EFECTIS ERA AVRASYA

Fire Test Laboratory

Test
TS EN ISO/IEC 17025
AB-0556-T

Accredited Body
No: AB-0556-T

CLASSIFICATION OF FIRE RESISTANCE PERFORMANCE IN ACCORDANCE WITH EN 13501-2:2016

Sponsor	: MULCOL INTERNATIONAL BV Arnesteinweg 18, 4338 PD Middelburg / The Netherlands
Prepared by	: EFECTIS ERA AVRASYA Test ve Belgelendirme A.Ş. Dilovası OSB 5. Kısım Fırat Caddesi No:18 Dilovası, KOCAELI/TURKEY
Product name	: Mulcol® Multimastic C System, in combination with Multisealant GR, Multitherm Bandage, Multicollar Slim, Multidisc, Multimortar. Installation in rigid floor
Classification report No.	: EEA - 20 - 008
Issue number	: 1/2
Date of issue	: 09.06.2020

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Address: DİLOVASI OSB 5. Kısım Fırat Cad. No: 18, 41455 Dilovası, KOCAELİ/TURKEY
Phone: 0262 6581662 Fax: 0262 6581669 E-mail: turkey@efectis.com
Web: www.efectis.com

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1. INTRODUCTION

This classification report defines the classification in accordance with the procedures given in EN 13501-2:2016, assigned to Penetration seals; Mulcol® Multimastic C System, in combination with Multisealant GR, Multitherm Bandage, Multicollar Slim, Multidisc, Multimortar. Installation in rigid floor.

2. DETAILS OF CLASSIFIED PRODUCT

2.1. General

The elements, Penetration seals; Mulcol® Multimastic C System, in combination with Multisealant GR, Multitherm Bandage, Multicollar Slim, Multidisc, Multimortar. Installation in rigid floor defined as type of product.

2.2. Description

Penetration seals; Mulcol® Multimastic C System, defined as type of product are fully described below.

2.2.1. General

Product identification	: Mulcol® Multimastic C System, in combination with Multisealant GR, Multitherm Bandage, Multicollar Slim, Multidisc, Multimortar. Installation in rigid floor
Manufacturer	: MULCOL INTERNATIONAL BV Arnesteinweg 18, 4338 PD Middelburg / The Netherlands
Sponsor of test	: MULCOL INTERNATIONAL BV Arnesteinweg 18, 4338 PD Middelburg / The Netherlands

2.2.2. Construction

The specimens were installed into a 150 mm thick rigid floor, supporting construction and tested to evaluate their fire resisting performance.

Sponsor's sub-contractor constructed a nominally 150 mm thick floor in accordance with EN 1363-1:2012. The sponsor subsequently installed the systems into the supporting construction, with assistance from Efectis Era Avrasya as required.

The supporting construction comprised of a 3000 mm x 3000 mm (w x h) floor, built in accordance with EN 1366-3: 2009, into a refractory lined steel restraint frame.

*All dimensions are given in mm.

2.2.3. Technical description of the products

Mulcol® Multimastic C System

- Mulcol® Multimastic FB is a mineral wool board coated with waterborne Mulcol® Multimastic C ablative firestop coating based on a sustainable polymer system used to reinstate the fire resistance performance of wall and floor constructions where they have been provided with apertures for the penetration of single or multiple services.
- The Mulcol® Multimastic FB is supplied coated on one face, referenced FB1, or on both faces, referenced FB2. The board or boards are then cut to allow the penetration of the required services, before being inserted into the aperture in the wall or floor.

Mulcol® Multidisc

- Mulcol® Multidisc is a surface mounted self-adhesive intumescent disc device used to form penetration seals where plastic conduits, metal pipes, electrical sockets, aluminium composite pipes and cables penetrate walls and floors.
- The Mulcol® Multidisc is supplied in boxes of 65 mm diameter x 3 mm disks, to be used single or in combination depending upon services.

Mulcol® Multicollar Slim

- Mulcol® Multicollar Slim is a pipe collar device used to form penetration seals where plastic pipes Flue Gas pipes, aluminium composite pipes and metal pipes, with and without insulation and cables penetrate walls and floors.
- The Mulcol® Multicollar Slim is supplied with 30 x 12 mm intumescent liner complete within a stainless steel shell, to be closed around the services and fixed to the supporting element.

Mulcol® Multisealant GR

- Mulcol® Multisealant GR is a sealant and pipe closure device used to form penetration seals where insulated and uninsulated metallic pipes, combustible pipes, combustible cable conduits and cables penetrate walls and floors.
- The Mulcol® Multisealant GR is supplied in liquid form contained within 310 ml cartridges. The sealant is gunned into the aperture in the separating element and around the service or multiple services, to a specified depth utilising mineral fibre insulation backing material.

Mulcol® Multitherm Bandage

- Mulcol® Multitherm Bandage is a pipe wrap device used to form penetration seals where cable trays, cables, aluminium composite pipes and metal pipes penetrate walls and floors.
- The Mulcol® Multitherm Bandage is supplied as a 3000 x 150 x 3 mm roll, to be cut to size for wrapping around pipes in 1, 2 or 3 layers.

2.3. Results

2.3.1. Mulcol Multimastic FB1 - 2x50 mm - with cables, trays

2.3.1.1. Cable tray with various cables in combination with Multitherm Bandage

Cable tray with various cables, penetrated through Mulcol Multimastic FB1. Insulation material Multitherm Bandage 150 mm (applied at unexposed side or at exposed side, around cable tray). Further details are given in the drawings. See Table 1 and 2 for details.

Classification

Mulcol® Multimastic C System, in combination with Multitherm Bandage is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multitherm Bandage provide the following classification:

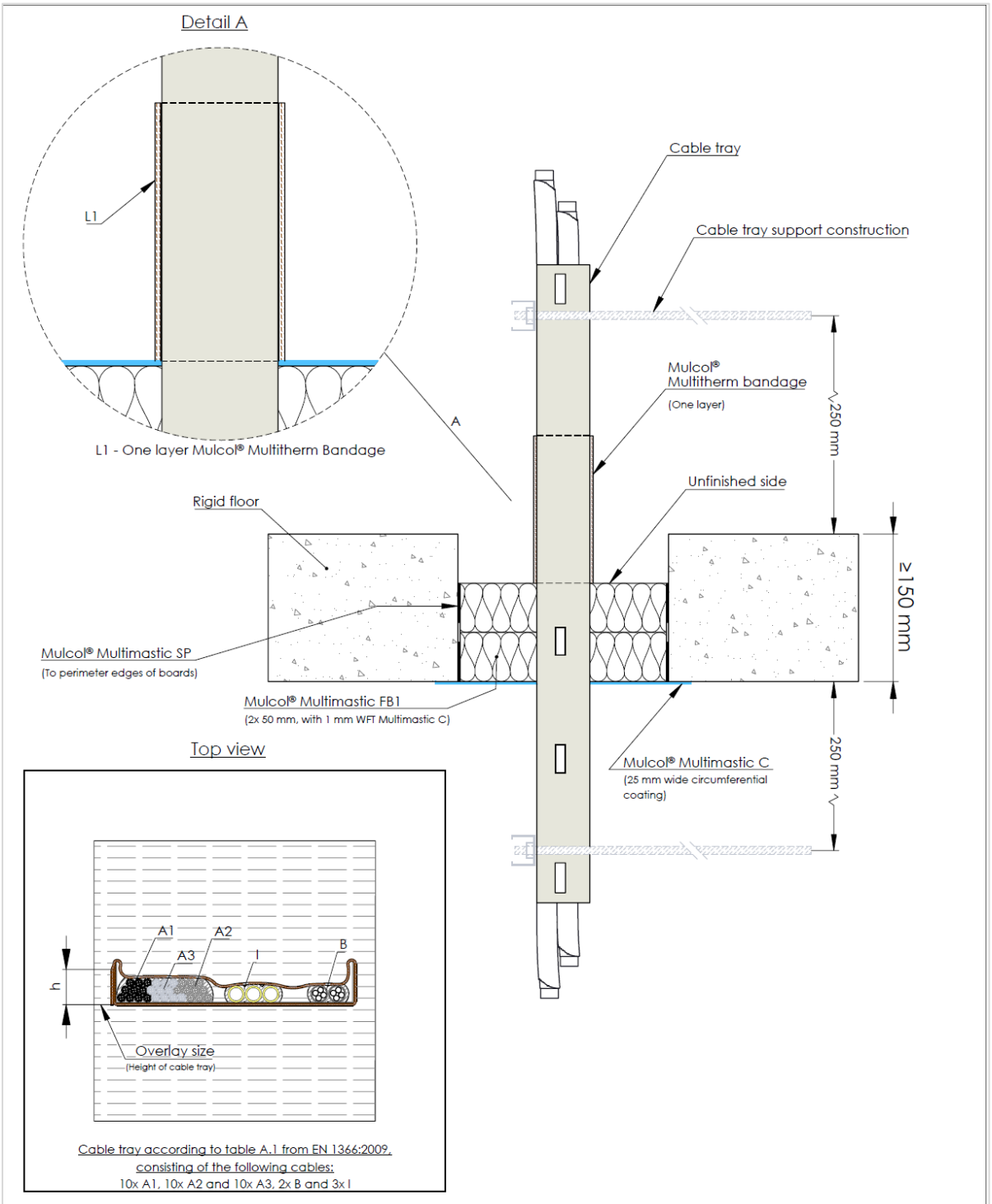
Mulcol Multimastic FB1 - 2x50 mm								
Service	**Dimensions**	**Wall thick ness**	**Insulation type**	**Insulation thickness**	**CS, Cl LS, LI**	**Side of app.**	**Sealing Product**	**Classification**
Cable tray	300x60	1,25	Multitherm Bandage	One layer	LI 150	unexposed side or at both sides	Multimastic C System	**E 120, EI 90***

Table 1: Tray details at unexposed side or at both sides.

*Fire resistant from one side when Multitherm Bandage is applied at unexposed side. Fire resistant from both sides when Multitherm Bandage is applied at both sides.

Mulcol Multimastic FB1 - 2x50 mm								
Service	**Dimensions**	**Wall thick ness**	**Insulation type**	**Insulation thickness**	**CS, Cl LS, LI**	**Side of app.**	**Sealing Product**	**Classification**
Cable tray	300x60	1,25	Multitherm Bandage	One layer	LI 150	At exposed side	Multimastic C System	**E 120, EI 60**

Table 2: Tray details at exposed side.

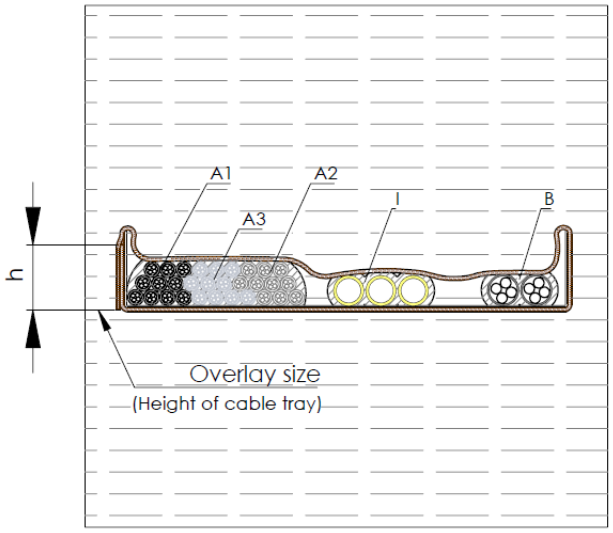


American projection	Scale :	Company : Mulcol International B.V.	PBrf-CT-MFB1-B3.1.10
	Unit of measure : mm	Department : Research & Development	A4 - Page 1 of 2
	Date : 12-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test cable tray penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

Top view



Cable tray according to table A.1 from EN 1366:2009,
consisting of the following cables:
10x A1, 10x A2 and 10x A3, 2x B and 3x I

Cable tray consisting of the following cables:

A1 - e.g. NYY-J Cable 5 x 1,5 mm
A2 - e.g. H07RN-F 5G Cable 5 x 1,5 mm
A3 - e.g. PVIK-LS-HF 5 x 1,5 mm
B - e.g. EYY-J Cable 1 x 95 mm
I - e.g. Plastic conduit Ø 16 mm

American projection	Scale :	Company : Mulcol International B.V.	PBrf-CT-MFB1-B3.1.10
	Unit of measure : mm	Department : Research & Development	A4 - Page 2 of 2
	Date : 12-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.1.2. Cables sealed with Multimastic C

Cables penetrated through Mulcol Multimastic FB1. All cables are coated with Mulcol Multimastic C System over 50 mm (300 mμ WFT). Further details are given in the drawings. See Table 3 for details.

