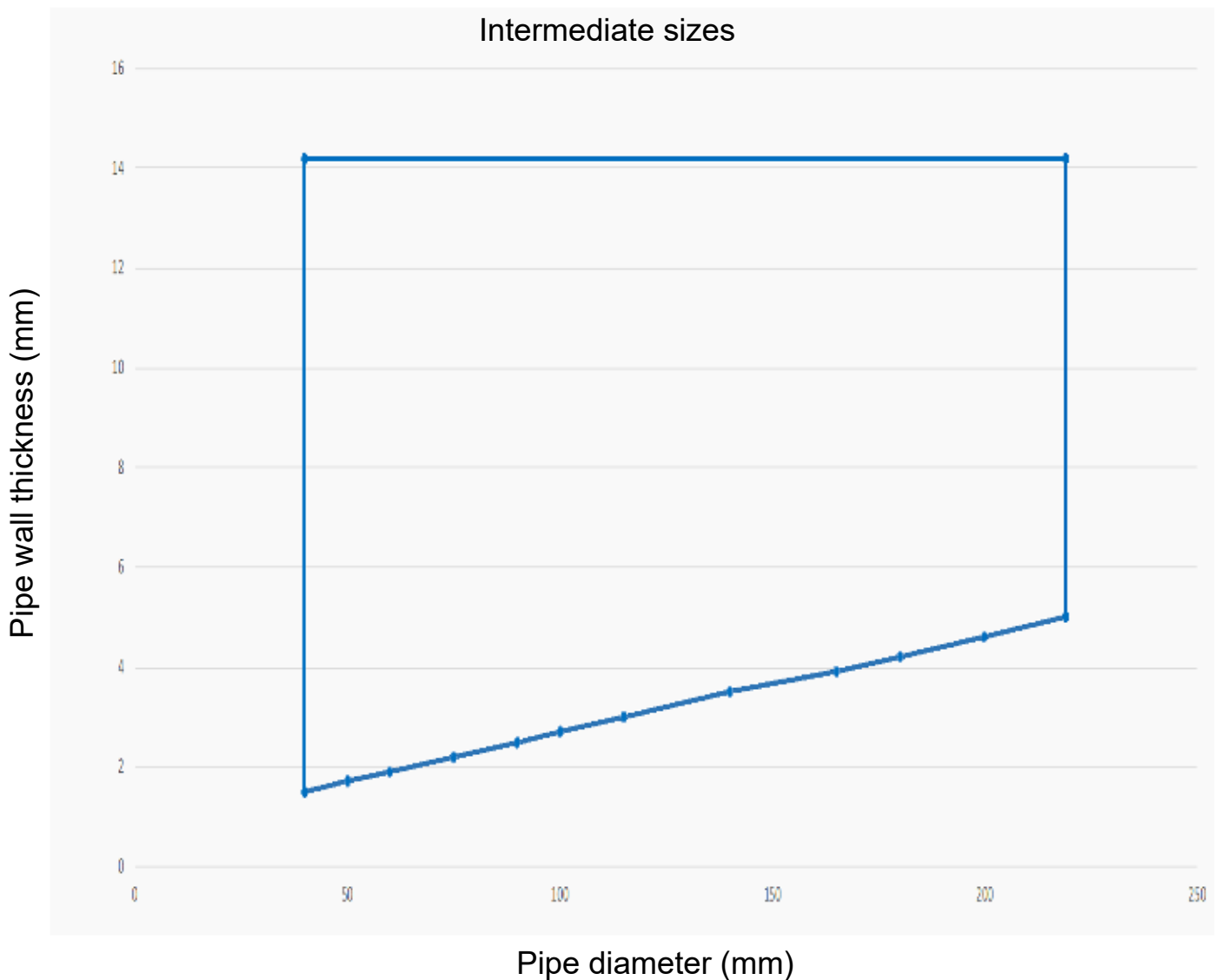
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 Date : 6-4-2016

Company : Mulcol International B.V.
 Department : Research & Development
 Draftsman : R.M.


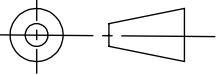
RW-ST-MM1.2.20

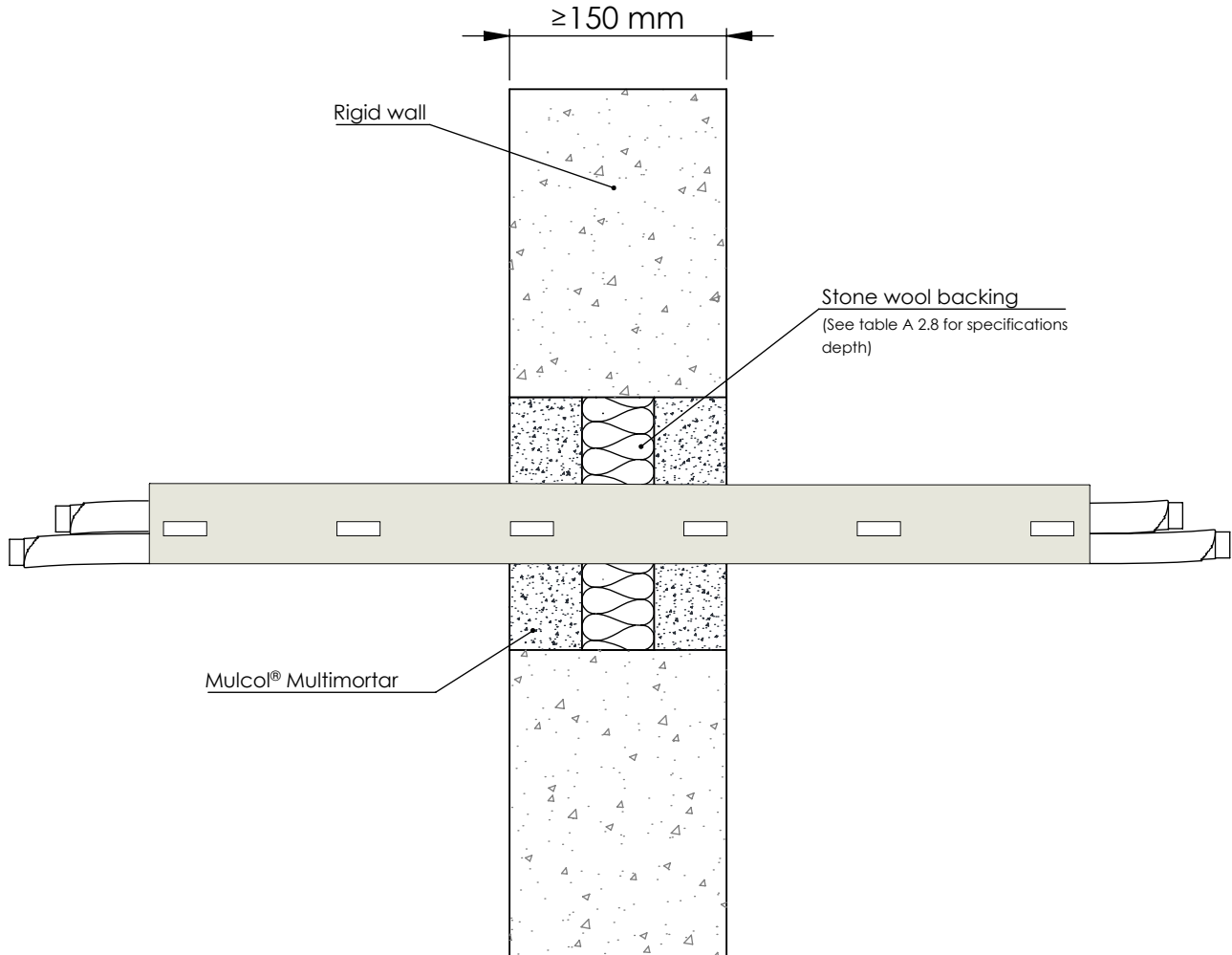
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar


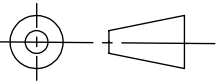
Fire test cable penetration seal Mulcol® Multimortar Rigid wall construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RW-EC-MM1.6.10 A4

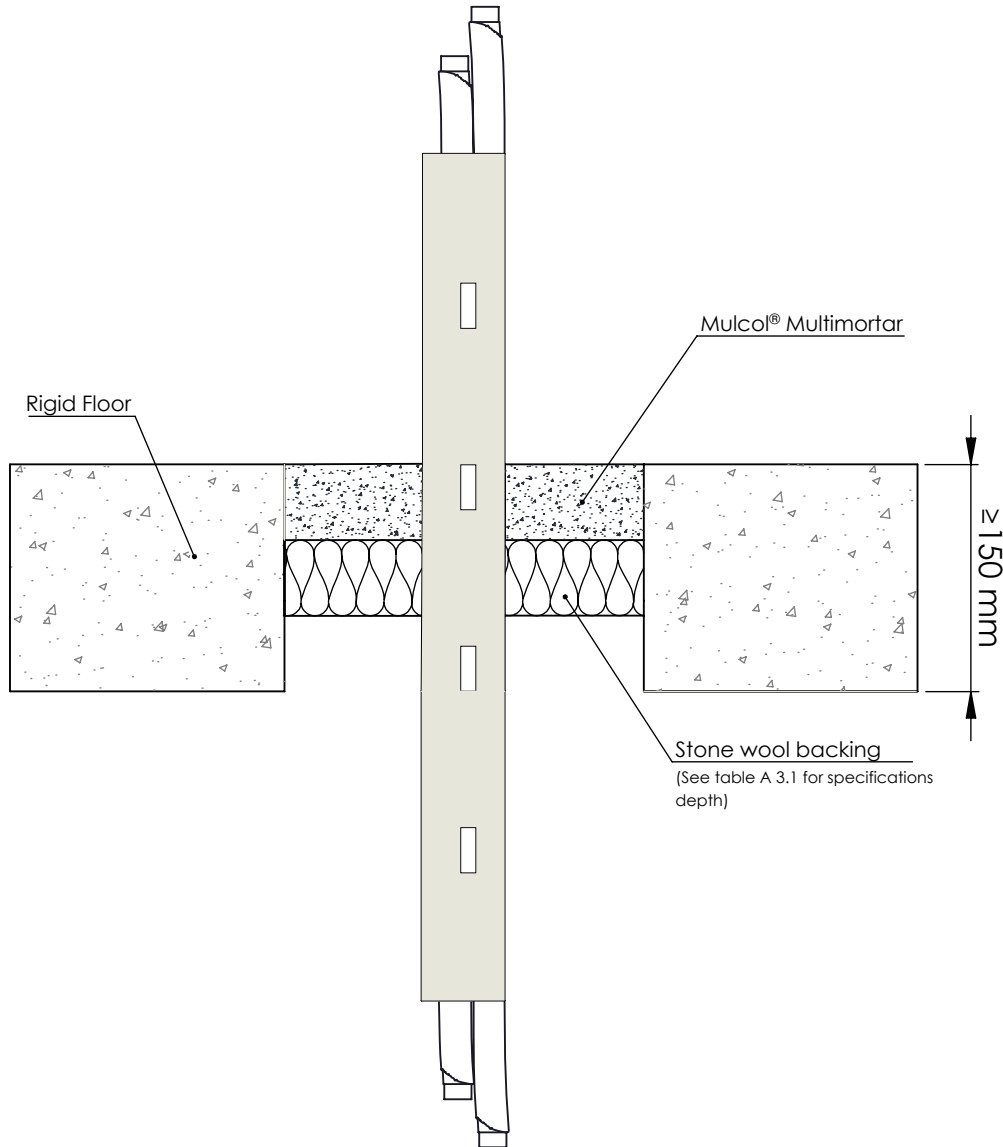


A 2.8 Double side penetration seal with cables and trays

Services	Classification	Position Mulcol® Multimortar	Backing	Maximum seal	Position services
Blank seals	EI 240	Both sides of the wall 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Single electrical cables up to \varnothing 80 mm single or in a bundle	E 240, EI 60				
Steel cable trays and ladders up to 500 mm wide	E 240, EI 60				
Telecom cables up to \varnothing 21 mm single or in a bundle up to \varnothing 100 mm	EI 60				
Non-sheathed wire up to \varnothing 24 mm	E 240, EI 120				

Annex A - Resistance to fire classification - Mulcol® Multimortar


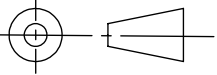
Fire test cable penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-CT-MM1.5.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4



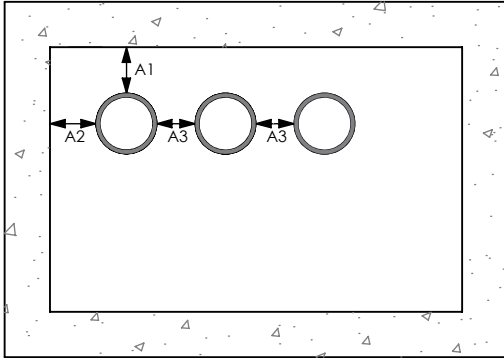
A 3.1 Single side penetration seal with cables, trays and conduits

Services	Classification	Position Mulcol® Multimortar	Backing	Maximum seal	Position services
Single electrical cables up to \varnothing 21 mm	E 180, EI 90	Top side of the floor 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 100 mm from other services)
Blank seal	EI 180				Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Electrical cables up to \varnothing 21 mm (single, bundled and on trays)	E 180, EI 60				
Electrical cables up to \varnothing 80 mm (single, bundled and on trays)	E 90, EI 45				
Telecommunication cables up to \varnothing 21 mm (single or bundles up to \varnothing 100mm)	EI 180				
Steel cable trays & ladders (perforated or non-perforated)	E 90, EI 60				
Non-sheathed wires up to \varnothing 17 mm	E 180, EI 60				
Non-sheathed wires up to \varnothing 24 mm	E 180, EI 30				
PVC conduit up to \varnothing 16 mm	EI 180 C/U				