Classification

Mulcol® Multimastic C System is classified according to the following combinations of performance parameters and classes:

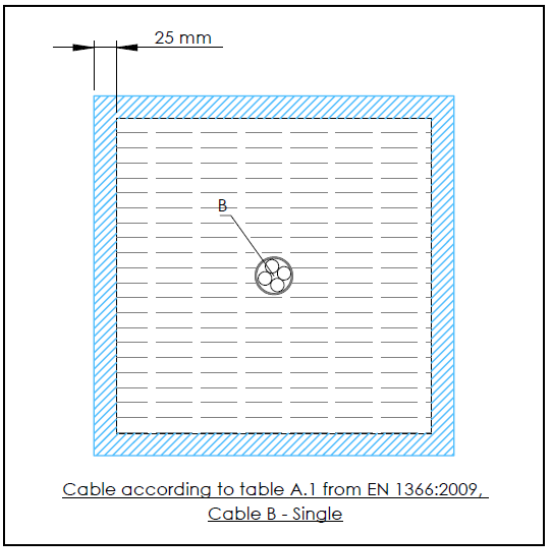
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System provide the following classification:

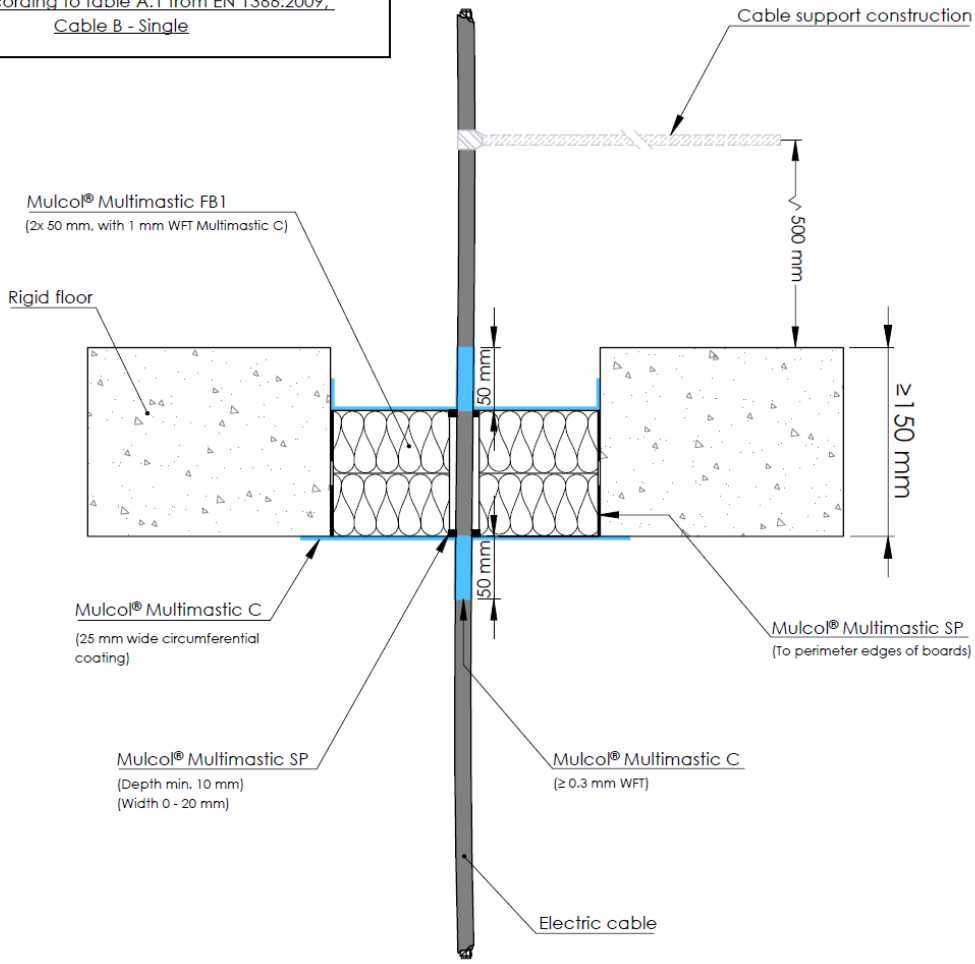
Mulcol Multimastic FB1 - 2x50 mm							
Service	**Dimensions**	**Insulation type**	**Insulation thickness**	**CS, CI LS, LI**	**Side of app.**	**Sealing Product**	**Classification**
Cable	≤ 21	Multimastic C	300 mμ WFT	LI 50	bs	Multimastic C	**E 45, EI 45**
Cable	≤ 47	Multimastic C	300 mμ WFT	LI 50	bs	Multimastic C	**E 60, EI 45**

Table 3: Cable details penetrated through Mulcol Multimastic FB1.

Bottom view



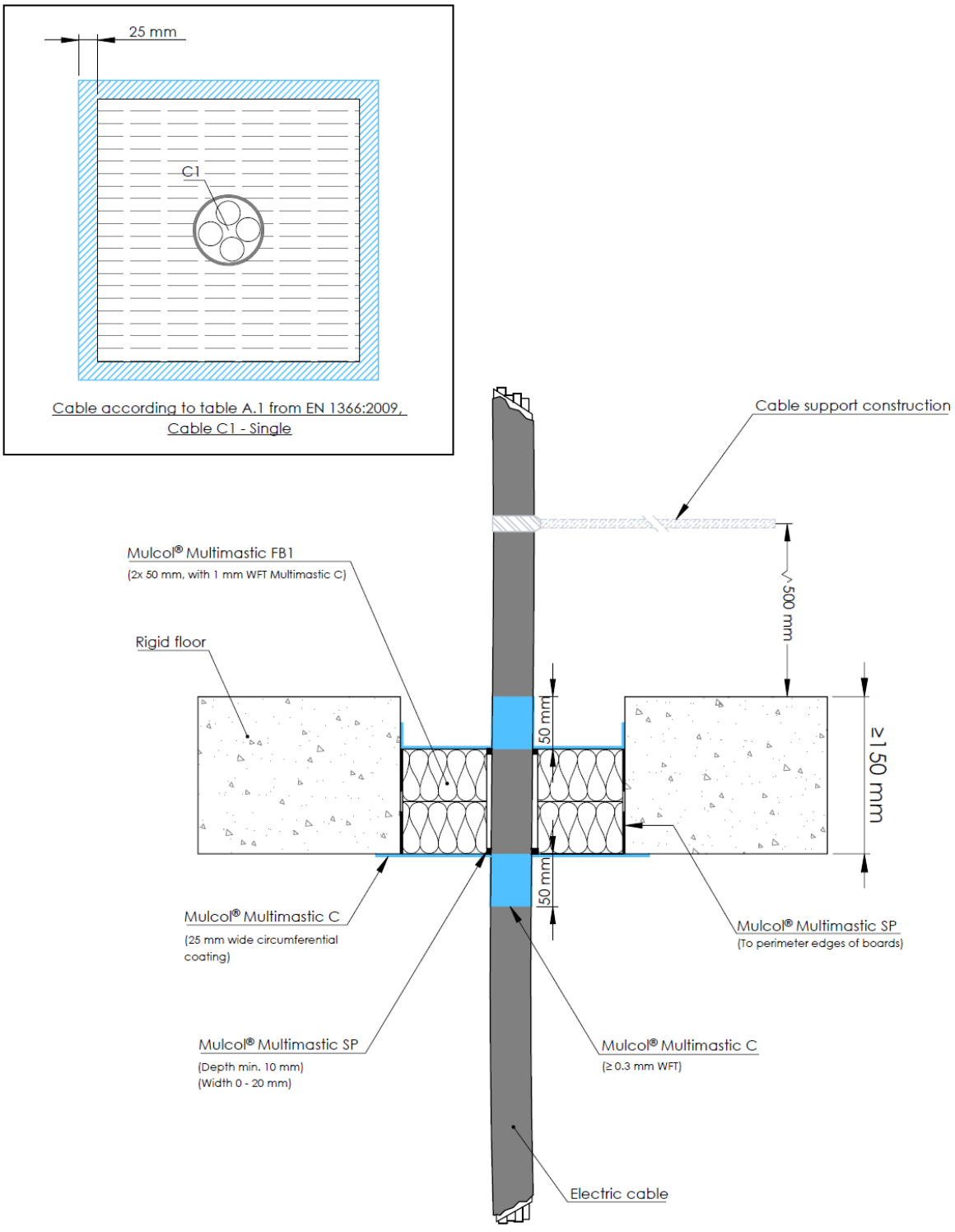
Cable according to table A.1 from EN 1366:2009,
Cable B - Single



American projection	Scale : 1:5	Company : Mulcol International B.V.	PBrf-EC21-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor



American projection	Scale :	Company : Mulcol International B.V.	PBrf-EC47-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.1.3. Various bundled cables sealed with Multimastic C

Bundled cables with a diameter of max. 21 mm per piece, total diameter of ≤ 50 mm, penetrated through Mulcol Multimastic FB1. All cables are sealed with Mulcol Multimastic C over 50 mm. Further details are given in the drawings. See Table 4 for details.

Classification

Mulcol® Multimastic C System is classified according to the following combinations of performance parameters and classes:

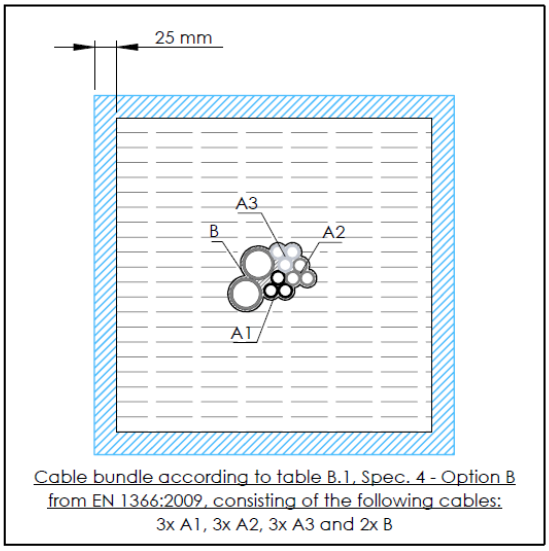
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System provide the following classification:

Mulcol Multimastic FB1 - 2x50 mm							
Service	**Dimensions**	**Insulation type**	**Insulation thickness**	**CS, CI LS, LI**	**Side of app.**	**Sealing Product**	**Classification**
Cable bundle	≤ 50	Multimastic C	300 um WFT	LI 50	bs	Multimastic C	**E 60, EI 60**

Table 4: Details of various bundled cables sealed with Multimastic C.

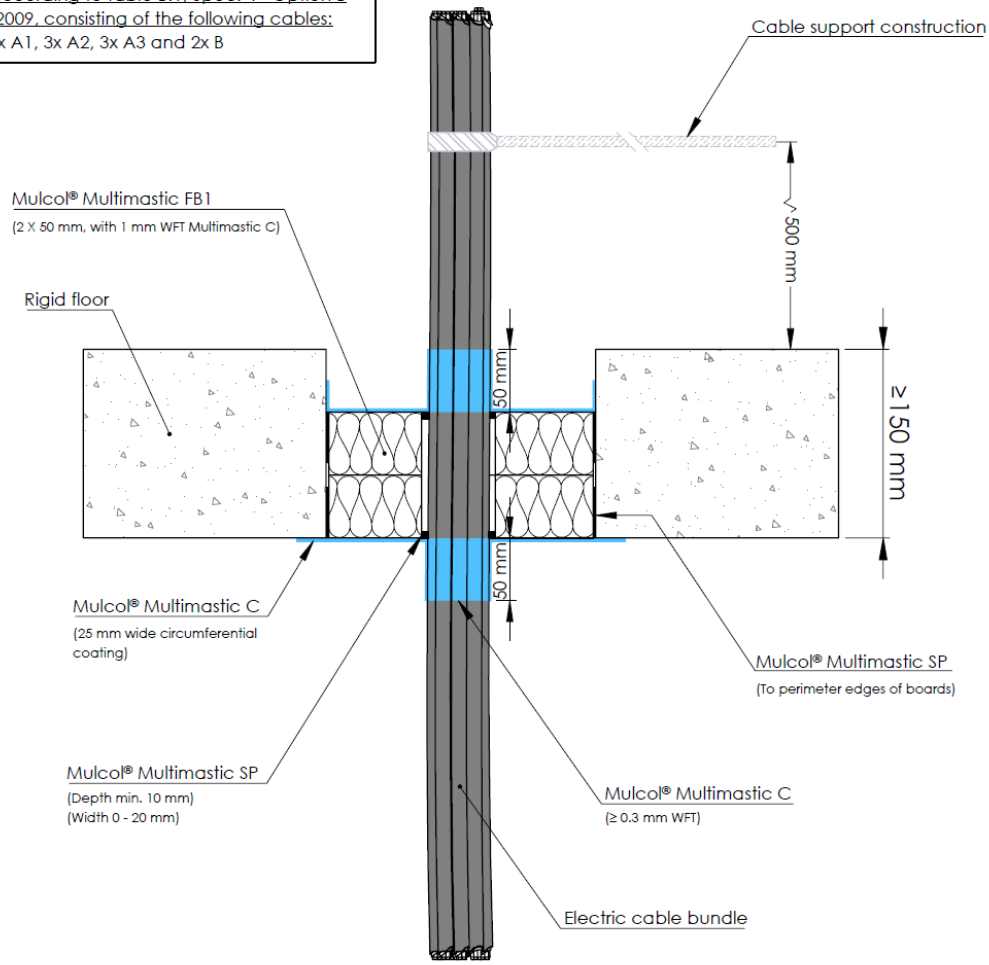
Bottom view



Cable bundle according to table B.1, Spec. 4 - Option B from EN 1366:2009, consisting of the following cables:
3x A1, 3x A2, 3x A3 and 2x B

Cable bundle consisting of the following cables:

A1 - e.g. NYY-J Cable 5 x 1,5 mm
A2 - e.g. H07RN-F 5G Cable 5 x 1,5 mm
A3 - e.g. PVIK-LS-HF 5 x 1,5 mm
B - e.g. EYY-J Cable 1 x 95 mm



American projection	Scale :	Company : Mulcol International B.V.	PBrf-ECB-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test cable penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.2. Mulcol Multimastic FB1 – 2x50 mm – with steel and copper pipes

2.3.2.1. Steel and copper pipes insulated with Armaflex AF

Copper and steel pipes insulated with elastomer insulation, penetrated through Mulcol Multimastic FB1. Insulation material AF/Armaflex. All pipes are sealed with Mulcol Mutlisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. Further details are given in the drawings. See Table 5 for details and the graphs for wall thickness-diameter range.

Classification

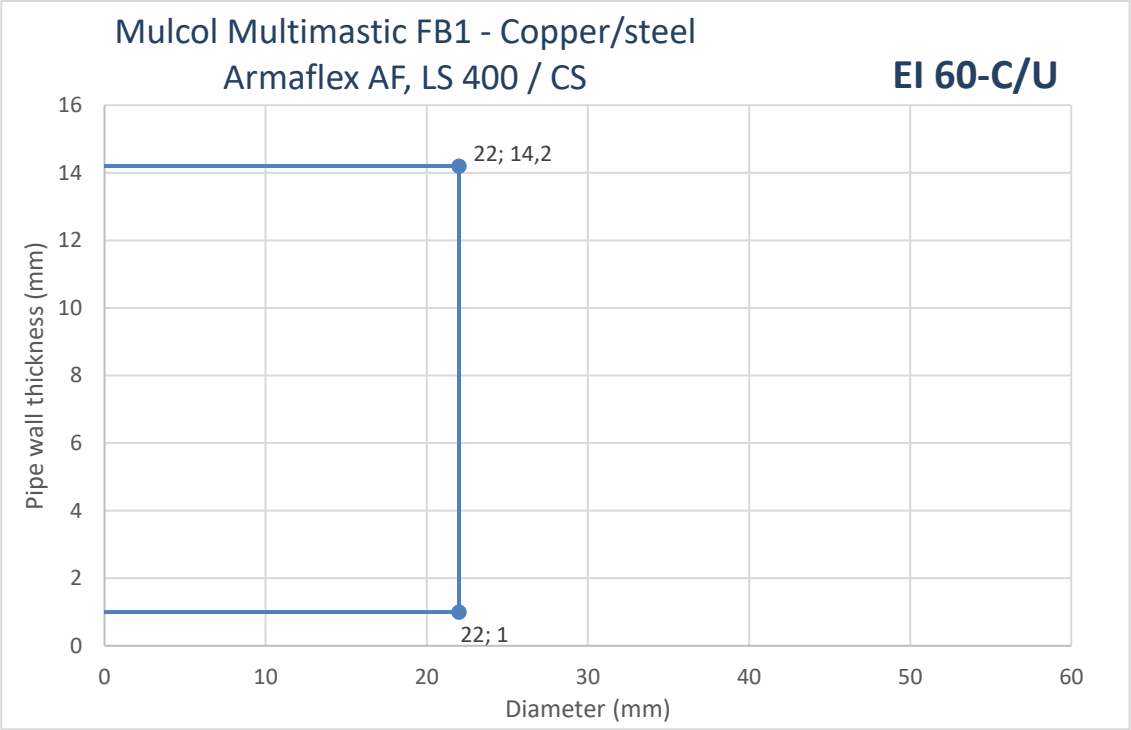
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

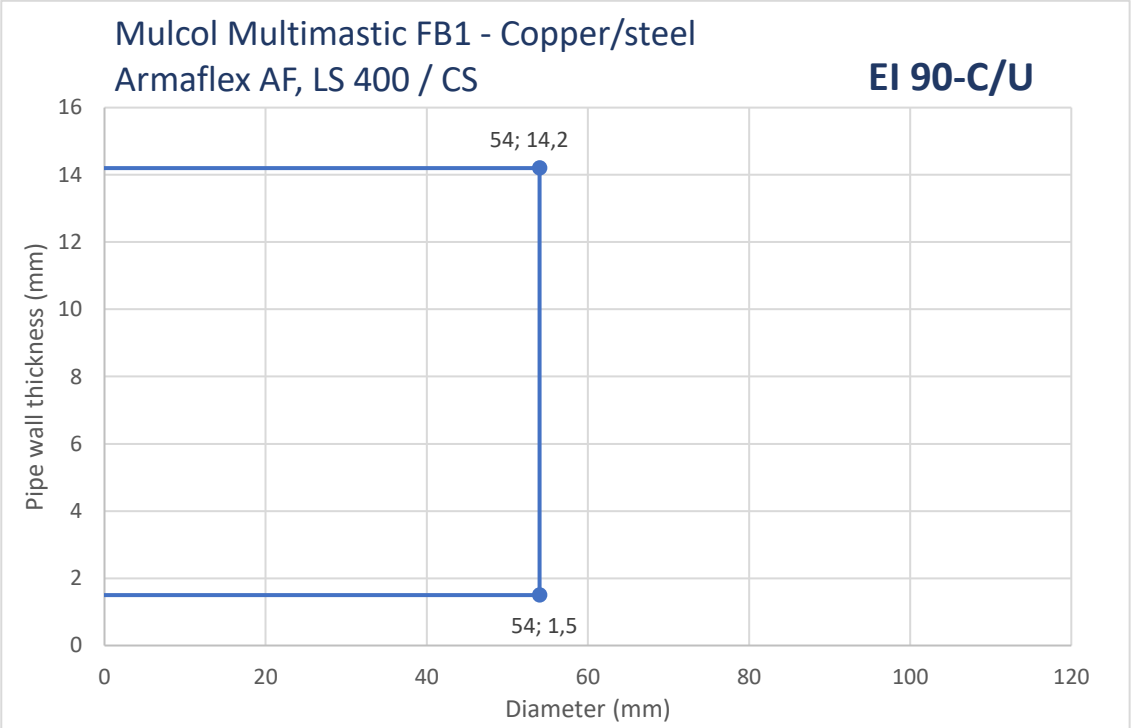
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

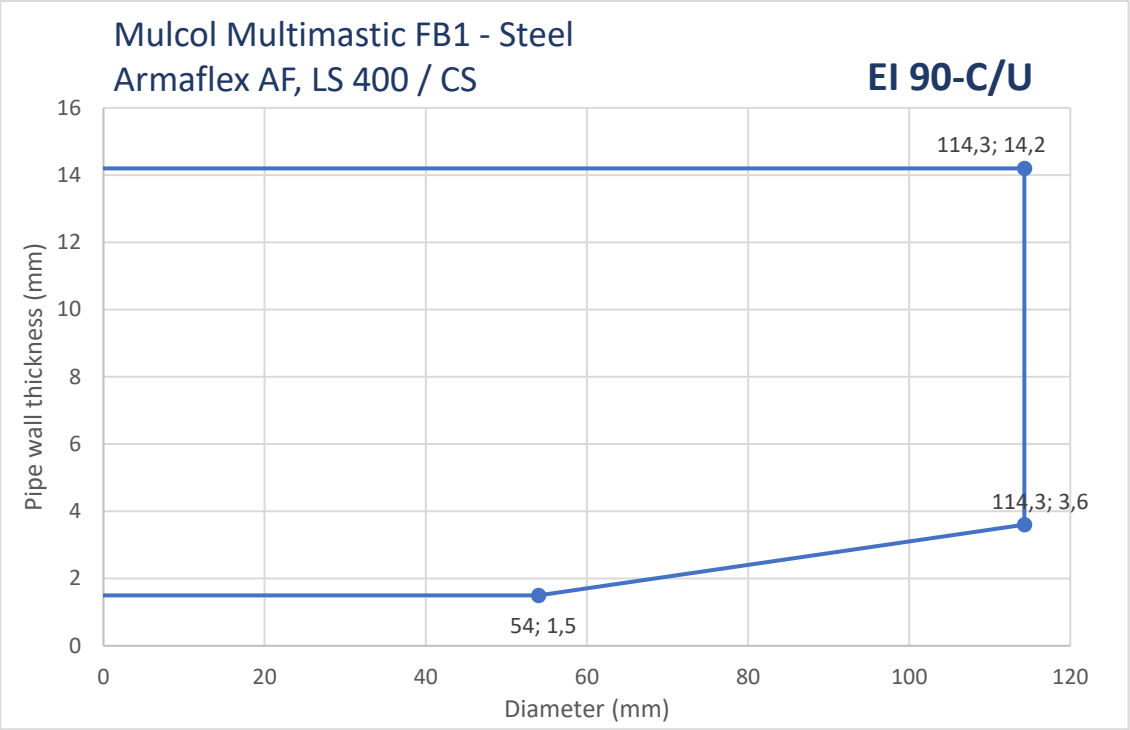
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

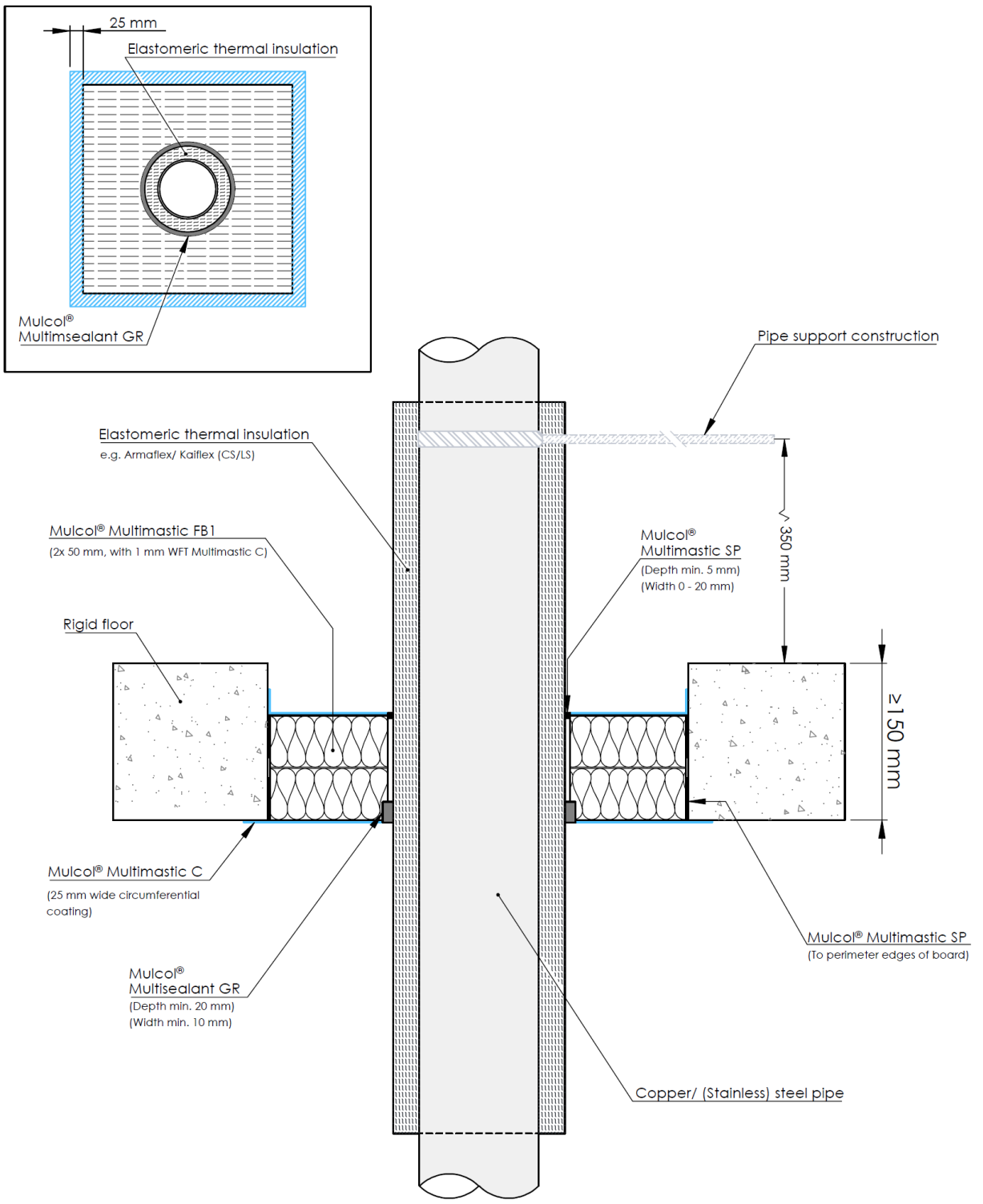
Mulcol Multimastic FB1 - 2x50 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, Cl LS, Ll**	**Side of app.**	**Classification**
Copper	≤ 22	1	AF/Armaflex	8,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**
Copper	≤ 22	1	AF/Armaflex	33,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 90, EI 60 C/U**
Steel	≤ 26,9	2,3	AF/Armaflex	8,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 26,9	2,3	AF/Armaflex	35	B_L-s3,d0	LS 400 / CS	Exposed side	**E 90, EI 90 C/U**
Copper	≤ 54	1,5	AF/Armaflex	13,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Copper	≤ 54	1,5	AF/Armaflex	38	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Steel	≤ 114,3	3,6	AF/Armaflex	15	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Steel	≤ 114,3	3,6	AF/Armaflex	43	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**

Table 5: Details of the pipes insulated with AF/Armaflex.


Mulcol Multimastic FB1 - Copper/steel
Armaflex AF, LS 400 / CS
EI 60-C/U
Pipe wall thickness (mm)
Diameter (mm)
22; 14,2
22; 1
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60


Mulcol Multimastic FB1 - Copper/steel
Armaflex AF, LS 400 / CS
EI 90-C/U
Pipe wall thickness (mm)
Diameter (mm)
54; 14,2
54; 1,5
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120


Mulcol Multimastic FB1 - Steel
Armaflex AF, LS 400 / CS
EI 90-C/U
Pipe wall thickness (mm)
Diameter (mm)
114,3; 14,2
114,3; 3,6
54; 1,5
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB1-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
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MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.2.2. Steel and copper pipes insulated with NH/Armaflex

Copper and steel pipes insulated with elastomer insulation, penetrated through Mulcol Multimastic FB1. Insulation material NH/Armaflex. All pipes are sealed with Mulcol Mutlisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. Further details are given in the drawings. See Table 6 for details and the graphs for wall thickness-diameter range.