Annex A - Resistance to fire classification - Mulcol® Multimortar

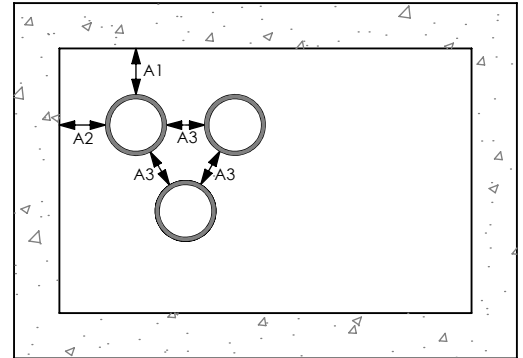
Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-ST-MM1.2.20
	Unit of measure : mm	Department : Research & Development	
	Date : 8-2-2018	Draftsman : K.J.	A4

Option 1

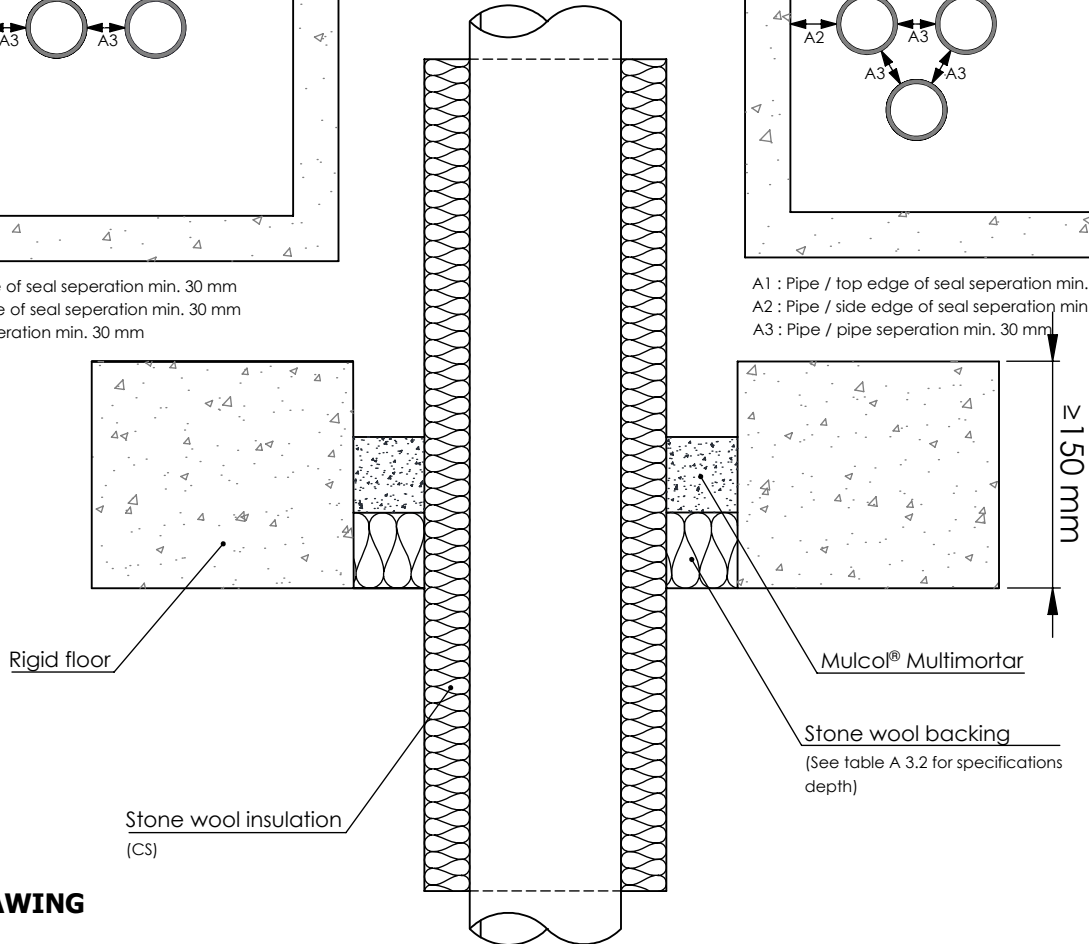


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2



A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm




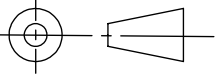
NEW 2D-DRAWING

A 3.2 Single side penetration seal with (stainless) steel pipes

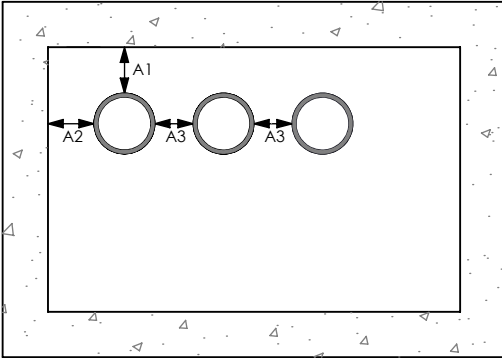
Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Configuration	Maximum seal
Ø 40 mm / 1-14.2 mm wall th. Ø 40 mm / 1-14.2 mm wall th. Ø 50 mm / 1.2-14.2 mm wall th. Ø 60 mm / 1.4-14.2 mm wall th. Ø 75 mm / 1.6-14.2 mm wall th. Ø 90 mm / 1.9-14.2 mm wall th. Ø 100 mm / 2.1-14.2 mm wall th. Ø 115 mm / 2.4-14.2 mm wall th. Ø 140 mm / 2.9-14.2 mm wall th. Ø 165 mm / 3.4-14.2 mm wall th. Ø 180 mm / 3.6-14.2 mm wall th. Ø 200 mm / 4.0-14.2 mm wall th. Ø 219 mm / 4.3-14.2 mm wall th. Ø 250 mm / 5.0-14.2 mm wall th. Ø 300 mm / 5.9-14.2 mm wall th. Ø 324 mm / 6.35-14.2 mm wall th.	EI 180 C/U	At any height within the depth of the floor	50 mm Stone wool insulation, 140 kg/m ³	20 mm thick stone, mineral wool min. 80 kg/m ³ 30-80 mm thick stone, mineral wool min. 80 kg/m ³	1 & 2	2400 x 1200 mm

See graph on page 36 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

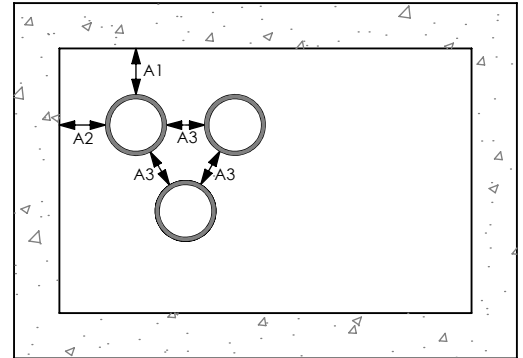
Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 8-2-2018	Company : Mulcol International B.V. Department : Research & Development Draftsman : K.J.	RF-ST-MM1.2.20 <hr/> A4

Option 1

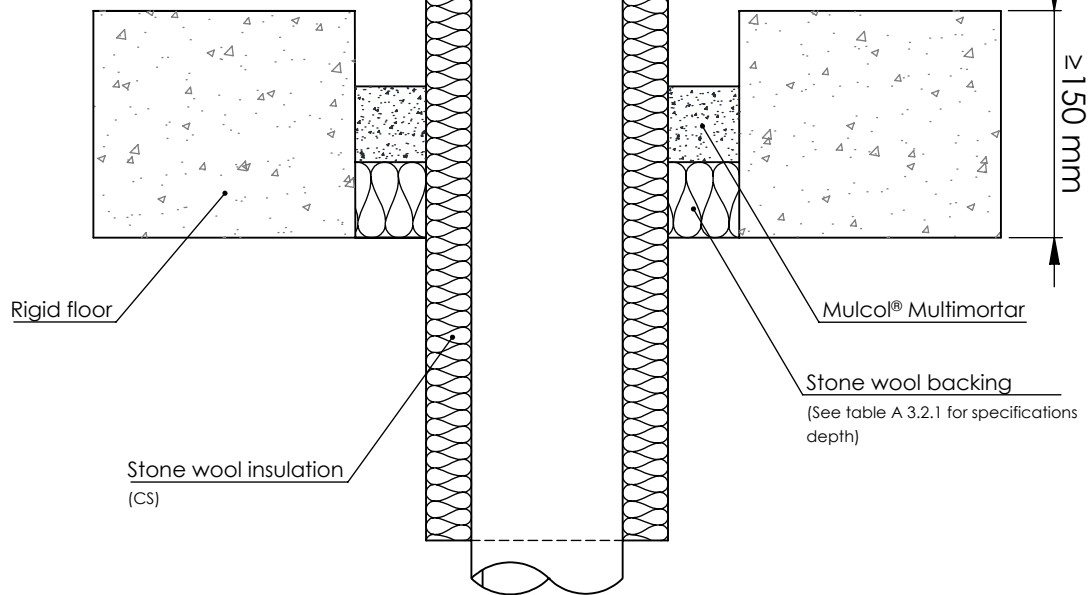


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2



A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm



A 3.2.1 Single side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Configuration	Maximum seal
Ø 40 mm / 1-14.2 mm wall th. Ø 50 mm / 1.2-14.2 mm wall th. Ø 60 mm / 1.4-14.2 mm wall th. Ø 75 mm / 1.6-14.2 mm wall th. Ø 90 mm / 1.9-14.2 mm wall th. Ø 100 mm / 2.1-14.2 mm wall th. Ø 115 mm / 2.4-14.2 mm wall th. Ø 140 mm / 2.9-14.2 mm wall th. Ø 165 mm / 3.4-14.2 mm wall th. Ø 180 mm / 3.6-14.2 mm wall th. Ø 200 mm / 4.0-14.2 mm wall th. Ø 219 mm / 4.3-14.2 mm wall th. Ø 250 mm / 5.0-14.2 mm wall th. Ø 300 mm / 5.9-14.2 mm wall th. Ø 324 mm / 6.35-14.2 mm wall th.	EI 240 C/U	At any height within the depth of the floor	50 mm Stone wool insulation, 140 kg/m ³	30-80 mm thick stone, mineral wool min. 80 kg/m ³	1 & 2	550 x 1100 mm

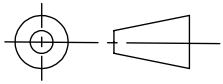
See graph on page 36 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid floor construction according to I.2.2



American projection



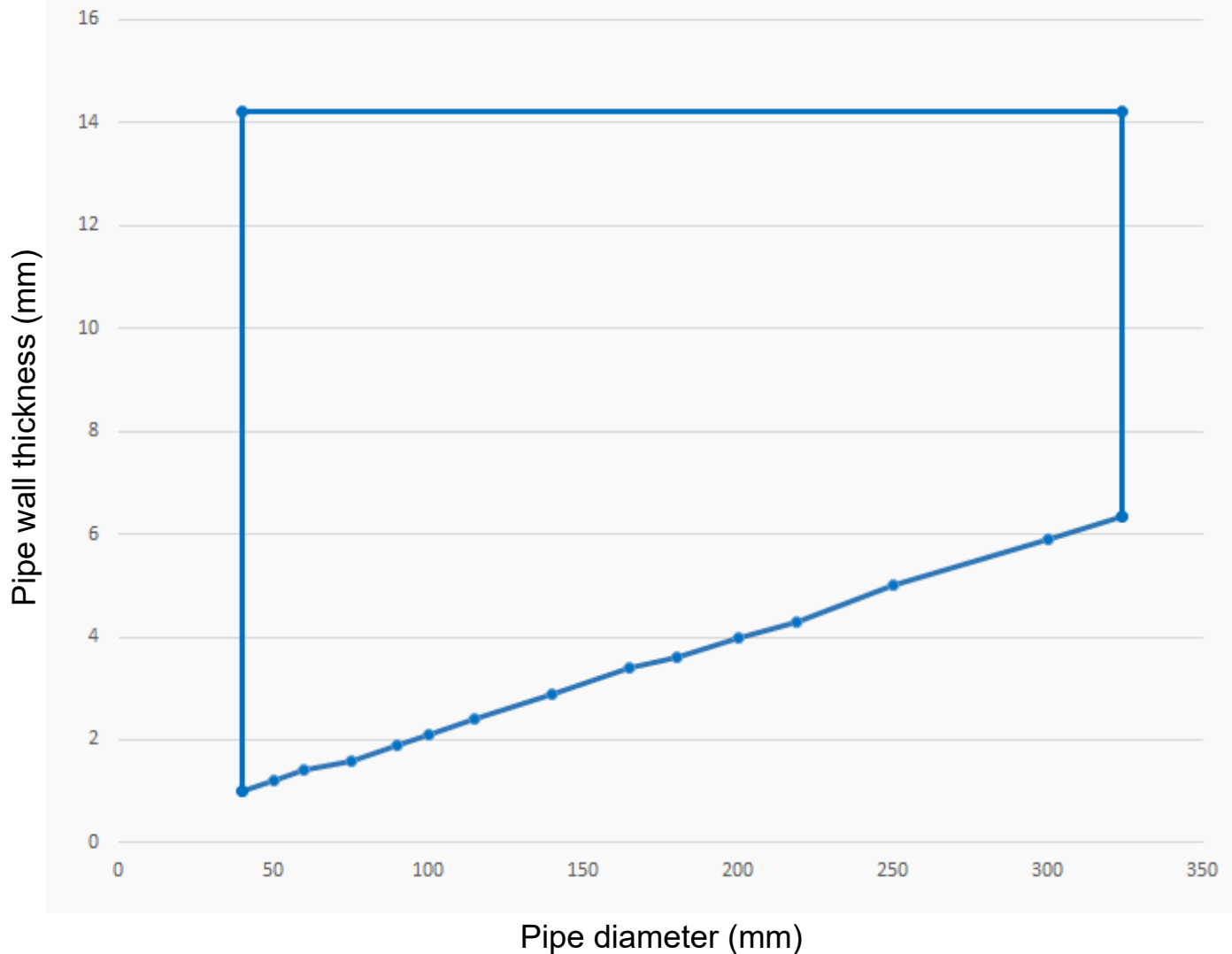
Scale : 1:5
 Unit of measure : mm
 Date : 8-2-2016

Company : Mulcol International B.V.
 Department : Research & Development
 Draftsman : K.J.