Classification

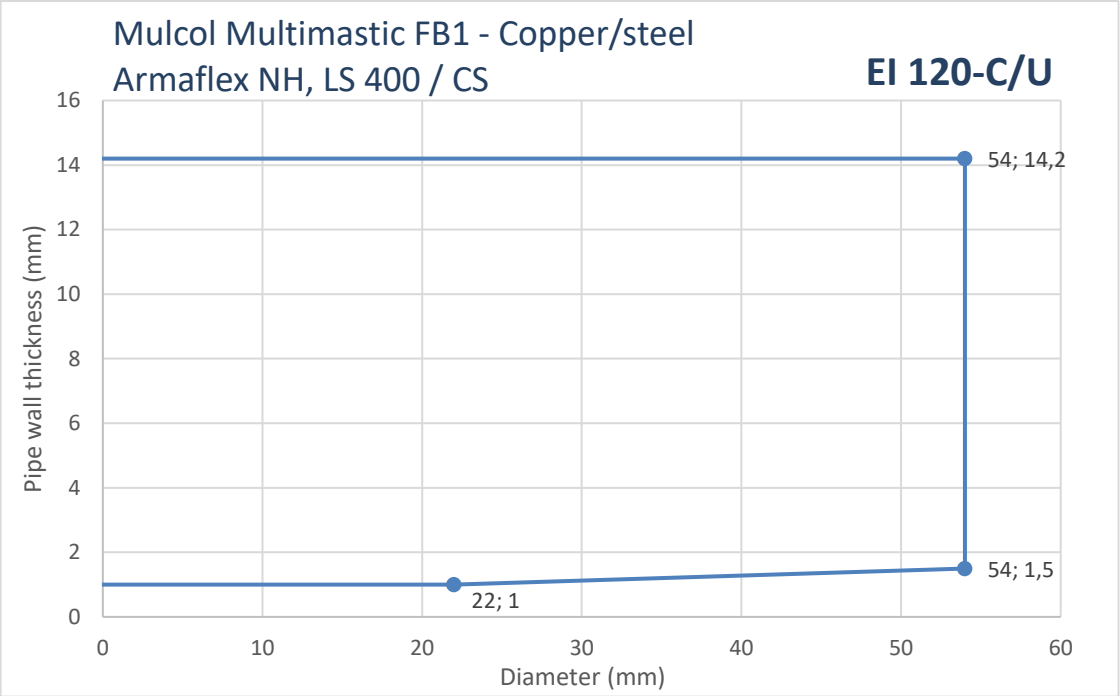
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

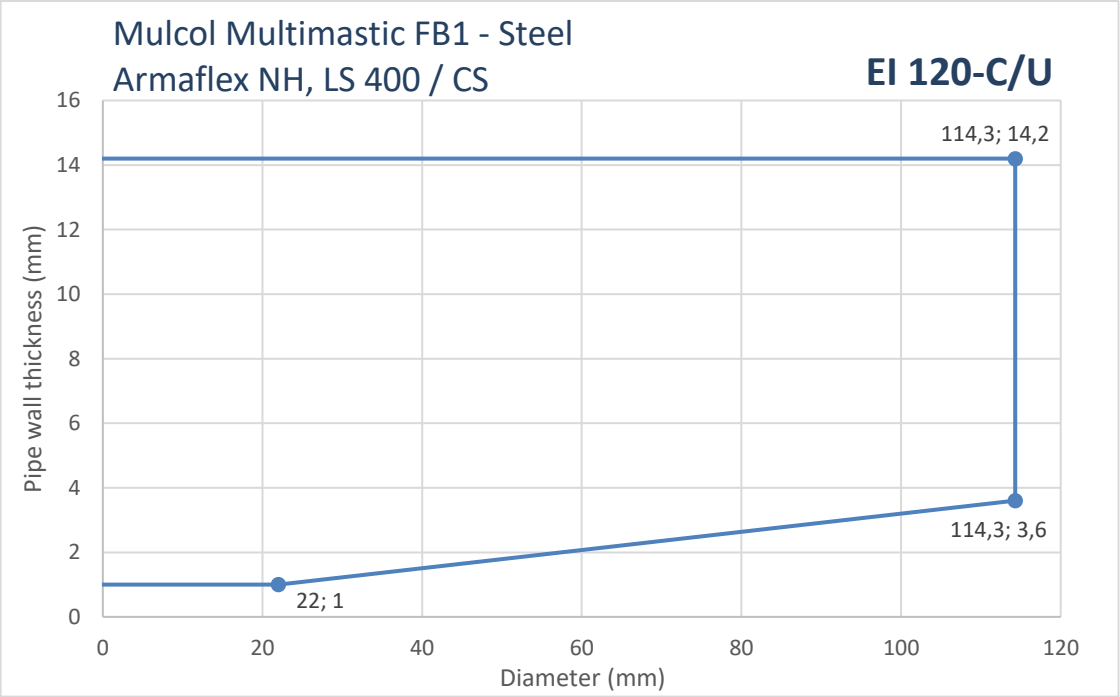
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

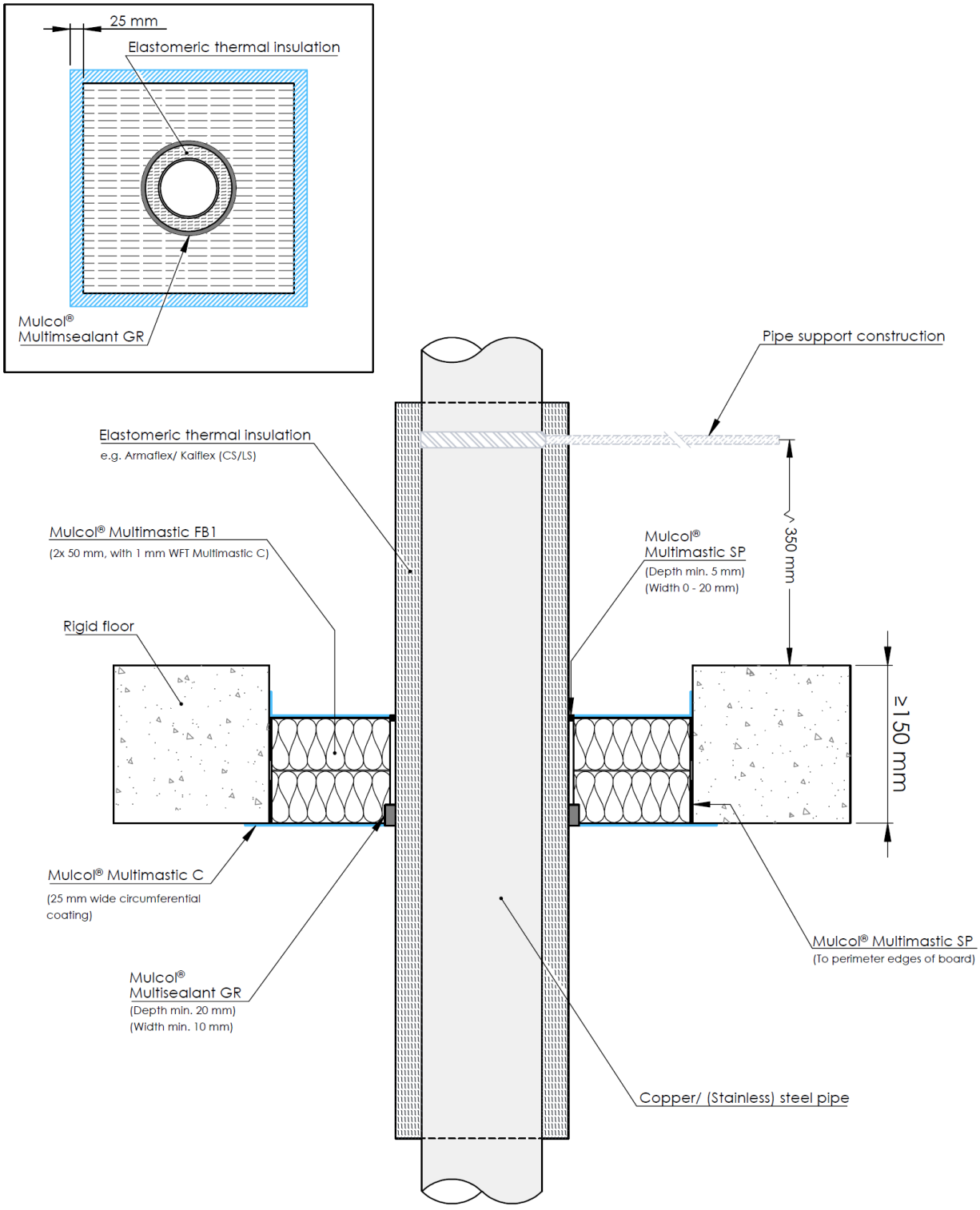
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB1 - 2x50 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Copper	≤ 22	1	NH/Armaflex	9	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Copper	≤ 22	1	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 26,9	2,3	NH/Armaflex	9	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 26,9	2,3	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 45 C/U**
Copper	≤ 54	1,5	NH/Armaflex	13	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Copper	≤ 54	1,5	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 90, EI 90 C/U**
Steel	≤ 114,3	3,6	NH/Armaflex	19	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 114,3	3,6	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**

Table 6: Details of the pipes insulated with NH/Armaflex.


Mulcol Multimastic FB1 - Copper/steel
Armaflex NH, LS 400 / CS
EI 120-C/U
Pipe wall thickness (mm)
Diameter (mm)
54; 14,2
54; 1,5
22; 1
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60


Mulcol Multimastic FB1 - Steel
Armaflex NH, LS 400 / CS
EI 120-C/U
Pipe wall thickness (mm)
Diameter (mm)
114,3; 14,2
114,3; 3,6
22; 1
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB1-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
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MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.2.3. Steel and copper pipes insulated with Armaflex Ultima

Copper and steel pipes insulated with elastomer insulation, penetrated through Mulcol Multimastic FB1. Insulation material Armaflex Ultima. All pipes are sealed with Mulcol Mutlisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. Further details are given in the drawings. See Table 7 for details and the graphs for wall thickness-diameter range.

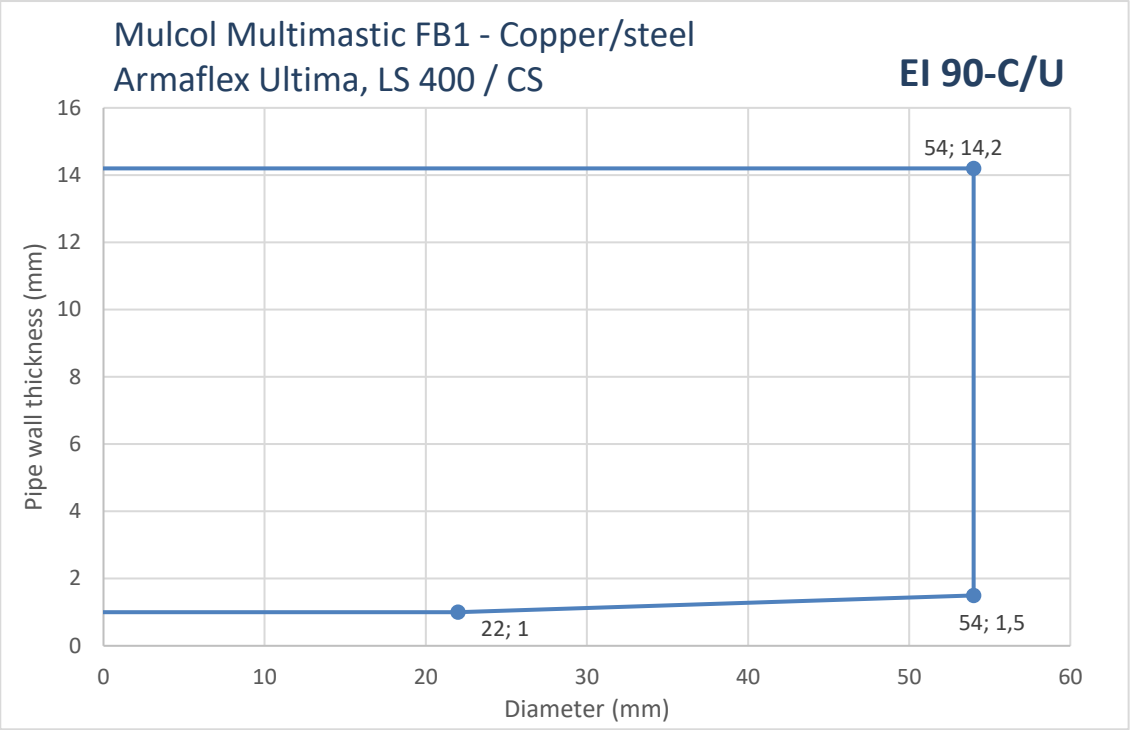
Classification
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

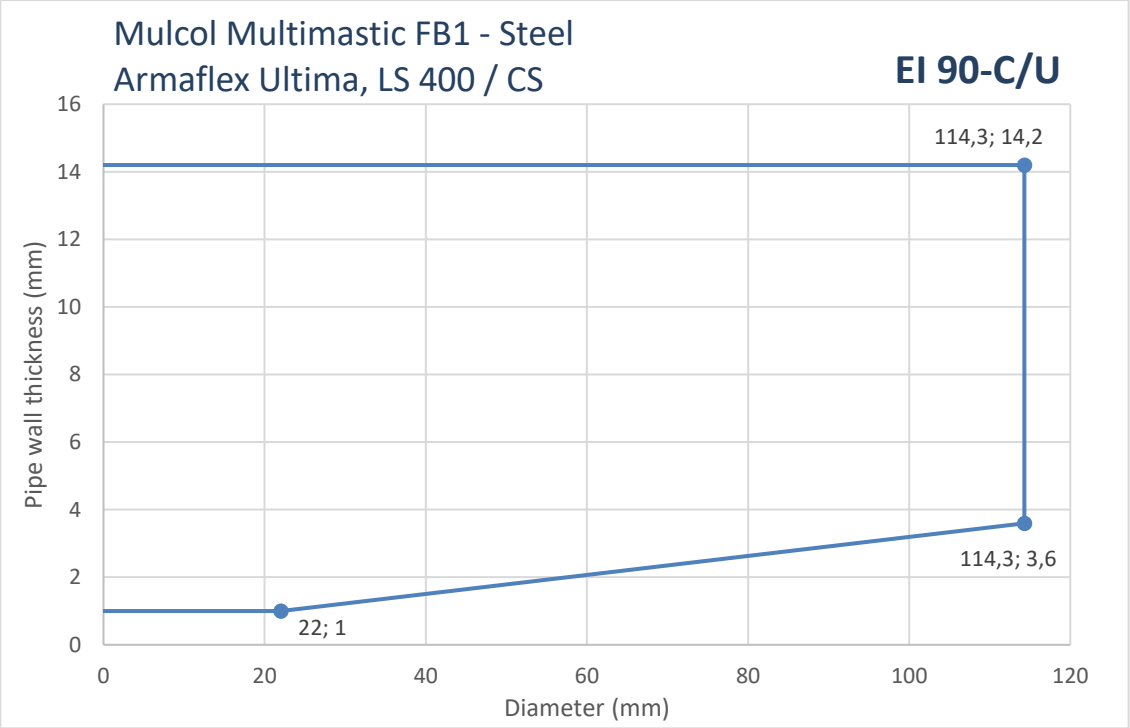
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

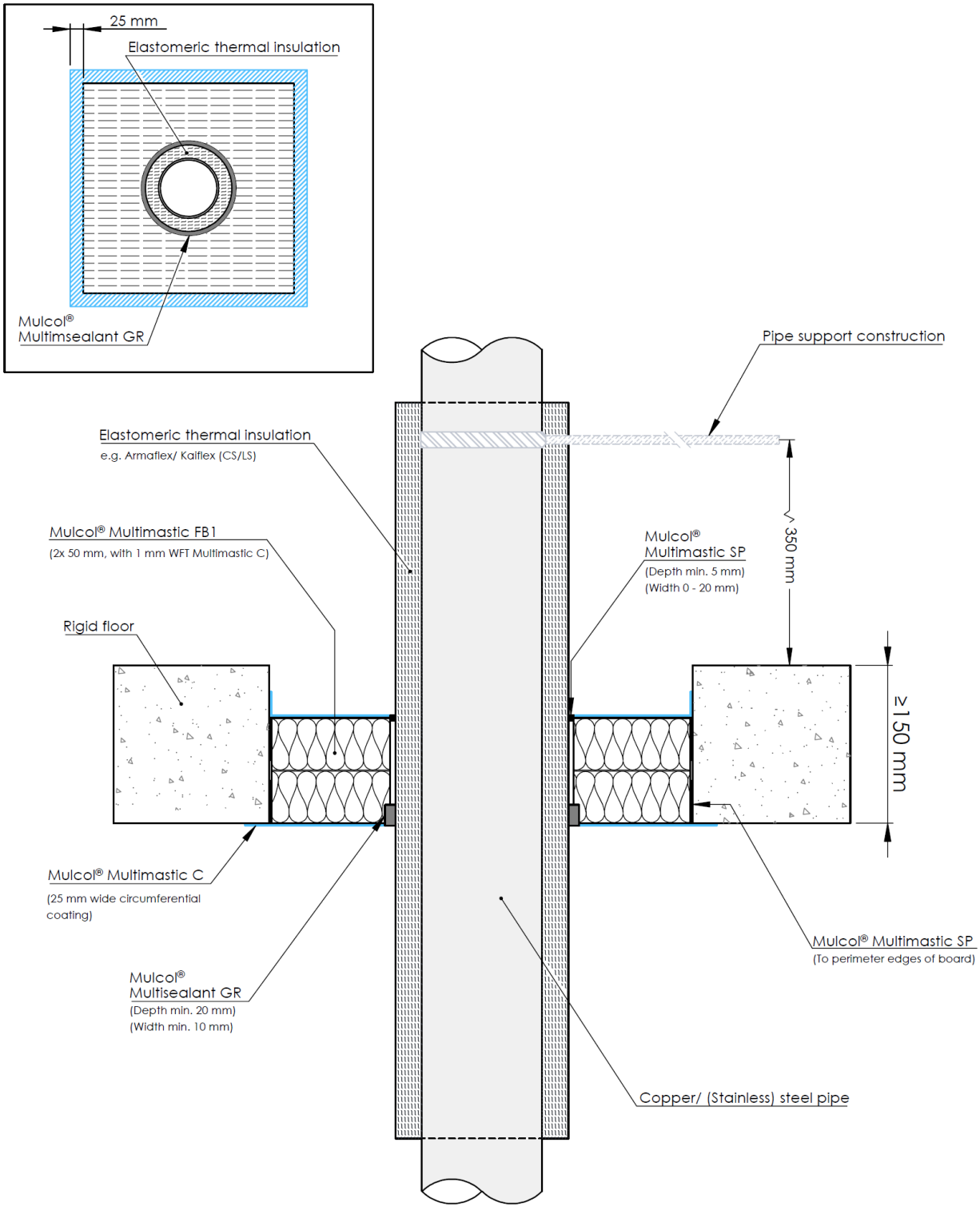
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB1 - 2x50 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Copper	≤ 22	1	Armaflex Ultima	9	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**
Copper	≤ 22	1	Armaflex Ultima	25	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Steel	≤ 26,9	2,3	Armaflex Ultima	9	B_L-s1,d0	LS 400 / CS	Exposed side	**E 90, EI 60 C/U**
Steel	≤ 26,9	2,3	Armaflex Ultima	25	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Copper	≤ 54	1,5	Armaflex Ultima	13	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**
Copper	≤ 54	1,5	Armaflex Ultima	32	B-s2,d0	LS 400 / CS	Exposed side	**E 90, EI 90 C/U**
Steel	≤ 114,3	3,6	Armaflex Ultima	13	B-s2,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Steel	≤ 114,3	3,6	Armaflex Ultima	32	B-s2,d0	LS 400 / CS	Exposed side	**E 60, EI 60 C/U**

Table 7: Details of the pipes insulated with Armaflex Ultima.


Mulcol Multimastic FB1 - Copper/steel
Armaflex Ultima, LS 400 / CS
EI 90-C/U
Pipe wall thickness (mm)
Diameter (mm)
54; 14,2
22; 1
54; 1,5
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60


Mulcol Multimastic FB1 - Steel
Armaflex Ultima, LS 400 / CS
EI 90-C/U
Pipe wall thickness (mm)
Diameter (mm)
114,3; 14,2
22; 1
114,3; 3,6
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB1-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 16-6-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.2.4. Steel and copper pipes insulated with Stone wool

Steel pipes insulated with mineral wool insulation, penetrated through Mulcol Multimastic FB1. Insulation material stone wool RW810, thickness 25 mm. All pipes are sealed with Mulcol Multimastic C System. See Table 8 for details and the graphs for wall thickness-diameter range.

Classification

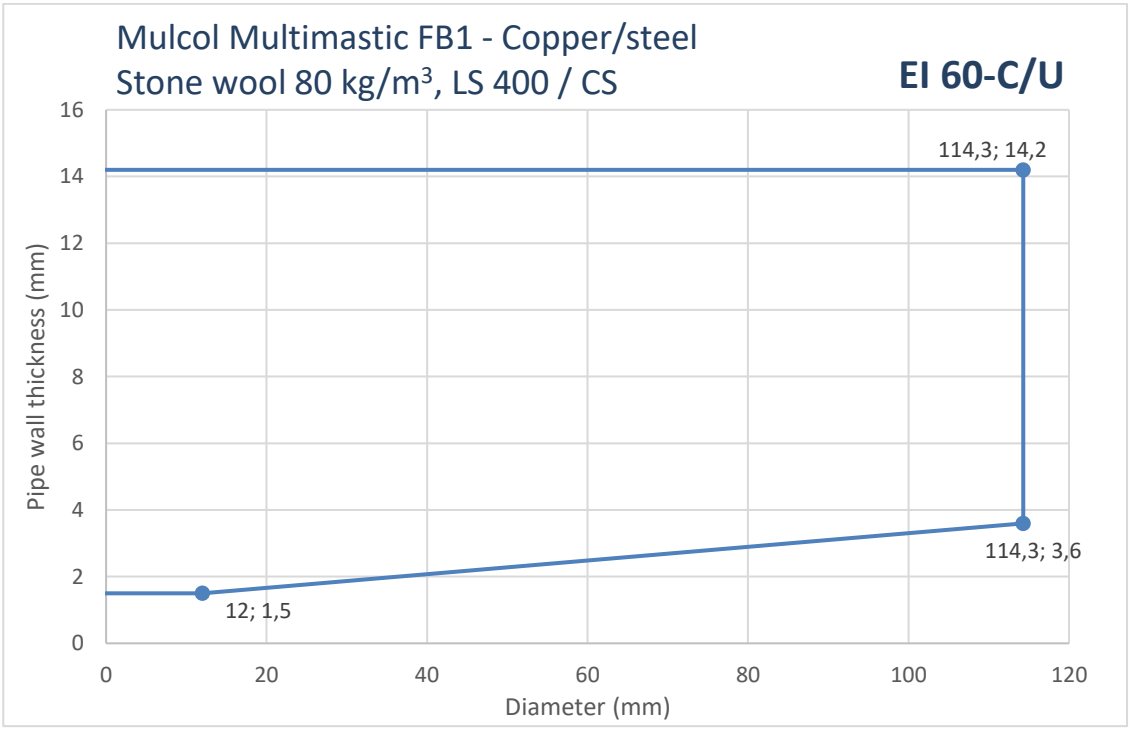
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

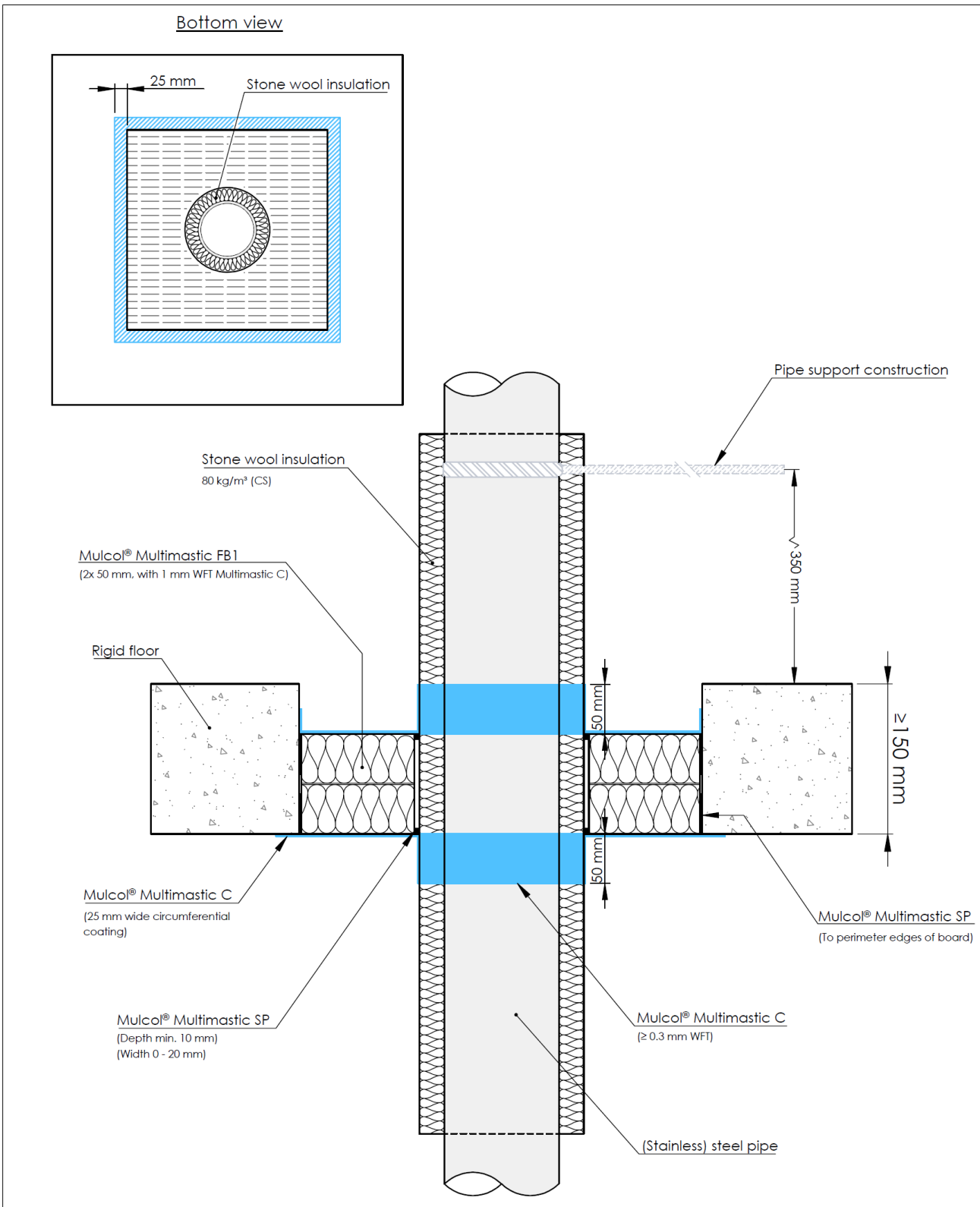
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB1 - 2x50 mm								
Penetration	**Dia.**	**Wall thick ness**	**Insulation thickness**	**Insulation type**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Steel	≤ 12	1,5	25	Stone wool 80 kg/m³	A2	LS 400 / CS	bs	**E 120, EI 60 C/U**
Steel	≤ 114,3	3,6	25	Stone wool 80 kg/m³	A2	LS 400 / CS	bs	**E 120, EI 60 C/U**

Table 8: Details of the pipes insulated with stone wool.





American projection	Scale :	Company : Mulcol International B.V.	PBrf-ST-MFB1.2.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.2.5. Steel and copper pipes insulated with Kaiflex KK Plus

Steel pipes insulated with elastomer insulation with a diameter of 26,9 mm, penetrated through Mulcol Multimastic FB1. Insulation material Kaiflex KK Plus KK+1/028, thickness 8,5 mm. All pipes are sealed with Mulcol Multisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. See Table 9 for details.