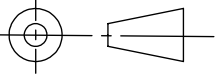
RF-ST-MM1.2.20

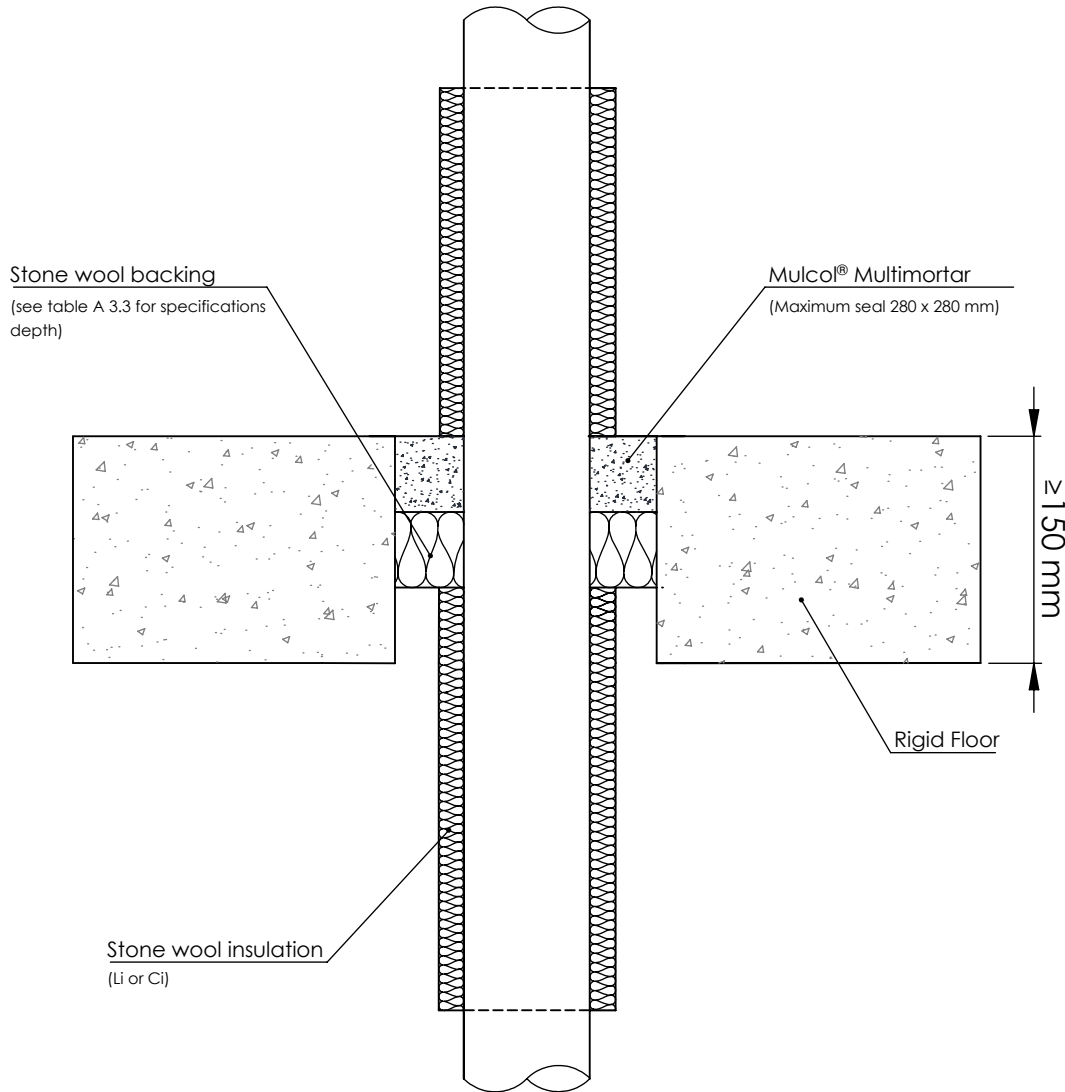
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-ST-MM1.2.20
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4


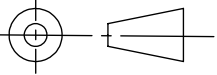


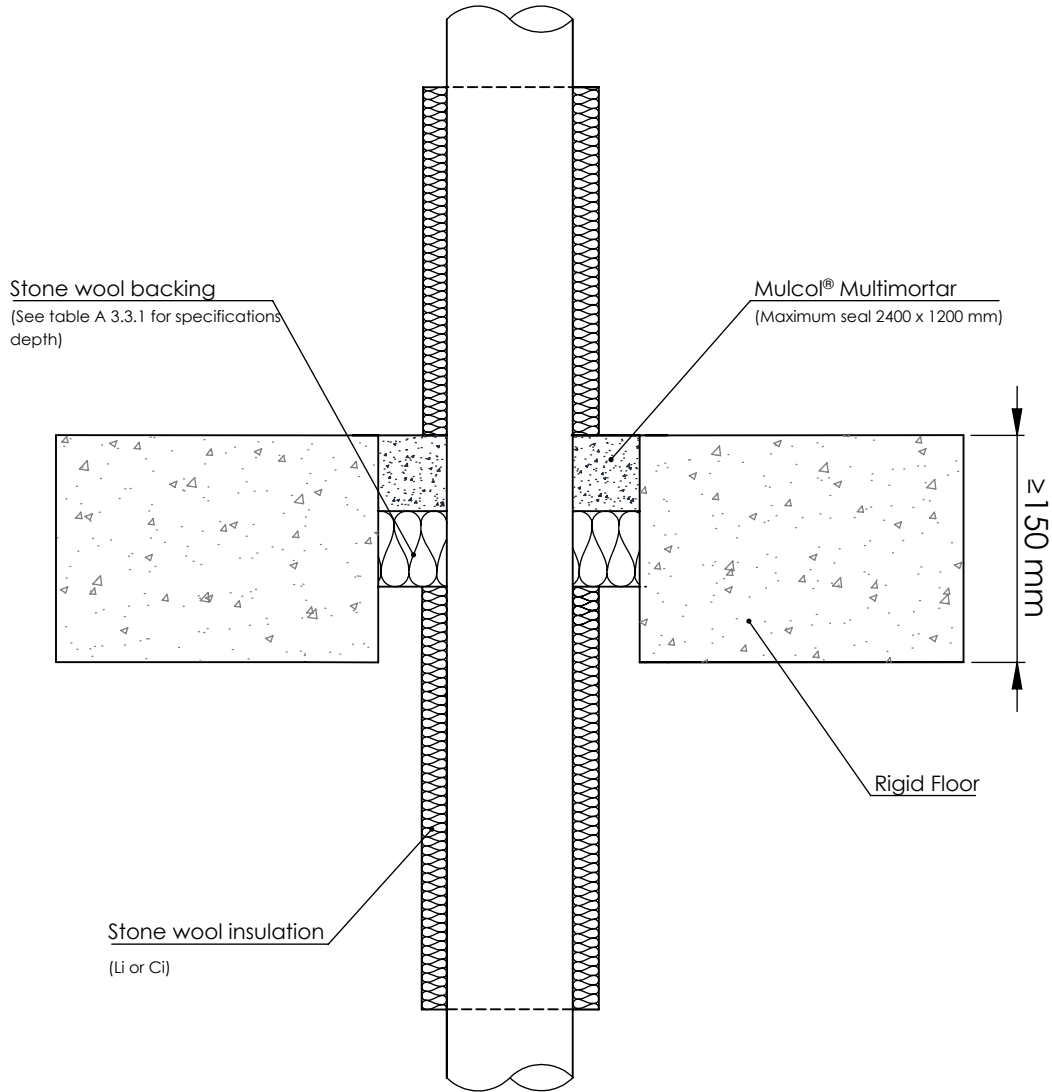
A 3.3 Single side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Position services
Steel pipe Ø40 mm / 1-14.2 mm wall th.	EI 240 C/U	Top side of the floor 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	1000 mm length of 20 mm Stone wool insulation, 80 kg/m ³	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Steel pipe Ø40 mm / 1-14.2 mm wall th.	E 240 C/U, EI 90 C/U			1000 mm length of 30 mm Stone wool insulation, 80 kg/m ³	
Steel pipe Ø50 mm / 1.2-14.2 mm wall th.					
Steel pipe Ø60 mm / 1.4-14.2 mm wall th.					
Steel pipe Ø75 mm / 1.7-14.2 mm wall th.					
Steel pipe Ø90 mm / 2-14.2 mm wall th.					
Steel pipe Ø100 mm / 2.2-14.2 mm wall th.					
Steel pipe Ø115 mm / 2.5-14.2 mm wall th.					
Steel pipe Ø140 mm / 3-14.2 mm wall th.					
Steel pipe Ø165 mm / 3.5-14.2 mm wall th.					
Steel pipe Ø180 mm / 3.8-14.2 mm wall th.					
Steel pipe Ø200 mm / 4.2-14.2 mm wall th.					
Steel pipe Ø219 mm / 4.5-14.2 mm wall th.					

See graph on page 39 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RF-PP-MM1.2.10 <hr/> A4



A 3.3.1 Single side penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Insulation	Position of services
Steel pipe Ø 40 mm / 1-14.2 mm wall th.	EI 180 C/U	Top side of the floor 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	1000 mm length of 20 mm Stone wool insulation, 80 kg/m ³	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Steel pipe Ø 40 mm / 1-14.2 mm wall th.	E 180 C/U, EI 90 C/U			1000 mm length of 30 mm Mineral wool insulation, 80 kg/m ³	
Steel pipe Ø 50 mm / 1.2-14.2 mm wall th.					
Steel pipe Ø 60 mm / 1.4-14.2 mm wall th.					
Steel pipe Ø 75 mm / 1.7-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.2-14.2 mm wall th.					
Steel pipe Ø 115 mm / 2.5-14.2 mm wall th.					
Steel pipe Ø 140 mm / 3-14.2 mm wall th.					
Steel pipe Ø 165 mm / 3.5-14.2 mm wall th.					
Steel pipe Ø 180 mm / 3.8-14.2 mm wall th.					
Steel pipe Ø 200 mm / 4.2-14.2 mm wall th.					
Steel pipe Ø 219 mm / 4.5-14.2 mm wall th.					

See graph on page 39 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid floor construction according to I.2.2

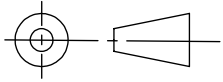


American projection

Scale : 1:5

Company : Mulcol International B.V.

RF-ST-MM1.2.10



Unit of measure : mm

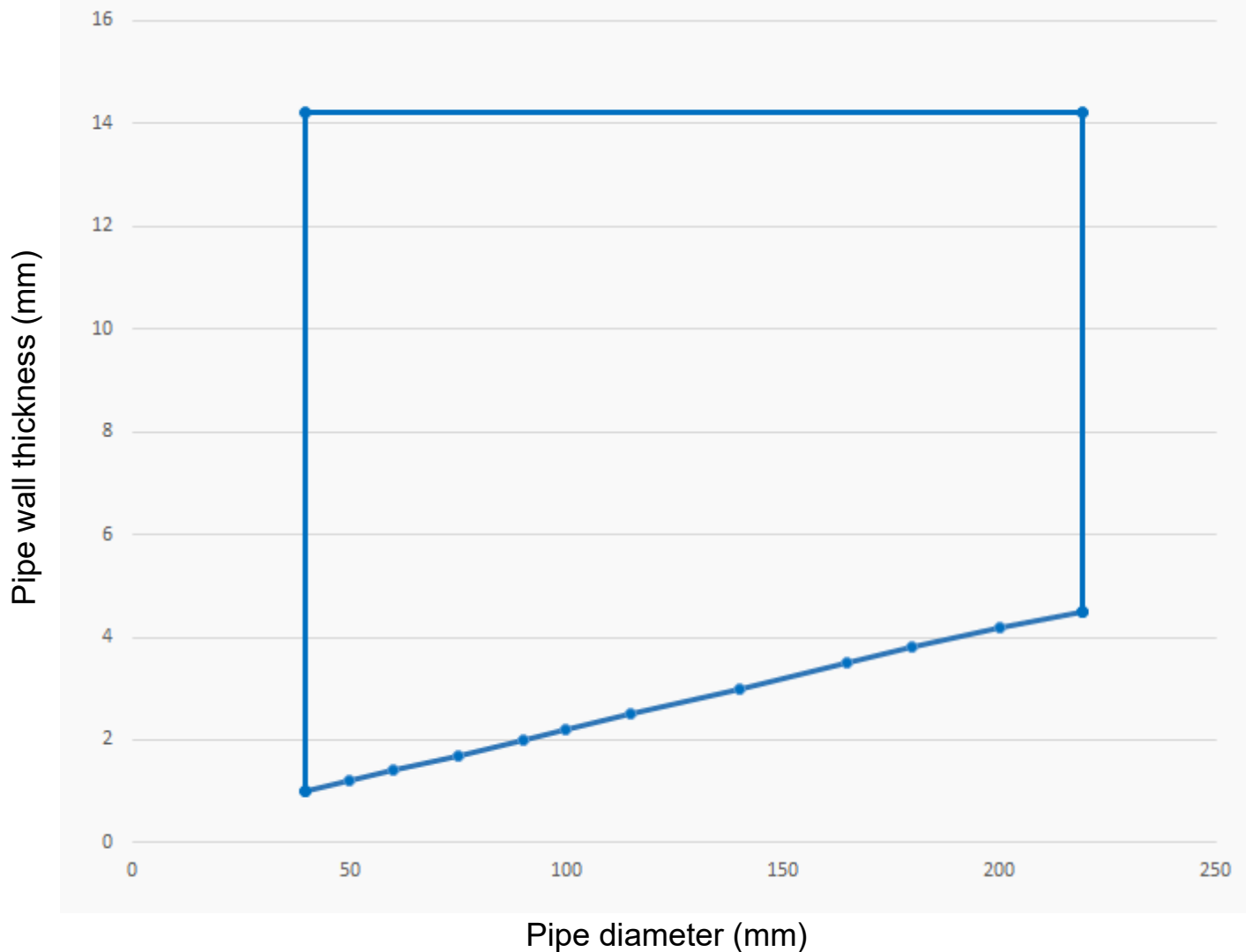
Department : Research & Development

Date : 6-4-2016


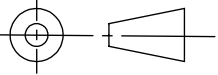
Draftsman : R.M.