Classification

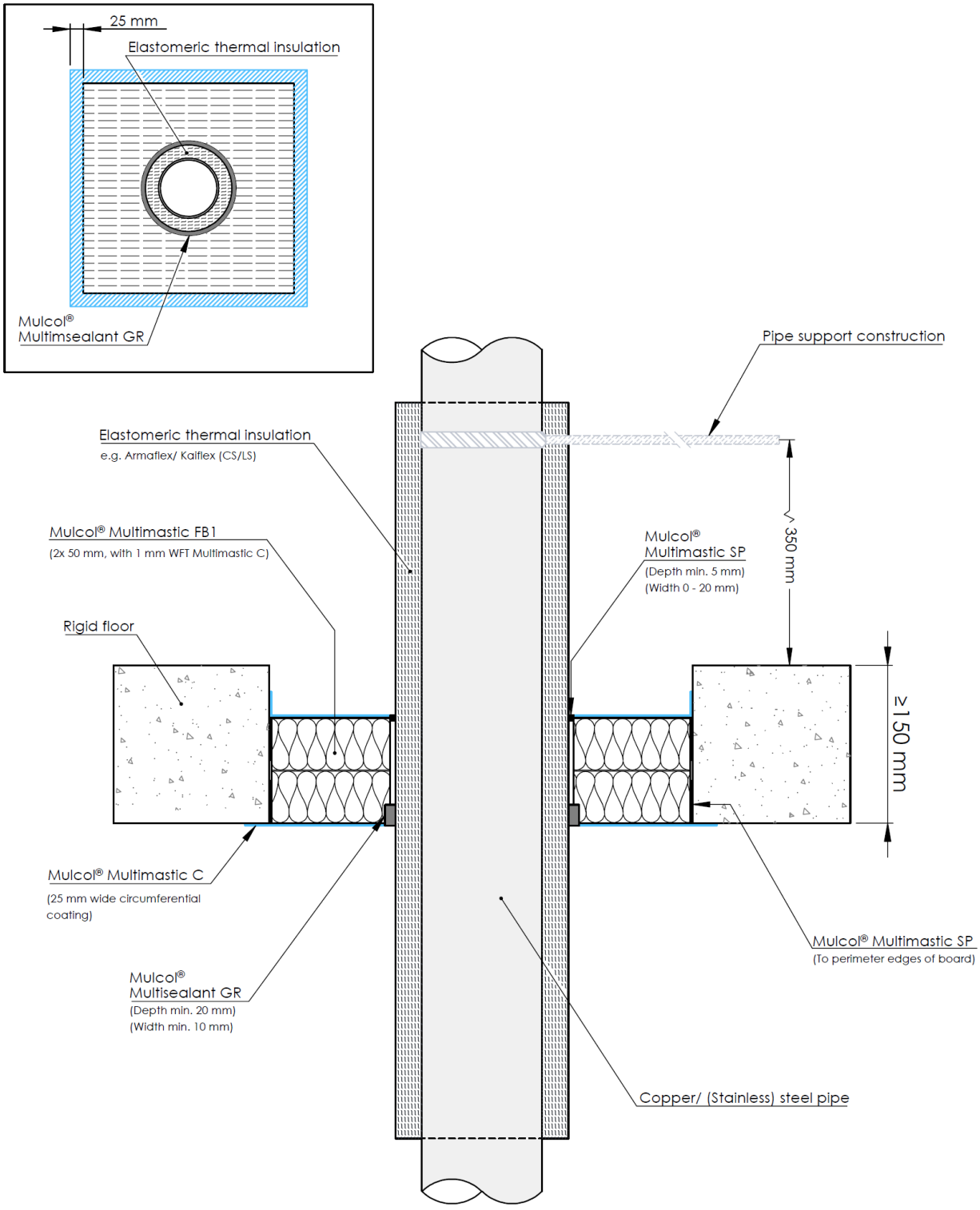
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB1 - 2x50 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Steel	≤ 26,9	2,3	Kaiflex KK Plus KK+1/028	8,5	B_L-s2,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**

Table 9: Details of the steel pipes insulated with Kaiflex KK Plus.



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB1-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 16-6-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.2.6. Copper pipes sealed with Multidisc

Non-insulated copper pipes with a diameter of 15 mm, penetrated through Mulcol Multimastic FB1. All pipes are sealed with Mulcol Multidisc. Further details are given in the drawing. See Table 10 for details.

Classification

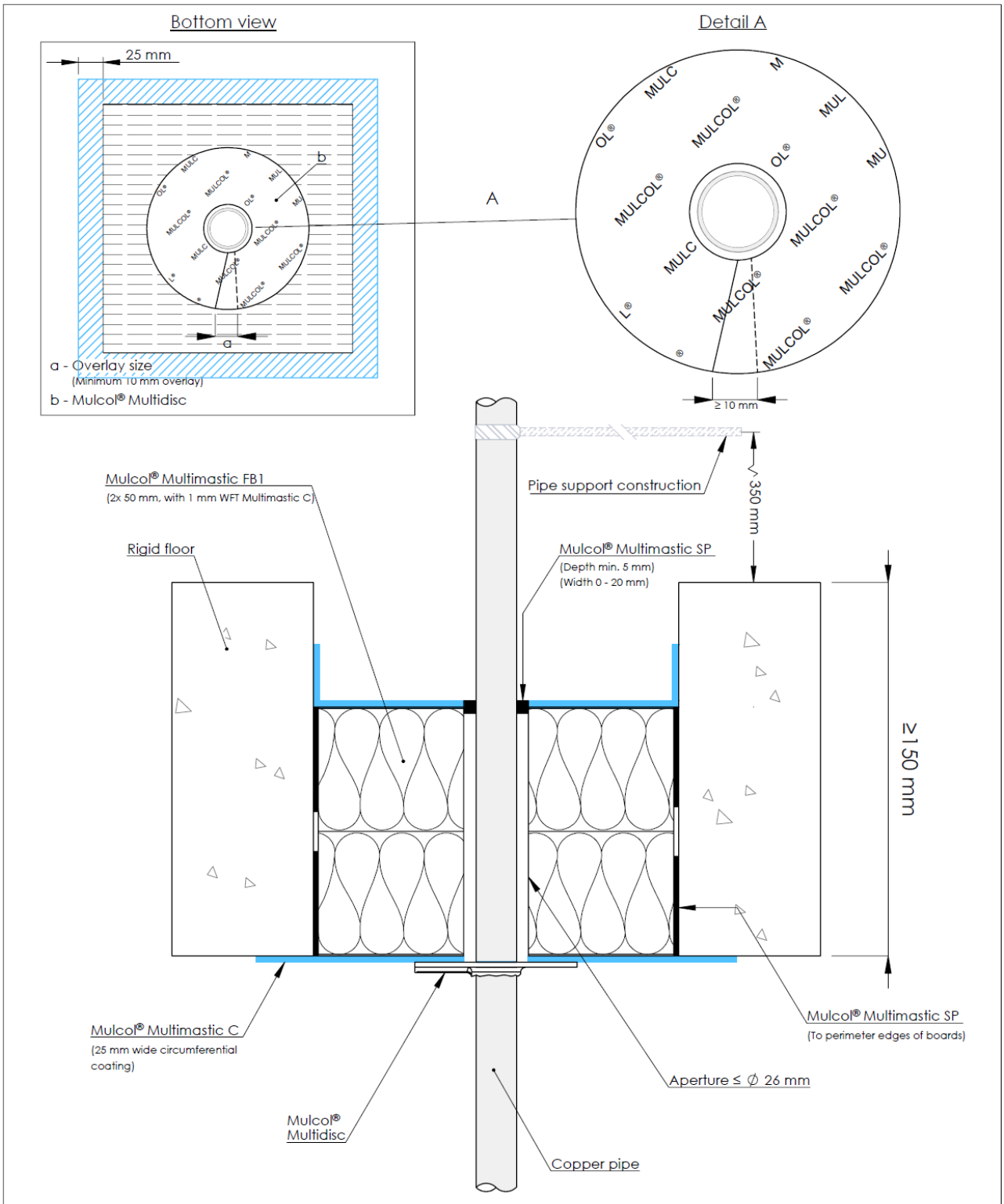
Mulcol® Multimastic C System, in combination with Multidisc is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination Multidisc provide the following classification:

Mulcol Multimastic FB1 - 2x50 mm							
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**CS, Cl LS, LI**	**Side of app.**	**Classification**
Copper/Steel	≤ 15	1,0	-	-	-	Exposed side	**E 60, EI 60 C/U**

Table 10: Details of copper pipes sealed with Multidisc.



American projection	Scale : 1:2	Company : Mulcol International B.V.	PBrf-CU-M2.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-4-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multidisc
Installation in rigid floor

2.3.3. Results Mulcol Multimastic FB2 – 1x60 mm - with cables and trays

2.3.3.1. Cables sealed with Multimastic C

Cables penetrated through Mulcol Multimastic FB2. All cables are coated with Mulcol Multimastic C System over 150 mm (300 mμ WFT). Further details are given in the drawings. See Table 13 for details.

Classification

Mulcol® Multimastic C System is classified according to the following combinations of performance parameters and classes:

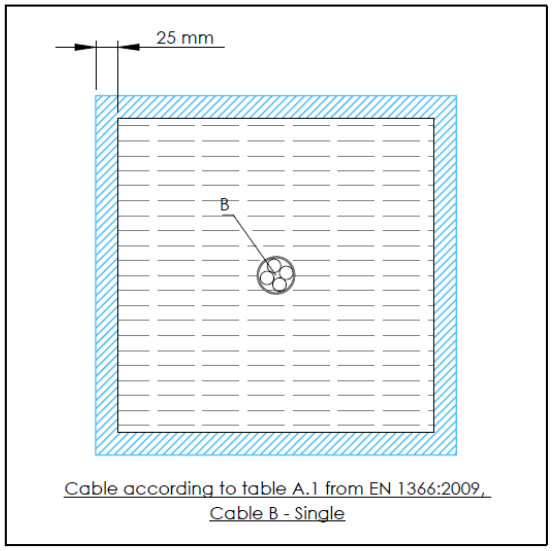
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System provide the following classification:

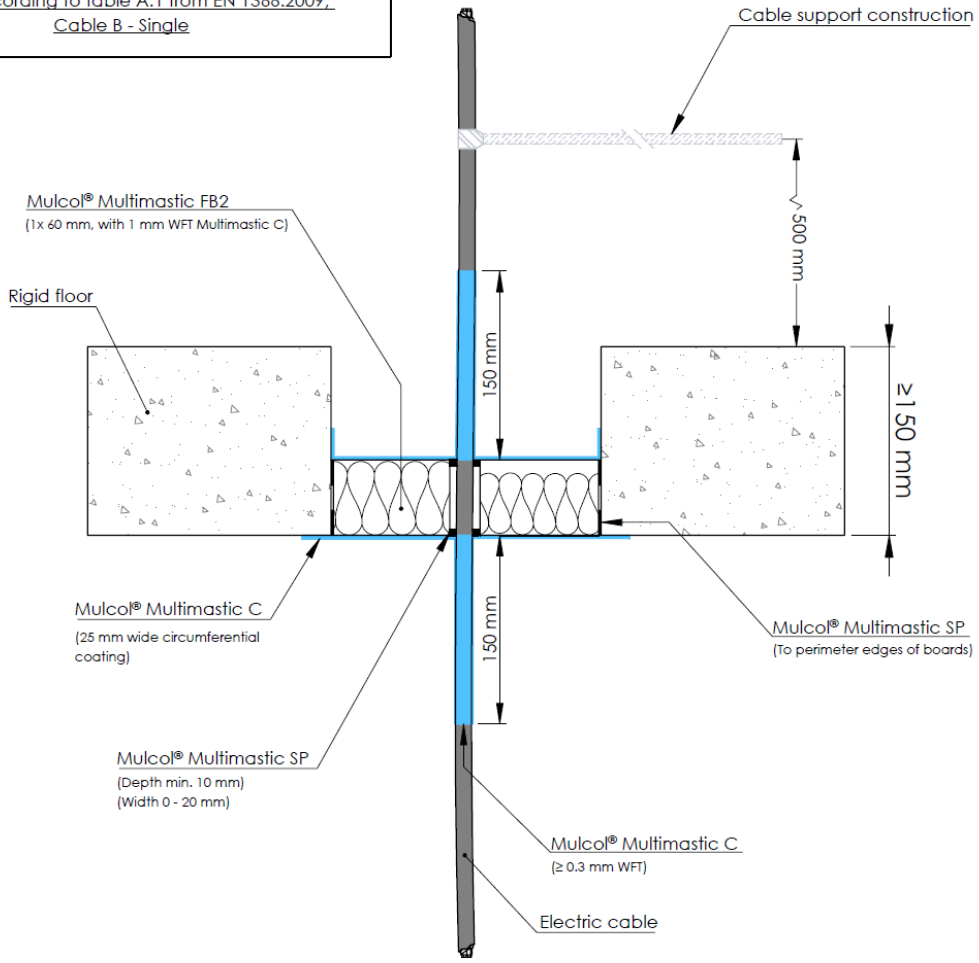
Mulcol Multimastic FB2 - 1x 60 mm							
Service	**Dimensions**	**Insulation type**	**Insulation thickness**	**CS, CI LS, LI**	**Side of app.**	**Sealing Product**	**Classification**
Cable	≤ 21	Multimastic C	300 mμ WFT	LI 150	bs	Multimastic C	**E 120, EI 90**
Cable	≤ 47	Multimastic C	300 mμ WFT	LI 150	bs	Multimastic C	**E 120, EI 45**

Table 13: Details of the cables sealed with Multimastic C.