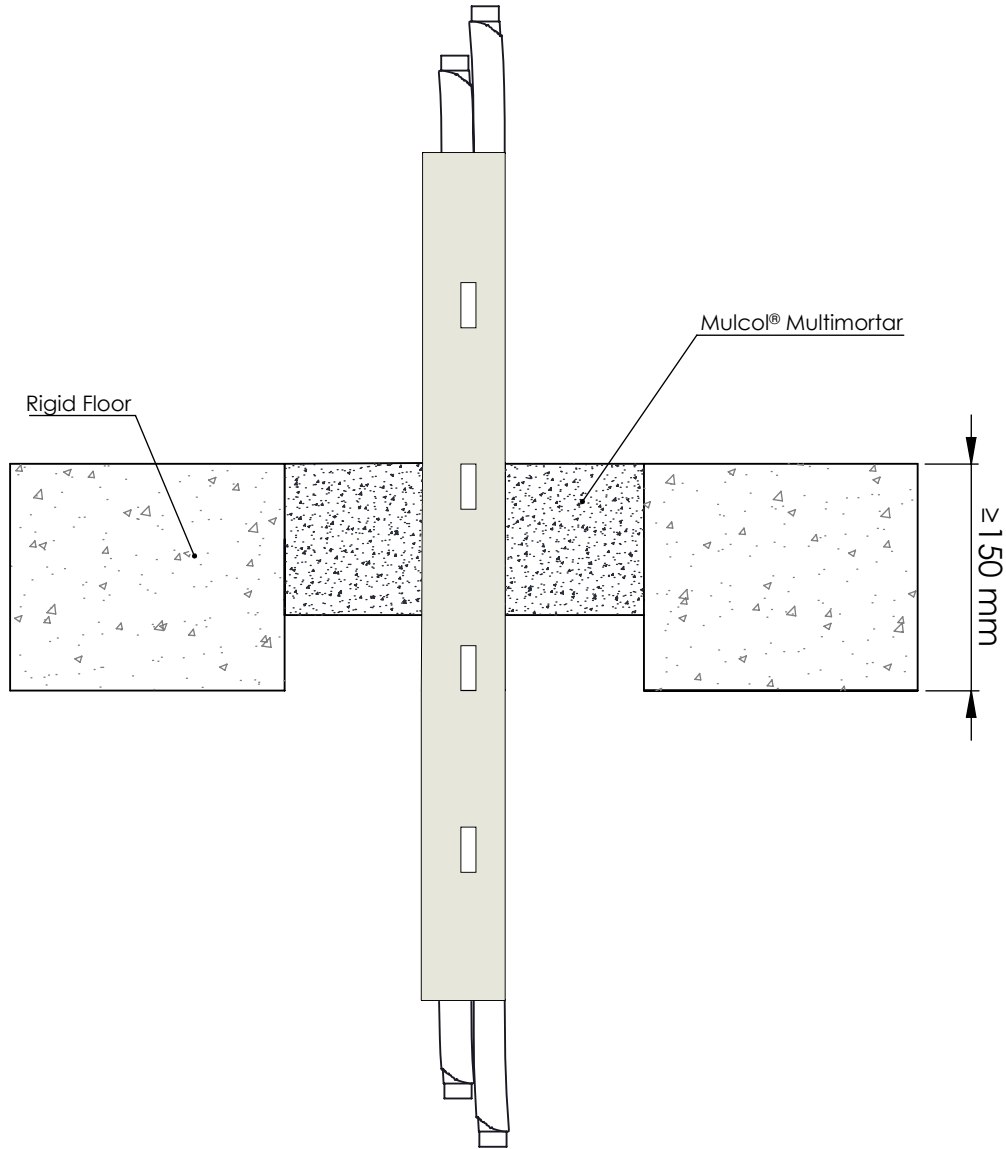
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar


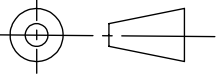
Fire test cable penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-EC-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

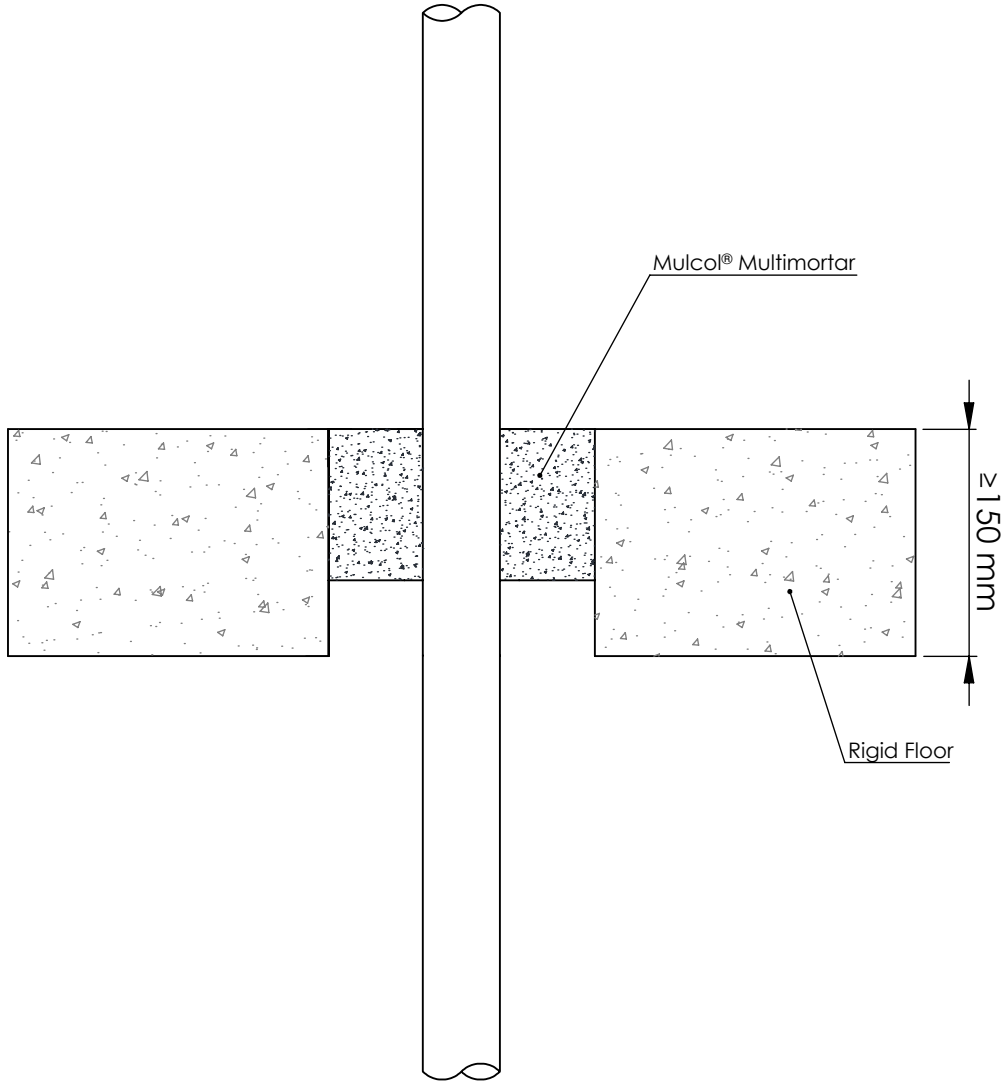


A 3.4 Penetration seal with cables, trays and conduits

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Position services
Blank seals	EI 240	Top side of the floor 100 mm thick	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 100 mm from seal edges and 0 mm from other services)
Electrical cables up to \varnothing 50 mm (single, bundled and on trays)	E 180, EI 60			
Electrical cables up to \varnothing 80 mm (single, bundled and on trays)	E 120, EI 60			
Telecommunication cables up to \varnothing 21 mm (single or bundles up to \varnothing 100mm)	E 180, EI 120			
Steel cable trays & ladders (perforated and none perforated)	E 120, EI 60			
Non-sheathed wires up to \varnothing 17 mm	E 180, EI 90			
Non-sheathed wires up to \varnothing 24 mm	E 180, EI 20			
PVC conduit up to \varnothing 16 mm	EI 180 C/U			

Annex A - Resistance to fire classification - Mulcol® Multimortar


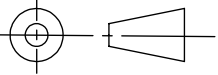
Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-PP-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4

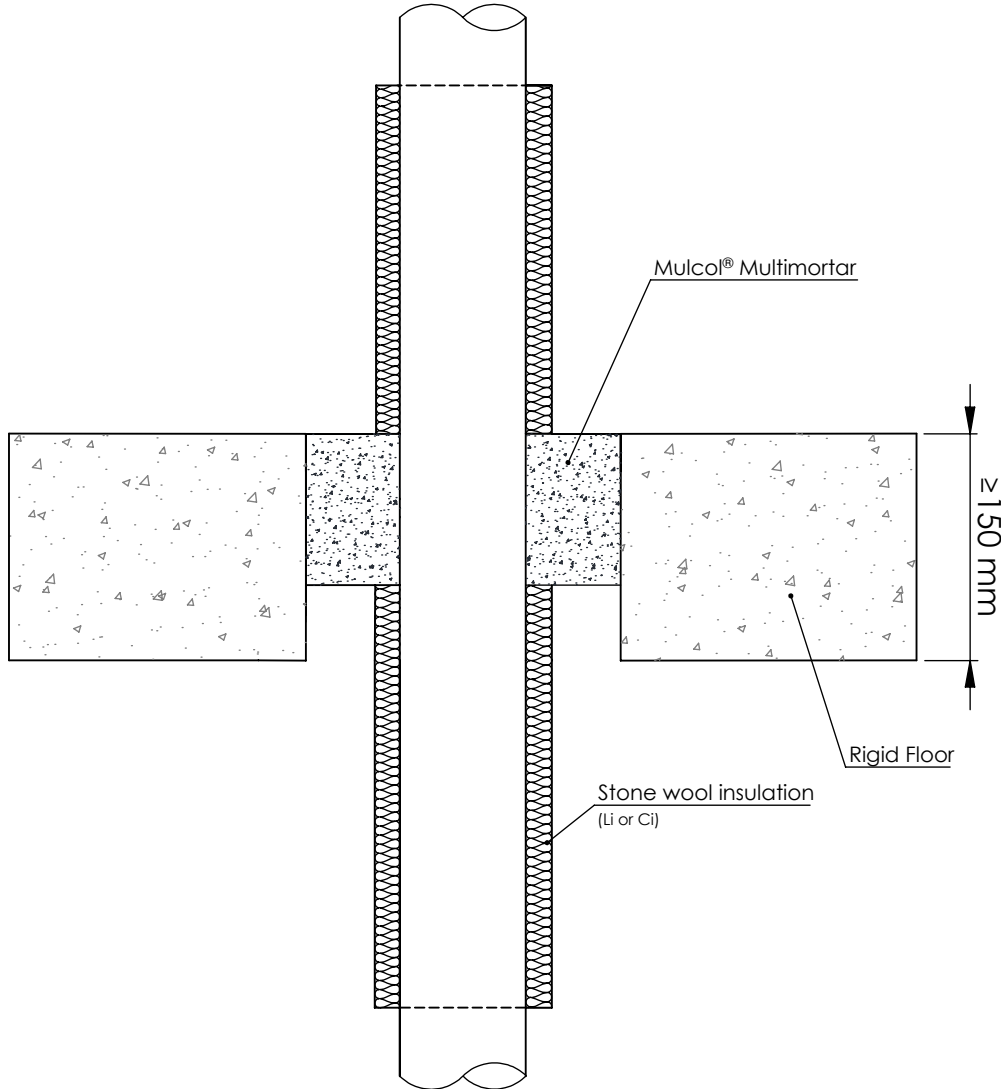


A 3.5 Penetration seal with composite pipes

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Position services
Alupex composite pipe $\varnothing 75$ mm / 4.6 mm wall thickness	E 240 U/C, EI 20 U/C	Top side of the floor 100 mm thick	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5 Unit of measure : mm Date : 6-4-2016	Company : Mulcol International B.V. Department : Research & Development Draftsman : R.M.	RF-ST-MM1.2.20 <hr/> A4



A 3.6 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Maximum seal	Position services
Steel pipe Ø40 mm / 1.5-14.2 mm wall th.	EI 240 C/U	Top side of the floor 100 mm thick	1000 mm length of 20 mm Stone wool insulation, 80 kg/m ³	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 0 mm from other services)
Steel pipe Ø40 mm / 1.5-14.2 mm wall th.	E 240 C/U, EI 120 C/U		1000 mm length of 30 mm Mineral wool insulation, 80 kg/m ³		
Steel pipe Ø50 mm / 1.7-14.2 mm wall th.					
Steel pipe Ø60 mm / 1.8-14.2 mm wall th.					
Steel pipe Ø75 mm / 2.1-14.2 mm wall th.					
Steel pipe Ø90 mm / 2.3-14.2 mm wall th.					
Steel pipe Ø100 mm / 2.5-14.2 mm wall th.					
Steel pipe Ø115 mm / 2.8-14.2 mm wall th.					
Steel pipe Ø140 mm / 3.2-14.2 mm wall th.					
Steel pipe Ø165 mm / 3.6-14.2 mm wall th.					
Steel pipe Ø180 mm / 3.9-14.2 mm wall th.					
Steel pipe Ø200 mm / 4.2-14.2 mm wall th.					
Steel pipe Ø219 mm / 4.5-14.2 mm wall th.					