Bottom view



Cable according to table A.1 from EN 1366:2009,
Cable B - Single

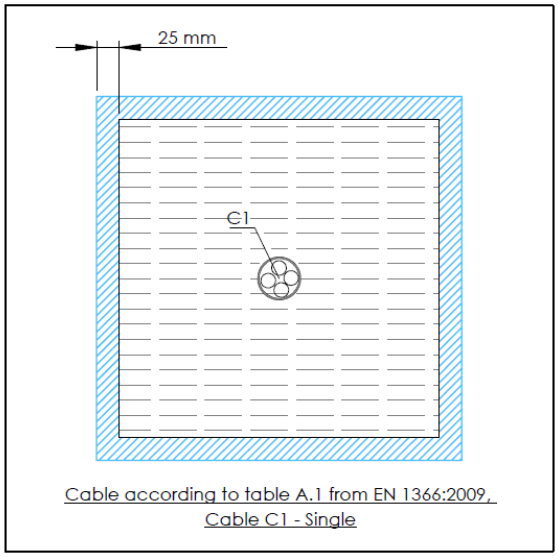


American projection	Scale :	Company : Mulcol International B.V.	PBrf-EC21-MFB2.1.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

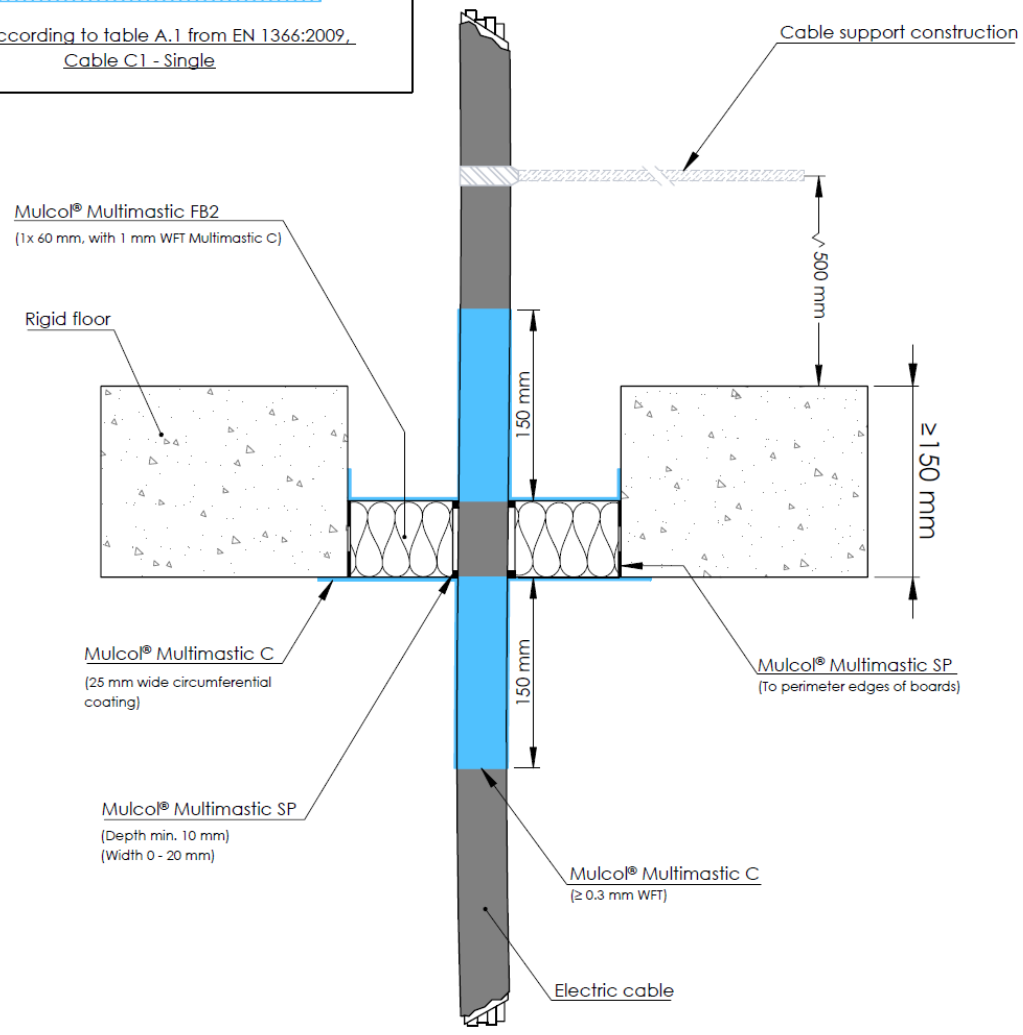
MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

Front view



Cable according to table A.1 from EN 1366:2009,
Cable C1 - Single



American projection	Scale :	Company : Mulcol International B.V.	PBrf-EC47-MFB2.1.10
	Unit of measure : mm	Department : Research & Development	
	Date : 11-3-2020	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test cable penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.3.2. Various bundled cables sealed with Multimastic C

Bundled cables with a diameter of max. 21 mm per piece, total diameter of ≤ 50 mm, penetrated through Mulcol Multimastic FB2. All cables are sealed with Mulcol Multimastic C over 150 mm (300 mμ WFT). Further details are given in the drawings. See Table 14 for details.

Classification

Mulcol® Multimastic C System is classified according to the following combinations of performance parameters and classes:

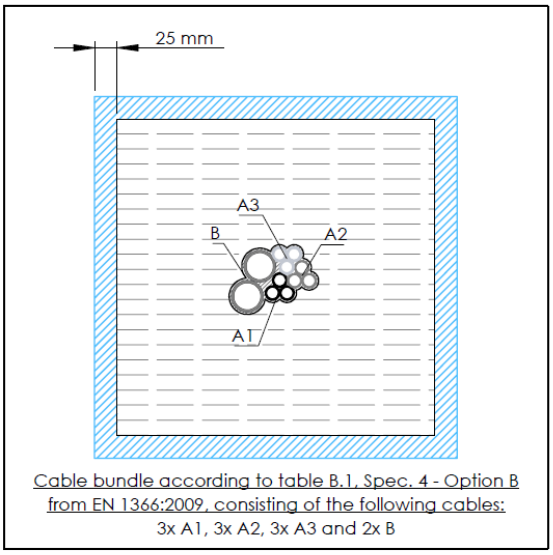
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System provide the following classification:

Mulcol Multimastic FB2 - 1x 60 mm							
Service	**Dimensions**	**Insulation type**	**Insulation thickness**	**CS, CI LS, LI**	**Side of app.**	**Sealing Product**	**Classification**
Bundled cables	≤ 50	Multimastic C	300 mμ WFT	LI 150	bs	Multimastic C	**E 120, EI 60**

Table 14: Details of various bundled cables sealed with Multimastic C.

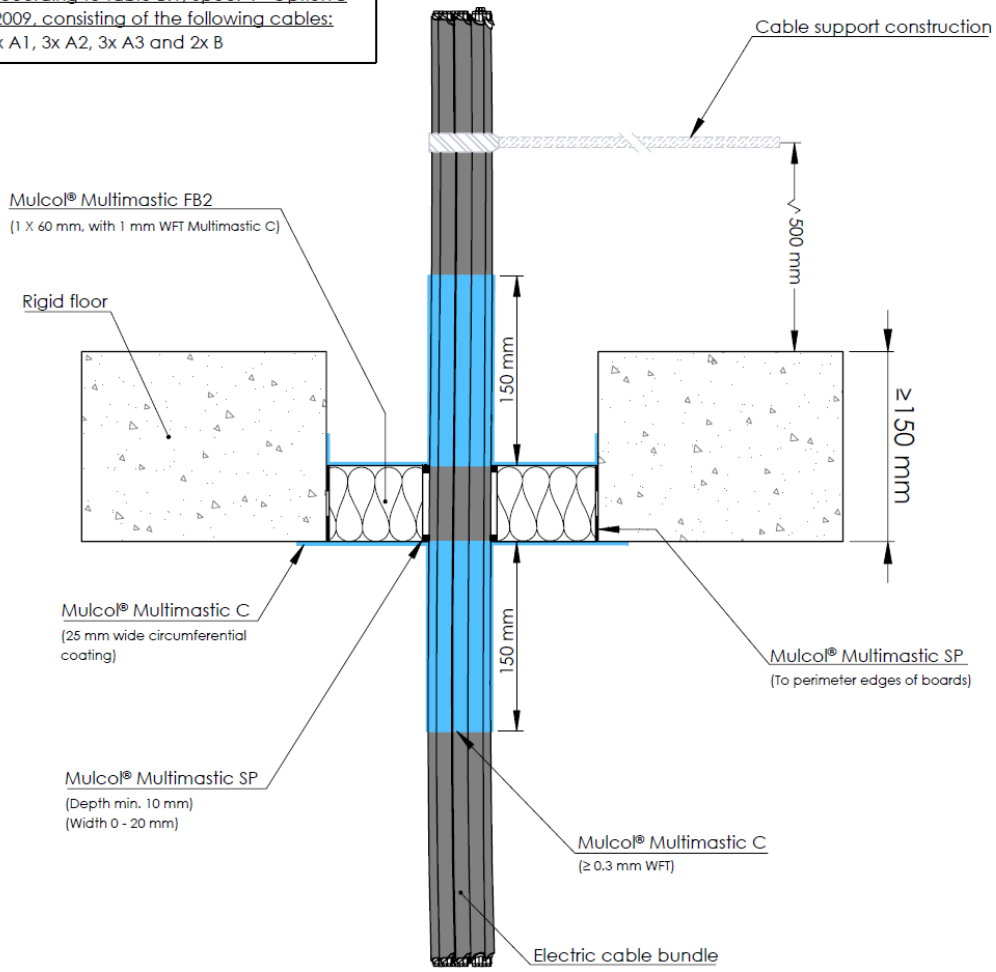
Bottom view



Cable bundle according to table B.1, Spec. 4 - Option B from EN 1366:2009, consisting of the following cables:
3x A1, 3x A2, 3x A3 and 2x B

Cable bundle consisting of the following cables:

A1 - e.g. NYY-J Cable 5 x 1,5 mm
A2 - e.g. H07RN-F 5G Cable 5 x 1,5 mm
A3 - e.g. PVIK-LS-HF 5 x 1,5 mm
B - e.g. EYY-J Cable 1 x 95 mm



American projection	Scale :	Company : Mulcol International B.V.	PBrf-ECB-MFB2.1.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.4. Mulcol Multimastic FB2 – 1x60 mm - with steel and copper pipes

2.3.4.1. Steel and copper pipes insulated with Armaflex AF

Copper and steel pipes insulated with elastomer insulation, penetrated through Mulcol Multimastic FB2. Insulation material AF/Armaflex. All pipes are sealed with Mulcol Mutlisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. See Table 15 for details and the graphs for wall thickness-diameter range.

Classification

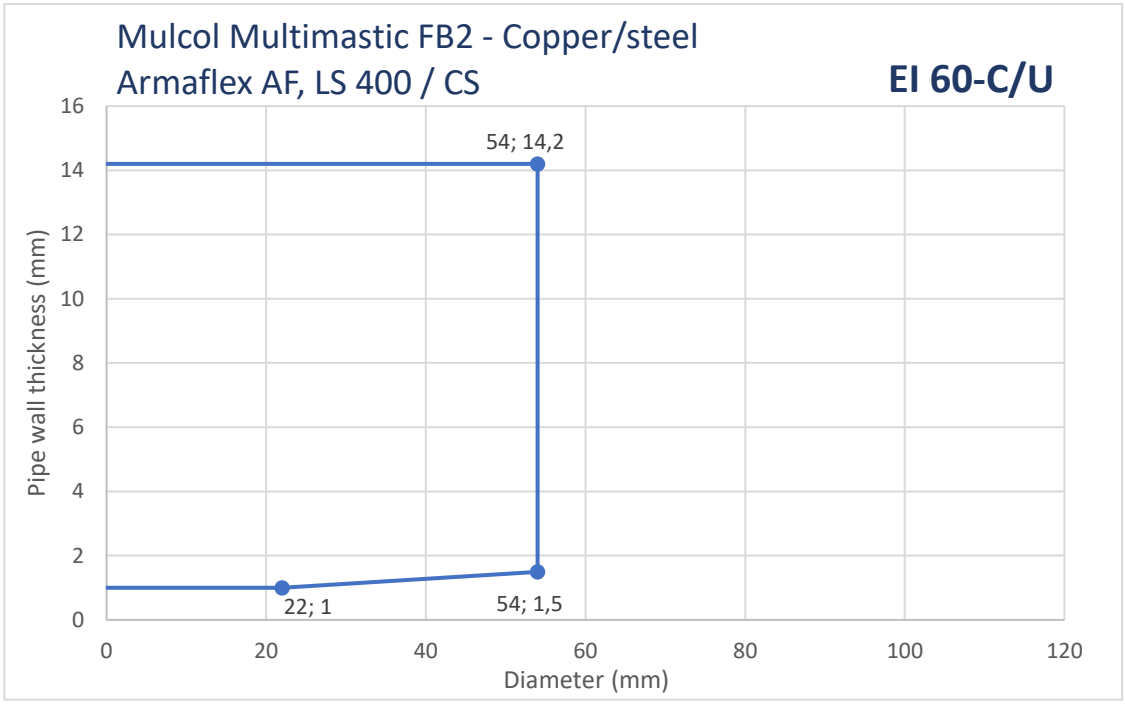
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

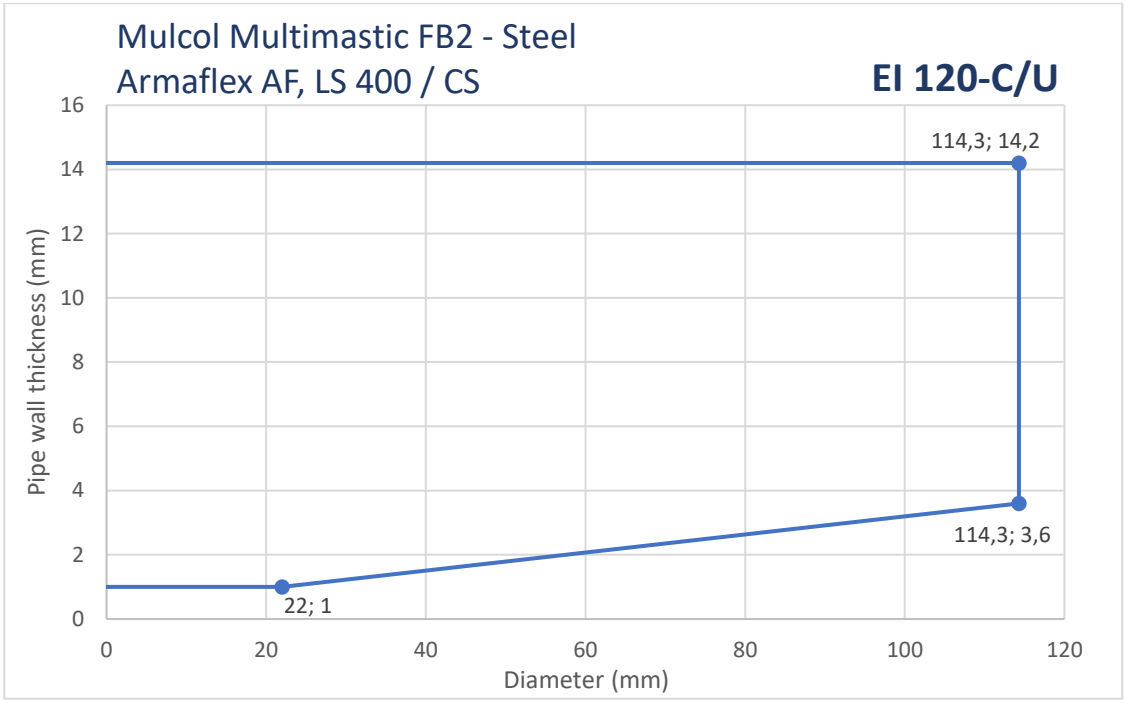
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