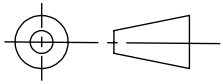
See graph on page 43 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid floor construction according to I.2.2



American projection



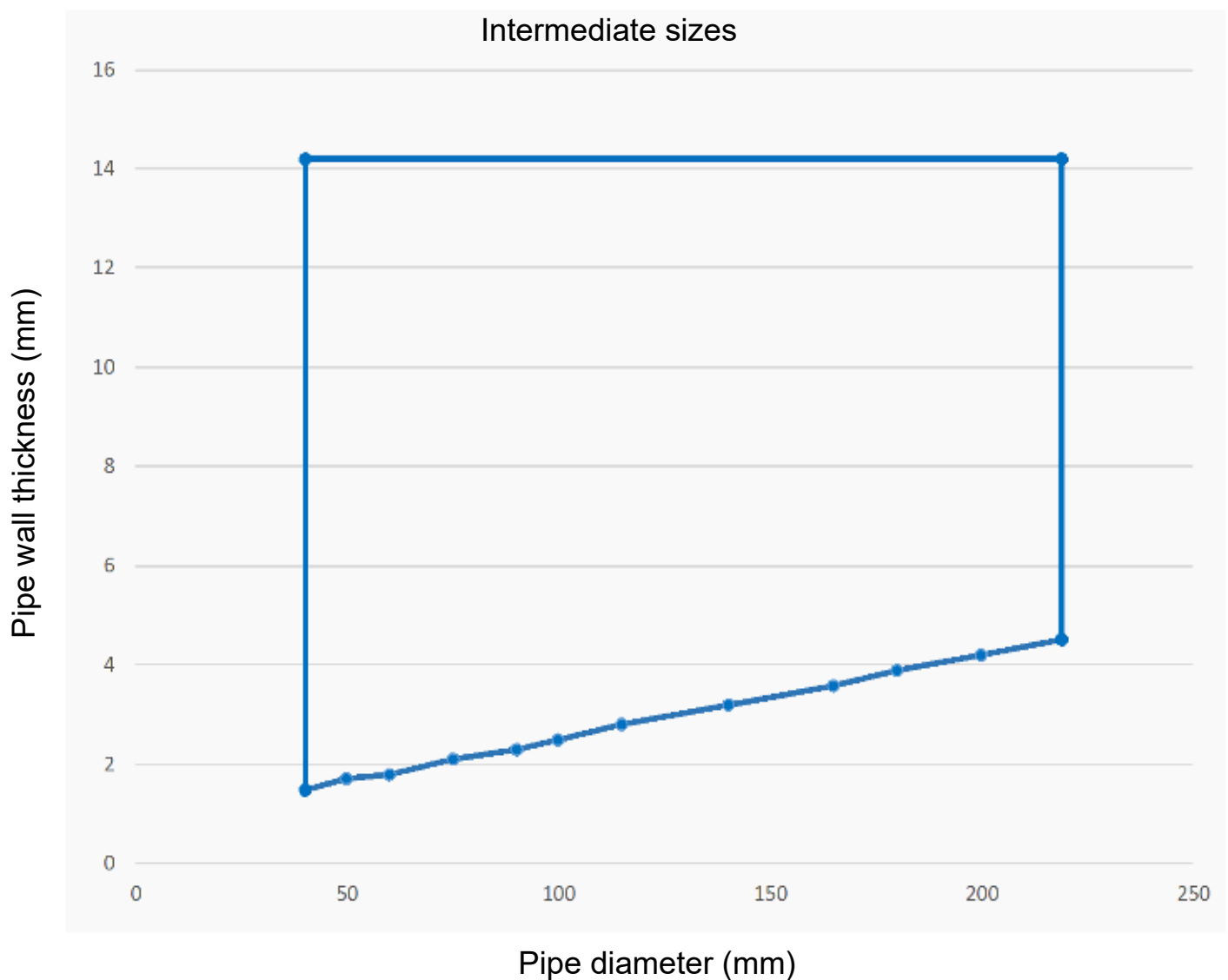
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 Unit of measure : mm
 Date : 6-4-2016

Company : Mulcol International B.V.
 Department : Research & Development
 Draftsman : R.M.


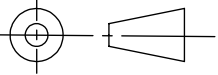
RF-ST-MM1.2.20

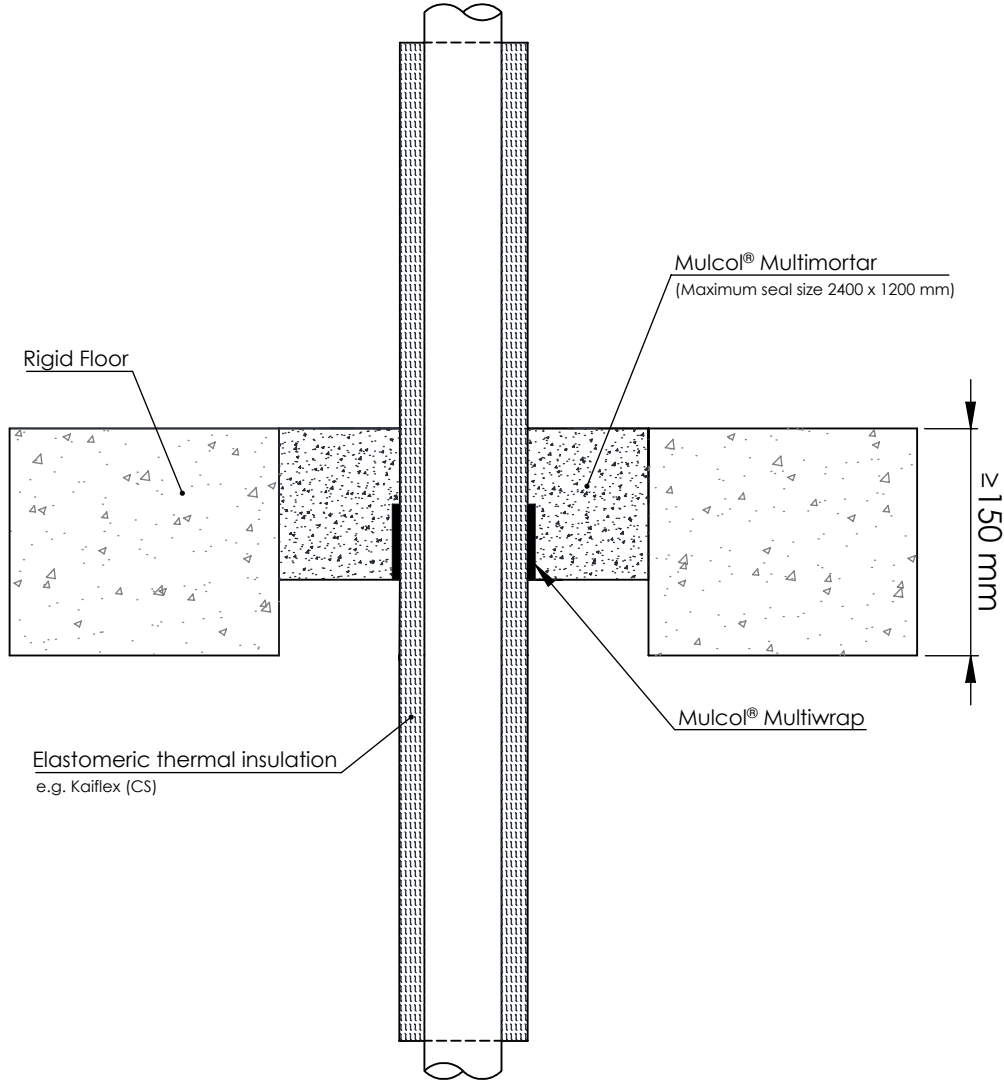
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-ST-MM1.2.20
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4



A 3.7 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Mulcol® Multiwrap	Position Services
Steel pipe Ø 40 mm / 0-14.2 mm wall th.	EI 180 C/U	Top side of the floor 100 mm thick	13 mm Kaiflex ST insulation	50 x 1.8 mm (1 layer) fitted at bottom of seal	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Steel pipe Ø 40 mm / 1.5-14.2 mm wall th.	E 180 C/U, EI 120 C/U		13 - 19 mm Kaiflex ST insulation		
Steel pipe Ø 50 mm / 1.6-14.2 mm wall th.					
Steel pipe Ø 60 mm / 1.7-14.2 mm wall th.					
Steel pipe Ø 75 mm / 1.9-14.2 mm wall th.					
Steel pipe Ø 90 mm / 2-14.2 mm wall th.					
Steel pipe Ø 100 mm / 2.1-14.2 mm wall th.					
Steel pipe Ø 115 mm / 2.3-14.2 mm wall th.					
Steel pipe Ø 140 mm / 2.6-14.2 mm wall th.					
Steel pipe Ø 165 mm / 2.8-14.2 mm wall th.					

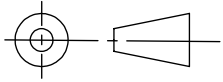
See graph on page 45 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid floor construction according to I.2.2



American projection



Scale : 1:5

Unit of measure : mm

Date : 6-4-2016

Company : Mulcol International B.V.

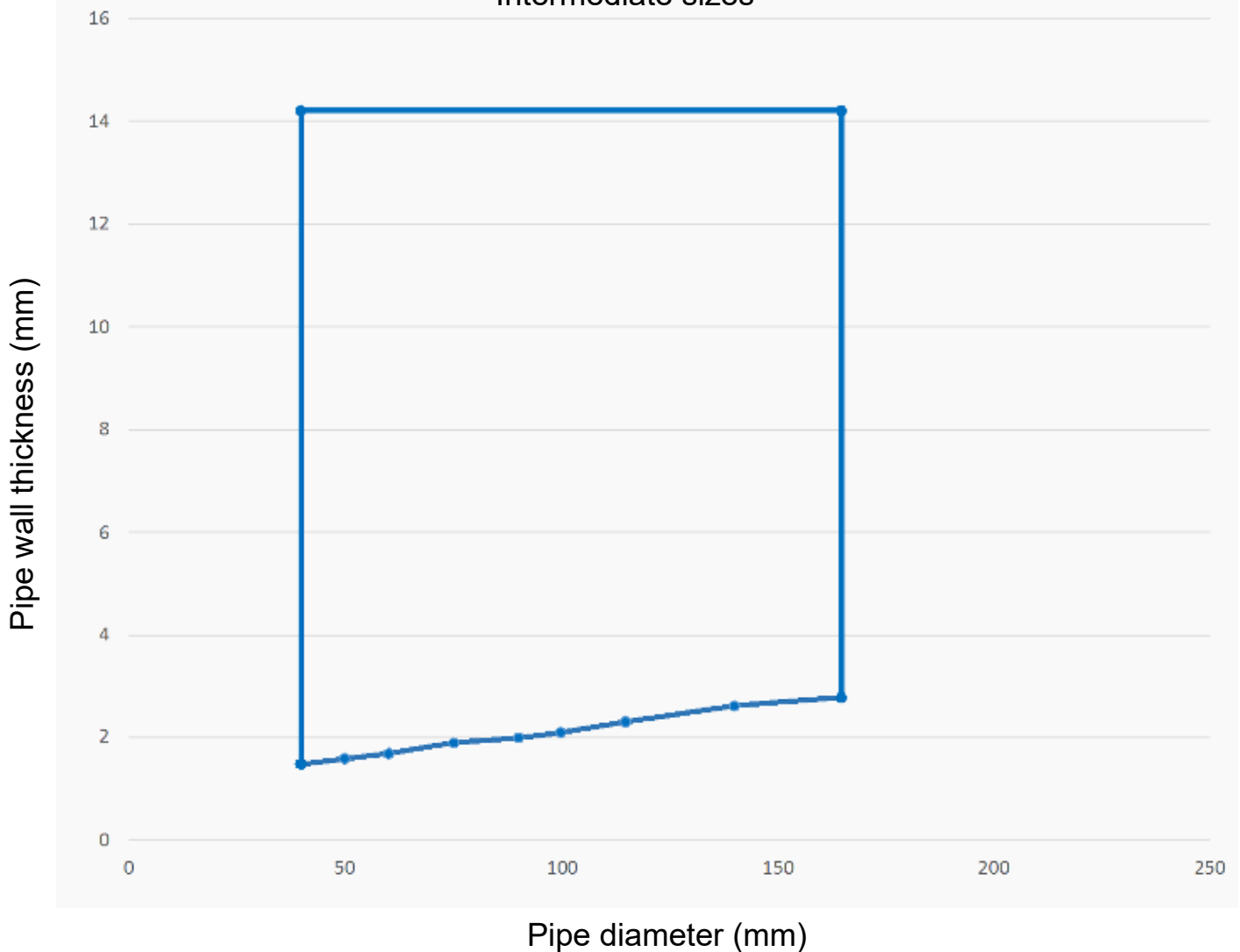
Department : Research & Development

Draftsman : R.M.

RF-ST-MM1.2.20

A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal

Mulcol® Multimortar

Rigid floor construction according to I.2.2

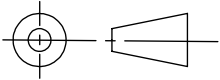


American projection

Scale : 1:5

Company : Mulcol International B.V.

RF-ST-MM1.2.20



Unit of measure : mm

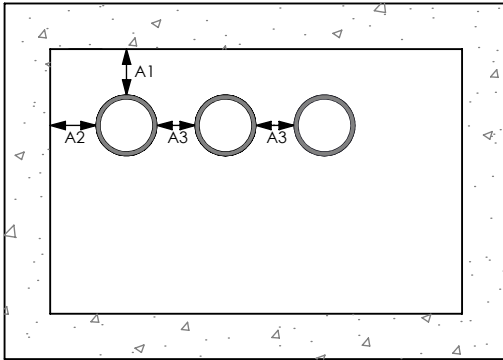
Department : Research & Development

Date : 8-2-2018

Draftsman : K.J.

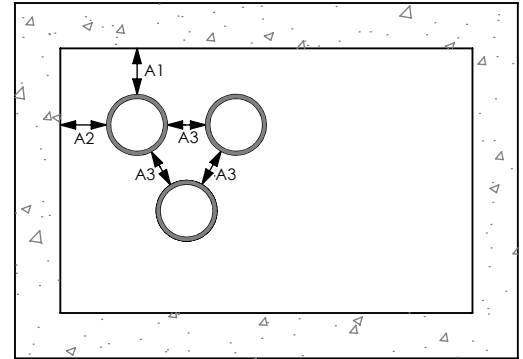
A4

Option 1

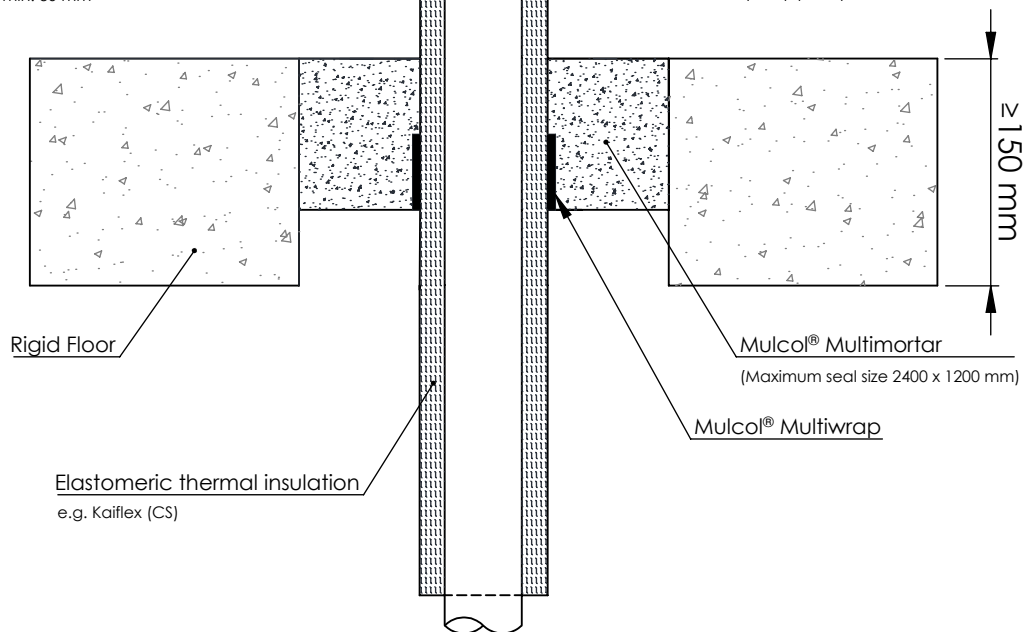


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2



A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm



A 3.7.1 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Mulcol® Multiwrap	Position Services
Steel pipe Ø40 mm / 1-14.2 mm wall th.	EI 240 C/U	Top side of the floor 100 mm thick	25 mm Kaiflex insulation	50 x 3.6 mm (2 layer) fitted at bottom of seal	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Steel pipe Ø40 mm / 1-14.2 mm wall th.					
Steel pipe Ø50 mm / 1.2-14.2 mm wall th.					
Steel pipe Ø60 mm / 1.4-14.2 mm wall th.					
Steel pipe Ø75 mm / 1.6-14.2 mm wall th.					
Steel pipe Ø90 mm / 1.9-14.2 mm wall th.					
Steel pipe Ø100 mm / 2.1-14.2 mm wall th.					
Steel pipe Ø115 mm / 2.4-14.2 mm wall th.					
Steel pipe Ø140 mm / 2.9-14.2 mm wall th.					
Steel pipe Ø165 mm / 3.4-14.2 mm wall th.					
Steel pipe Ø180 mm / 3.6-14.2 mm wall th.					
Steel pipe Ø200 mm / 4.0-14.2 mm wall th.					
Steel pipe Ø219 mm / 4.3-14.2 mm wall th.					
Steel pipe Ø250 mm / 5.0-14.2 mm wall th.					
Steel pipe Ø300 mm / 5.9-14.2 mm wall th.					
Steel pipe Ø324 mm / 6.35-14.2 mm wall th.					

See graph on page 48 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal

Mulcol® Multimortar

Rigid floor construction according to I.2.2

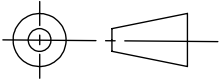


American projection

Scale : 1:5

Company : Mulcol International B.V.

RF-ST-MM1.2.20



Unit of measure : mm

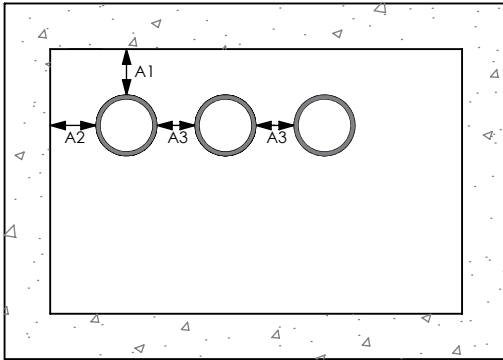
Department : Research & Development

Date : 8-2-2018

Draftsman : K.J.

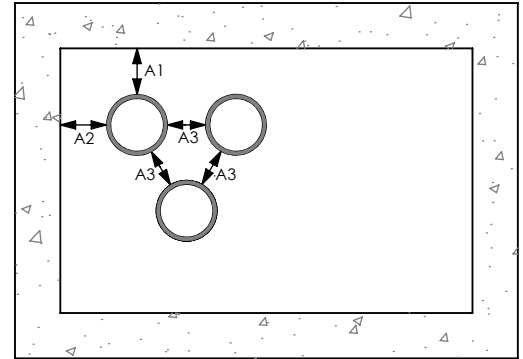
A4

Option 1

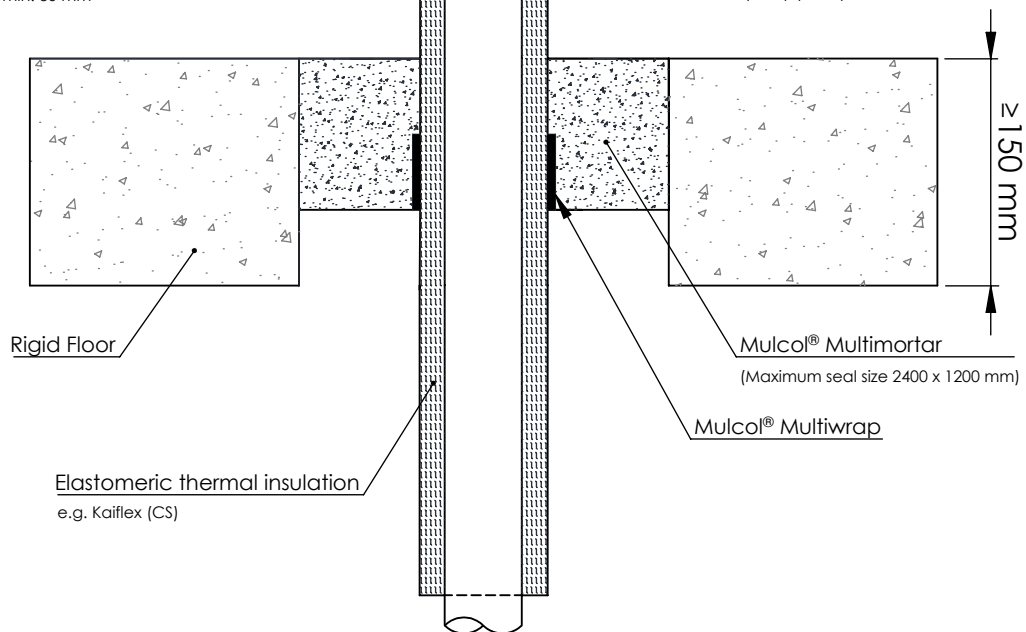


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2



A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm



A 3.7.2 Penetration seal with (stainless) steel pipes

Services	Classification	Position Mulcol® Multimortar	Insulation	Mulcol® Multiwrap	Position Services
Steel pipe Ø40 mm / 1-14.2 mm wall th.	EI 120 C/U	Top side of the floor 100 mm thick	25-50 mm Kaiflex insulation	50 x 5.4 mm (3 layer) fitted at bottom of seal	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Steel pipe Ø50 mm / 1.2-14.2 mm wall th.					
Steel pipe Ø60 mm / 1.4-14.2 mm wall th.					
Steel pipe Ø75 mm / 1.6-14.2 mm wall th.					
Steel pipe Ø90 mm / 1.9-14.2 mm wall th.					
Steel pipe Ø100 mm / 2.1-14.2 mm wall th.					
Steel pipe Ø115 mm / 2.4-14.2 mm wall th.					
Steel pipe Ø140 mm / 2.9-14.2 mm wall th.					
Steel pipe Ø165 mm / 3.4-14.2 mm wall th.					
Steel pipe Ø180 mm / 3.6-14.2 mm wall th.					
Steel pipe Ø200 mm / 4.0-14.2 mm wall th.					
Steel pipe Ø219 mm / 4.3-14.2 mm wall th.					
Steel pipe Ø250 mm / 5.0-14.2 mm wall th.					
Steel pipe Ø300 mm / 5.9-14.2 mm wall th.					
Steel pipe Ø324 mm / 6.35-14.2 mm wall th.					

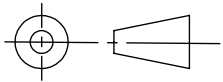
See graph on page 48 for intermediate sizes

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test pipe penetration seal
 Mulcol® Multimortar
 Rigid floor construction according to I.2.2



American projection



Scale : 1:5

Unit of measure : mm

Date : 8-2-2016

Company : Mulcol International B.V.

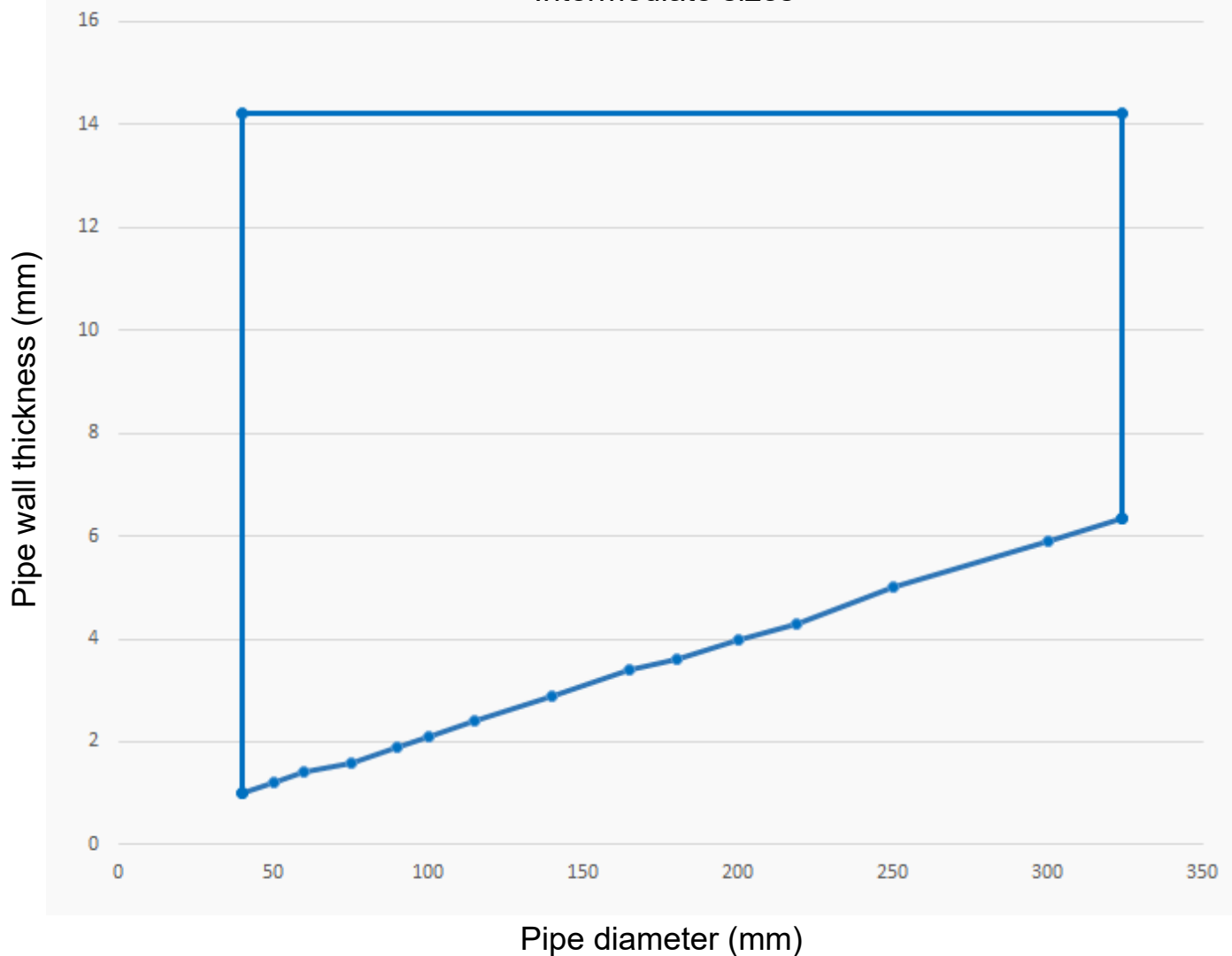
Department : Research & Development

Draftsman : K.J.

RF-ST-MM1.2.20

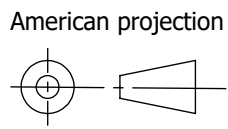
A4

Intermediate sizes



Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test cable penetration seal
Mulcol® Multimortar
Rigid floor construction according to I.2.2

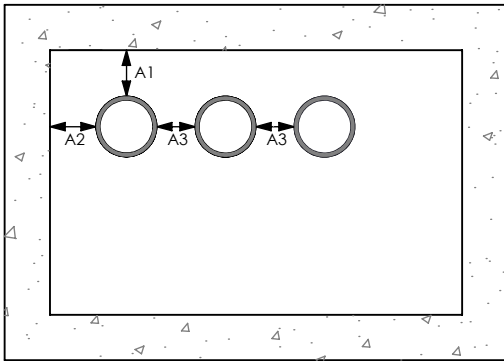


Scale : 1:5
Unit of measure : mm
Date : 6-4-2016

Company : Mulcol International B.V.
Department : Research & Development
Draftsman : R.M.

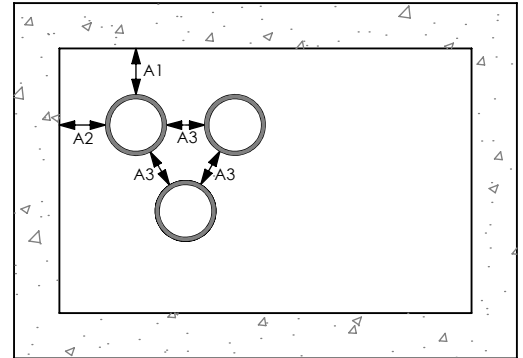
RF-PP-MM1.5.10
A4

Option 1

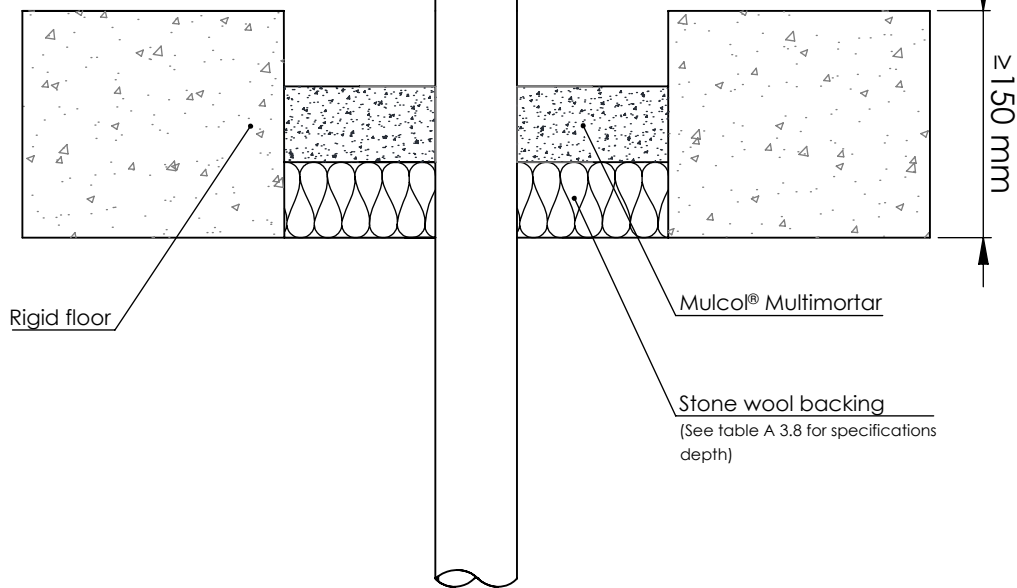


A1 : Pipe / top edge of seal separation min. 30 mm
A2 : Pipe / side edge of seal separation min. 30 mm
A3 : Pipe / pipe separation min. 30 mm

Option 2




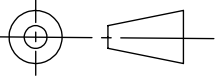
A1 : Pipe / top edge of seal separation min. 30 mm
A2 : Pipe / side edge of seal separation min. 30 mm
A3 : Pipe / pipe separation min. 30 mm



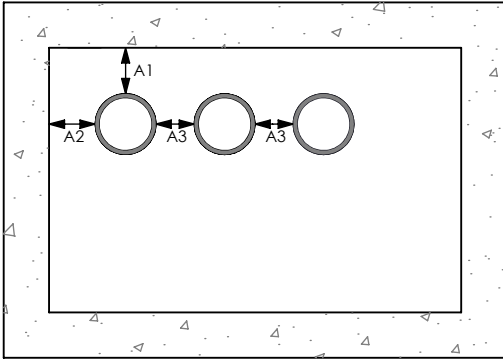
A 3.8 Single side penetration seal with combustible pipes

Services	Classification	Position Mulcol® Multimortar	Backing	Configuration	Maximum seal
PVC-U pipe according to EN 1329-1, EN 1452 and EN 1453-1**, PVC-C according to EN 1566-1					
Ø 16 mm / 1.6 - 3.4 mm wall th. up to Ø 40 mm / 1.9 - 3.0 mm wall th.	EI 120 U/C	To either side of the floor 50 mm thick	50 mm Stone wool insulation, 150 kg/m ³	1 & 2 between all specified pipes	2400 x 1200 mm

Annex A - Resistance to fire classification - Mulcol® Multimortar

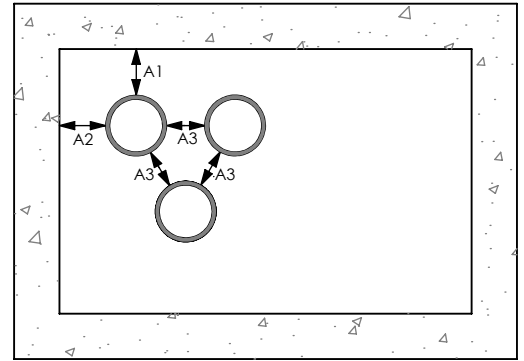
Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-PP-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 8-2-2018	Draftsman : K.J.	A4

Option 1

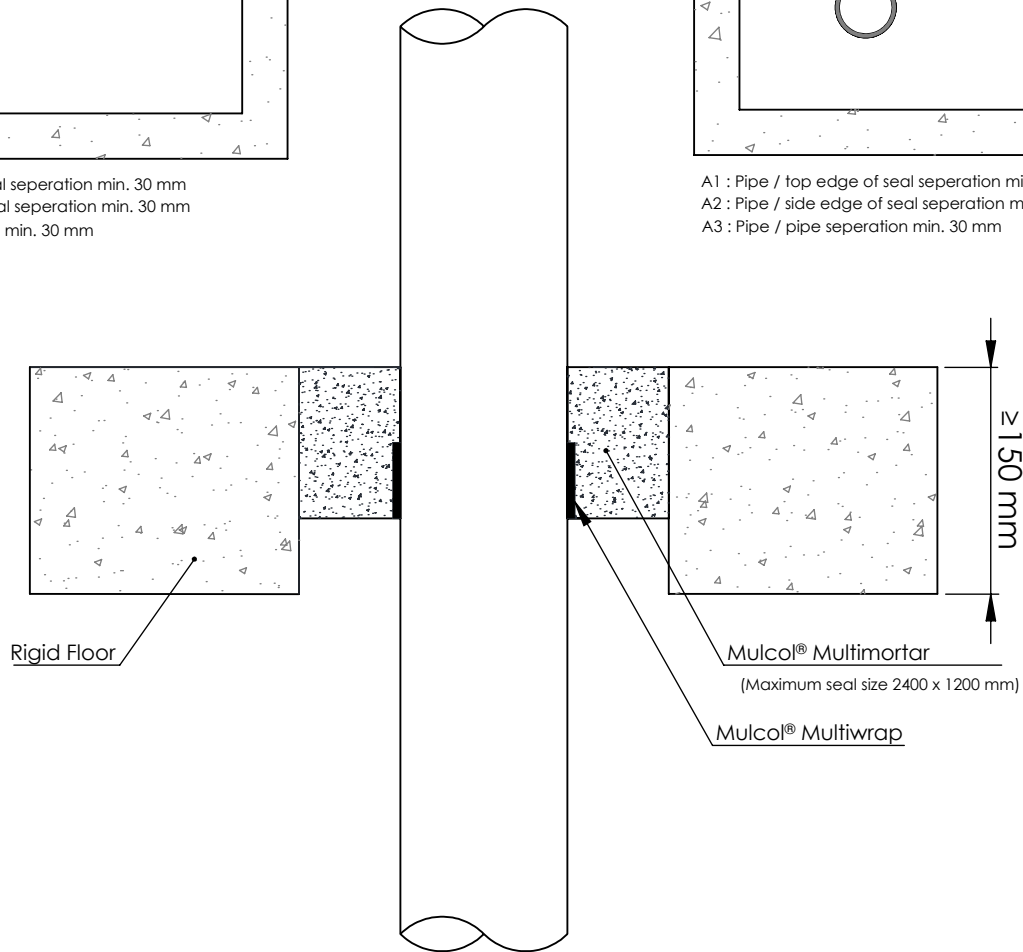


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2




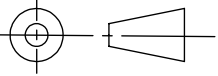
A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm



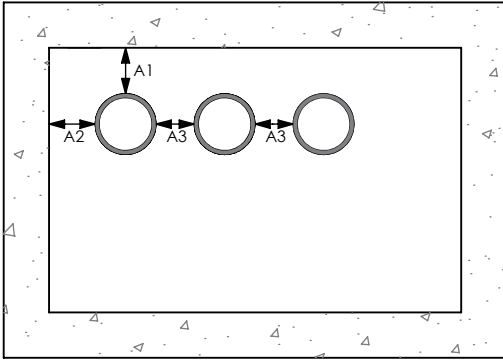
A 3.9 Penetration seal with combustible pipes

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Mulcol® Multiwrap (fitted at bottom of seal)	Position Services
PP pipe according to EN 1451-1					
Up to Ø 40 mm / 1.8-4.4 mm wall th.	EI 120 U/C	Either surface of the floor or anywhere in between	2400 x 1200 mm	None	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Up to Ø 40 mm / 1.8-5.5 mm wall th.	EI 120 U/U			50 x 1.8 mm (1 layer)	
Up to Ø 110 mm / 2.7-6.3 mm wall th.	EI 240 U/C			50 x 3.6 mm (2 layers)	
Up to Ø 125 mm / 3.4-11.4 mm wall th.				50 x 7.2 mm (4 layers)	
Up to Ø 160 mm / 4.9-14.6 mm wall th.				50 x 10.8 mm (6 layers)	
Up to Ø 110 mm / 3.4-6.3 mm wall th., containing telecom cables up to Ø 14 mm (bundled up to Ø 90 mm)	EI 60 U/C	50 x 3.6 mm (2 layers)			

Annex A - Resistance to fire classification - Mulcol® Multimortar

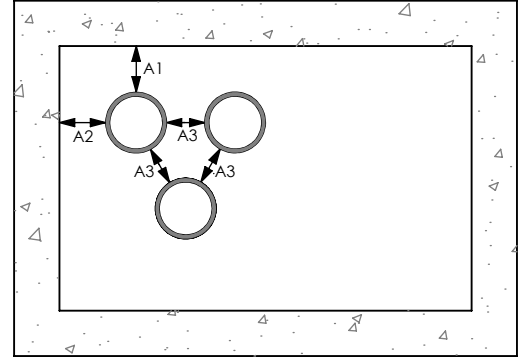
Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-PP-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 8-2-2018	Draftsman : K.J.	A4

Option 1

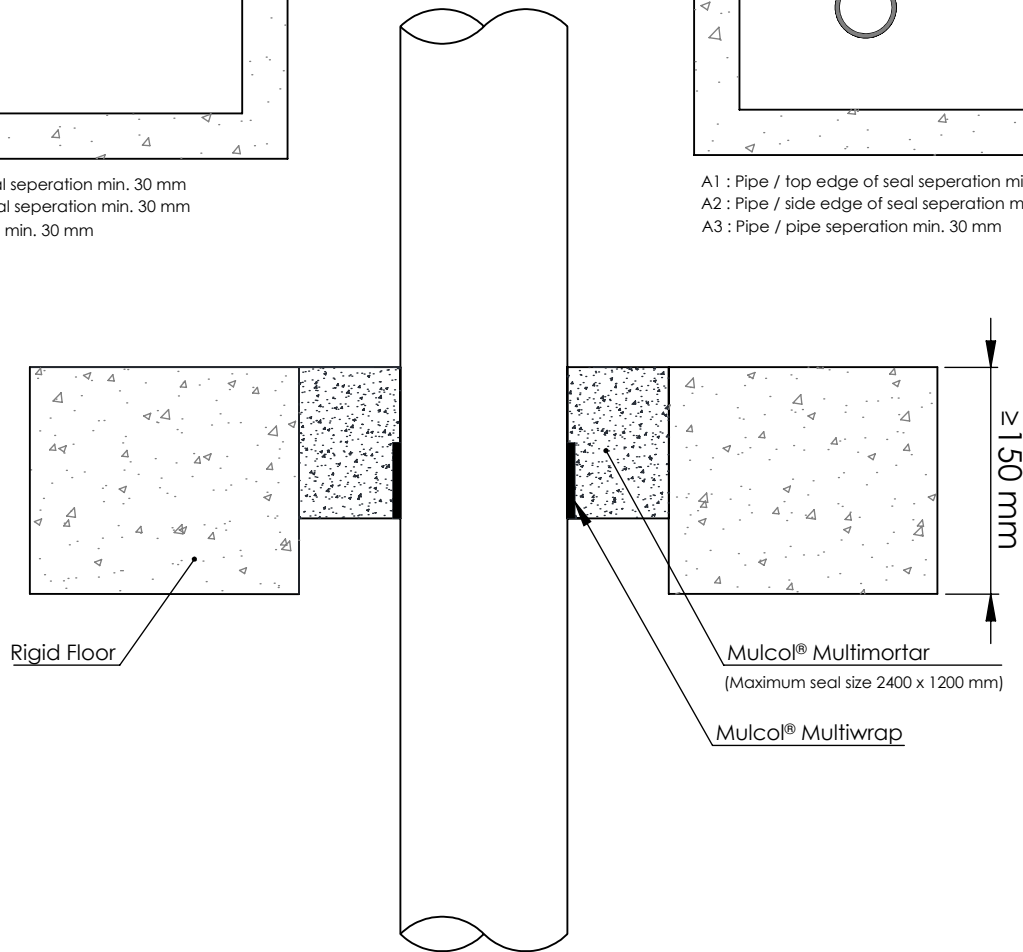


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2




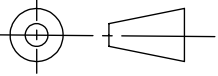
A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm



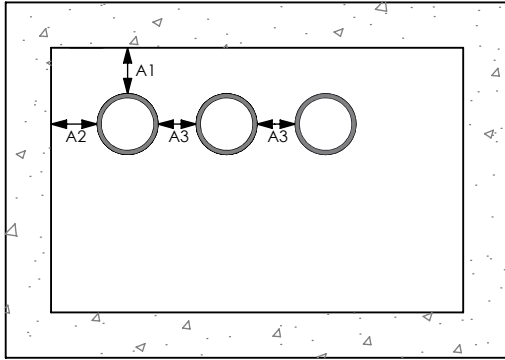
A 3.9.1 Penetration seal with combustible pipes

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Mulcol® Multiwrap (fitted at bottom of seal)	Position Services
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					
Up to Ø 40 mm / 2.0-4.4 mm wall th.	EI 120 U/C	Either surface of the floor or anywhere in between	2400 x 1200 mm	None	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Up to Ø 40 mm / 2.4-3.7 mm wall th.	EI 240 U/U			50 x 1.8 mm (1 layer)	
Up to Ø 110 mm / 3.4-10.0 mm wall th.	EI 120 U/C			50 x 3.6 mm (2 layers)	
Up to Ø 125 mm / 3.9-11.4 mm wall th.	EI 240 U/C			50 x 7.2 mm (4 layers)	
Up to Ø 160 mm / 4.9-14.6 mm wall th.	EI 120 U/C			50 x 10.8 mm (6 layers)	
Up to Ø 110 mm / 2.7-10.0 mm wall th., containing telecom cables up to Ø 14 mm (bundled up to Ø 90 mm)	E 120 U/C, EI 60 U/C			50 x 3.6 mm (2 layers)	

Annex A - Resistance to fire classification - Mulcol® Multimortar

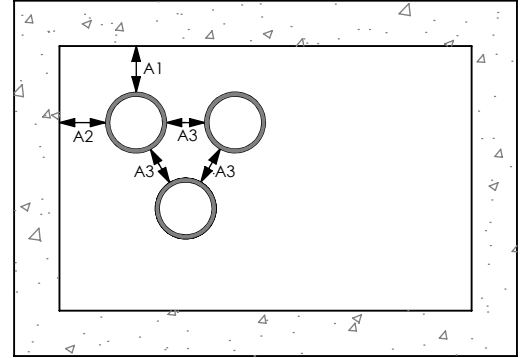
Fire test pipe penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-PP-MM1.2.10
	Unit of measure : mm	Department : Research & Development	
	Date : 8-2-2018	Draftsman : K.J.	A4

Option 1

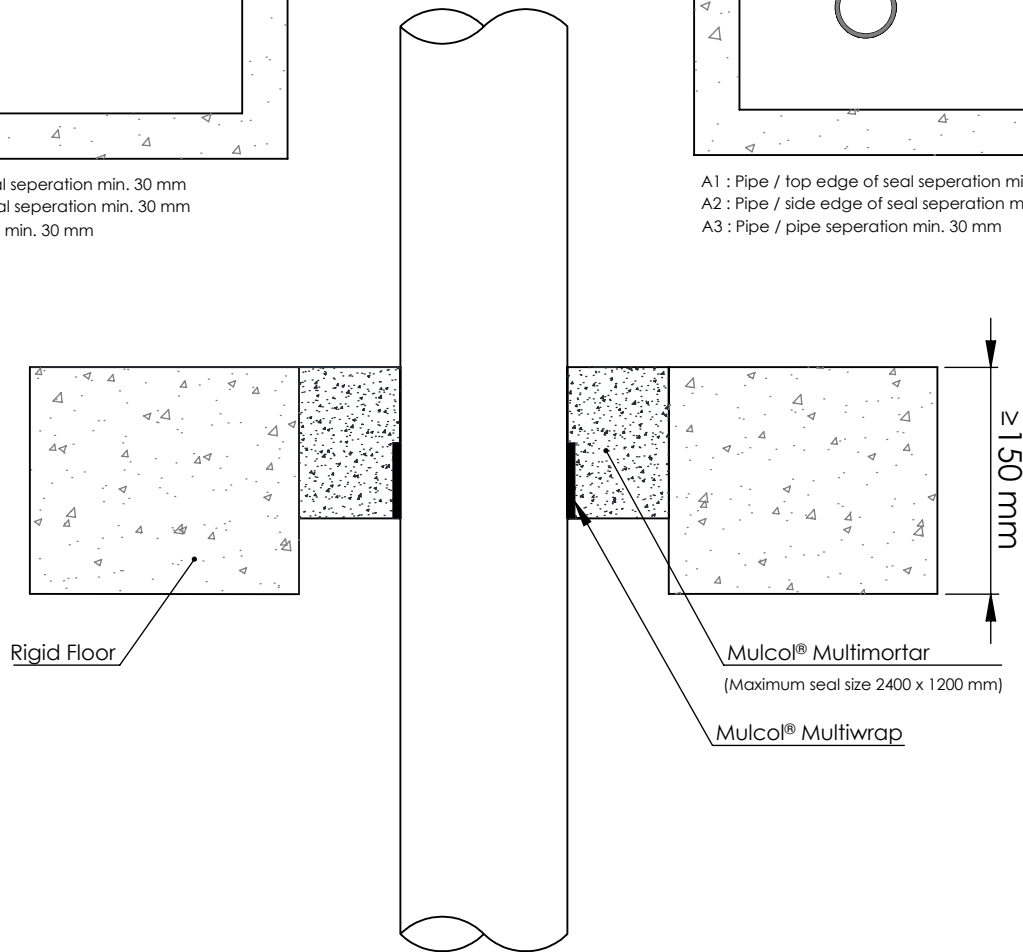


A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

Option 2




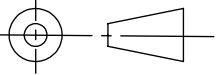
A1 : Pipe / top edge of seal separation min. 30 mm
 A2 : Pipe / side edge of seal separation min. 30 mm
 A3 : Pipe / pipe separation min. 30 mm

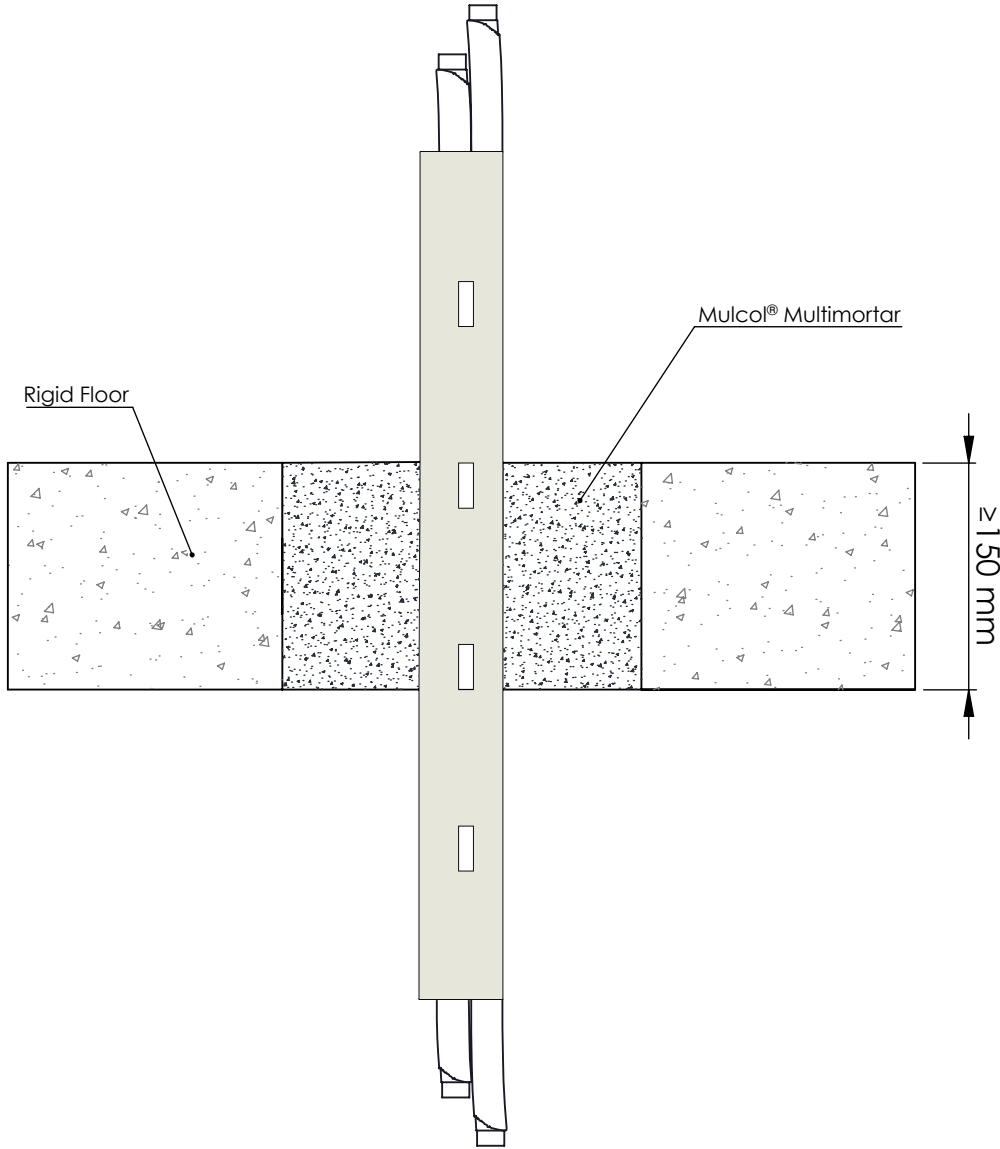


A 3.9.2 Penetration seal with combustible pipes

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Mulcol® Multiwrap (fitted at bottom of seal)	Position Services
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1					
Up to Ø 40 mm / 1.8-3.7 mm wall th.	E 180 U/U, EI 120 U/U	Either surface of the floor or anywhere in between	2400 x 1200 mm	50 x 1.8 mm (1 layer)	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Up to Ø 110 mm / 3.0-6.6 mm wall th.	EI 240 U/C			50 x 3.6 mm (2 layers)	
Up to Ø 125 mm / 3.5-7.4 mm wall th.	EI 120 U/C			50 x 7.2 mm (4 layers)	
Up to Ø 110 mm / 2.7-6.6 mm wall th., containing telecom cables up to Ø 14 mm (bundled up to Ø 90 mm)				50 x 3.6 mm (2 layers)	

Annex A - Resistance to fire classification - Mulcol® Multimortar

Fire test cable penetration seal Mulcol® Multimortar Rigid floor construction according to I.2.2			
American projection 	Scale : 1:5	Company : Mulcol International B.V.	RF-EC-MM1.3.10
	Unit of measure : mm	Department : Research & Development	
	Date : 6-4-2016	Draftsman : R.M.	A4



A 3.10 Penetration seal with cables and trays

Services	Classification	Position Mulcol® Multimortar	Maximum seal	Position services
Blank seals	E 240, EI 180	Entire floor thickness 150 mm	2400 x 1200 mm	Service fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services)
Electrical cables up to \varnothing 21 mm (single or in a bundle)	E 240, EI 120			
Steel cable trays & ladders up to 500 mm wide				
Electric cables \varnothing 22-50 mm single or in a bundle	E 240, EI 90			
Electric cables \varnothing 51-80 mm single or in a bundle	E 90, EI 60			
Telecommunication cables up to \varnothing 21 mm (single or bundles up to \varnothing 100mm)	EI 120			
Non-sheathed wires up to \varnothing 24 mm				