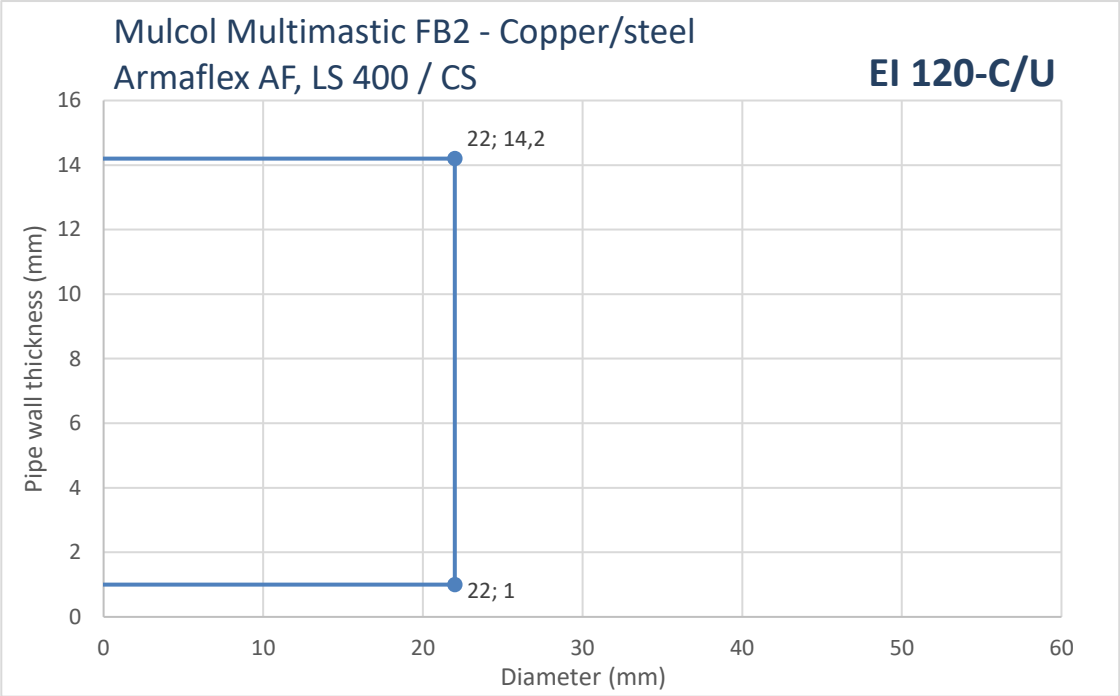
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

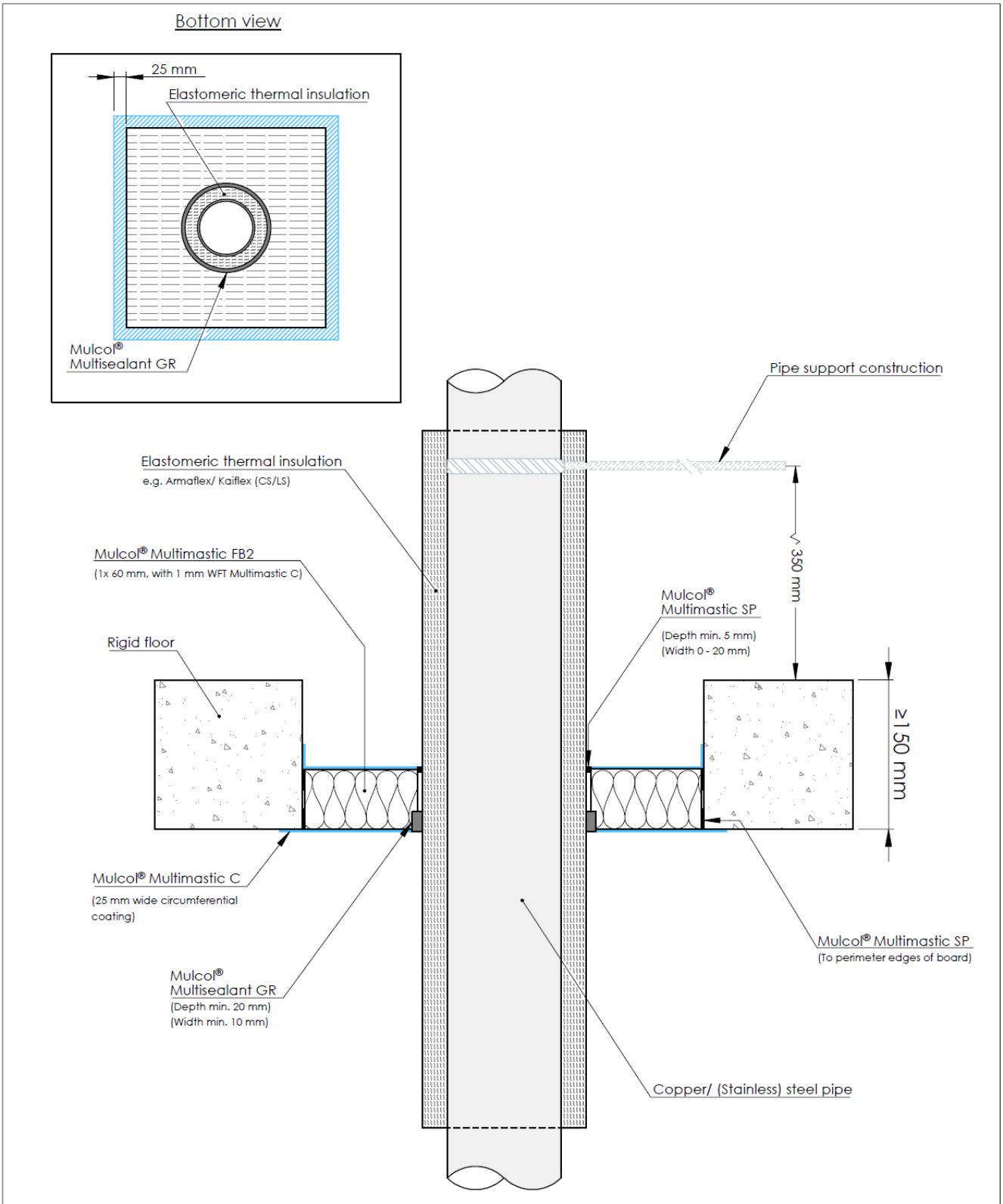
Mulcol Multimastic FB2 - 1x 60 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Copper	≤ 22	1	AF/Armaflex	8,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 60, EI 60 C/U**
Copper	≤ 22	1	AF/Armaflex	33,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 26,9	2,3	AF/Armaflex	8,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 60, EI 60 C/U**
Steel	≤ 26,9	2,3	AF/Armaflex	35	B_L-s3,d0	LS 400 / CS	Exposed side	**E 90,EI 90 C/U**
Copper	≤ 54	1,5	AF/Armaflex	13,5	B_L-s3,d0	LS 400 / CS	Exposed side	**E 60,EI 60 C/U**
Copper	≤ 54	1,5	AF/Armaflex	38	B_L-s3,d0	LS 400 / CS	Exposed side	**E 45, EI 45 C/U**
Steel	≤ 114,3	3,6	AF/Armaflex	15	B_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 114,3	3,6	AF/Armaflex	43	B_L-s3,d0	LS 400 / CS	Exposed side	**E 45, EI 45 C/U**

Table 15: Details of the pipes insulated with AF/Armaflex.


Mulcol Multimastic FB2 - Copper/steel
Armaflex AF, LS 400 / CS
EI 60-C/U
Pipe wall thickness (mm)
Diameter (mm)
54; 14,2
22; 1
54; 1,5
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120


Mulcol Multimastic FB2 - Steel
Armaflex AF, LS 400 / CS
EI 120-C/U
Pipe wall thickness (mm)
Diameter (mm)
114,3; 14,2
114,3; 3,6
22; 1
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120


Mulcol Multimastic FB2 - Copper/steel
Armaflex AF, LS 400 / CS
EI 120-C/U
Pipe wall thickness (mm)
Diameter (mm)
22; 14,2
22; 1
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB2-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 15-6-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.4.2. Steel and copper pipes insulated with NH/Armaflex

Copper and steel pipes insulated with elastomer insulation, penetrated through Mulcol Multimastic FB2. Insulation material NH/Armaflex. All pipes are sealed with Mulcol Mutlisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. See Table 16 for details and the graphs for wall thickness-diameter range.

Classification

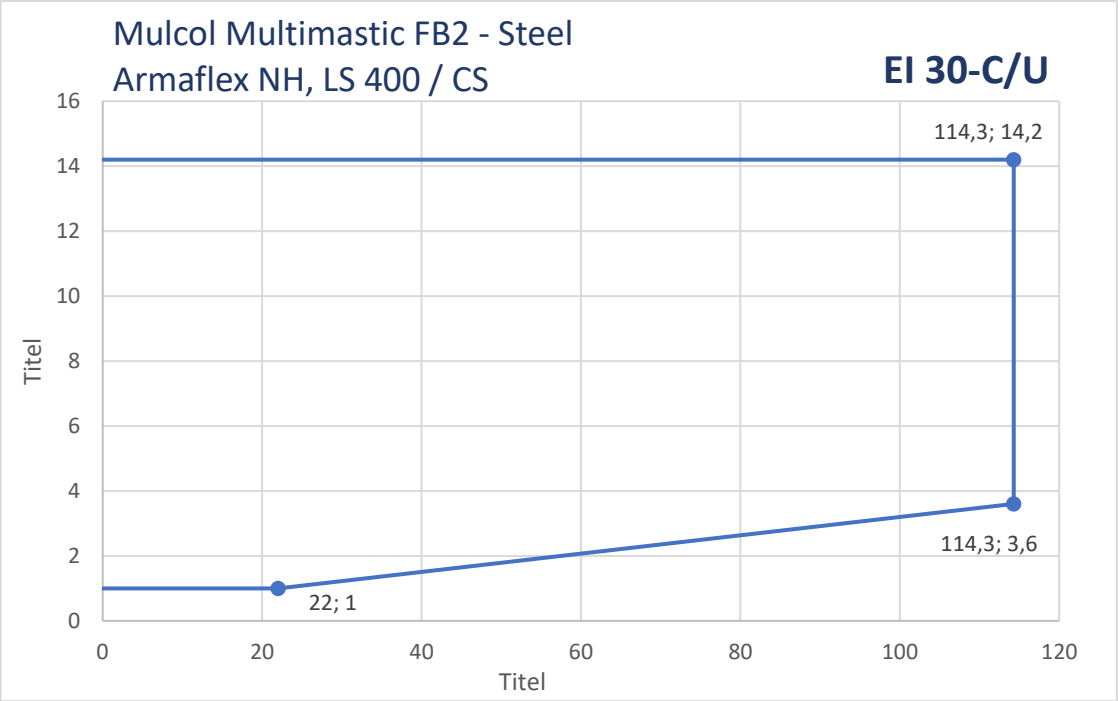
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

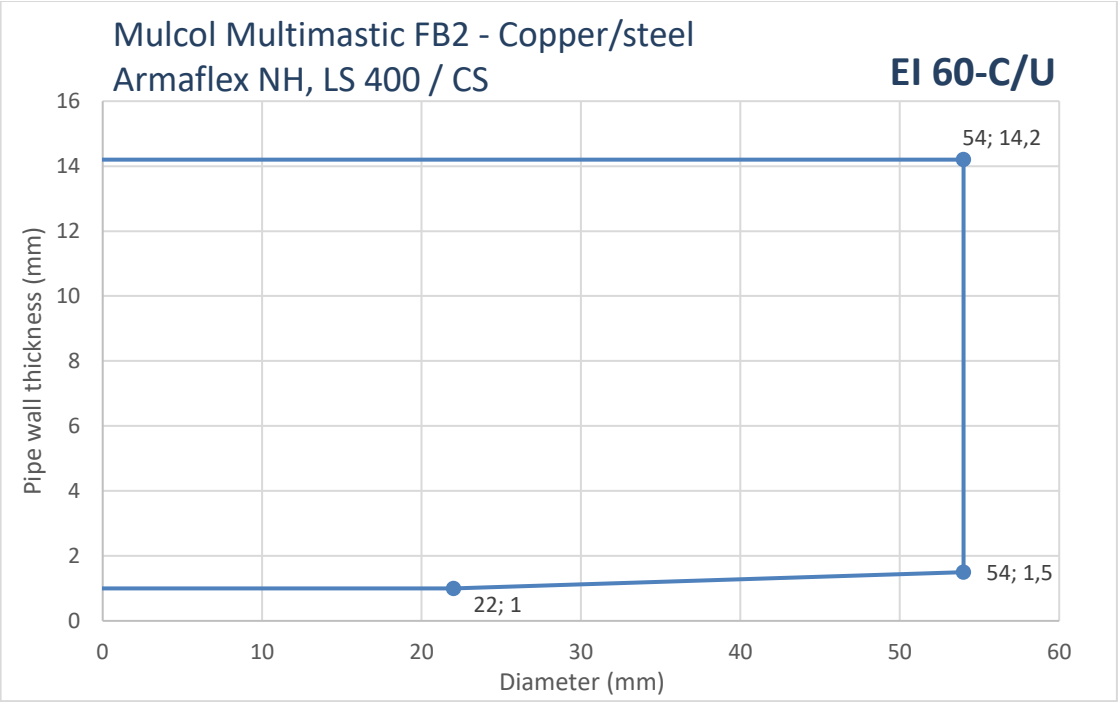
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

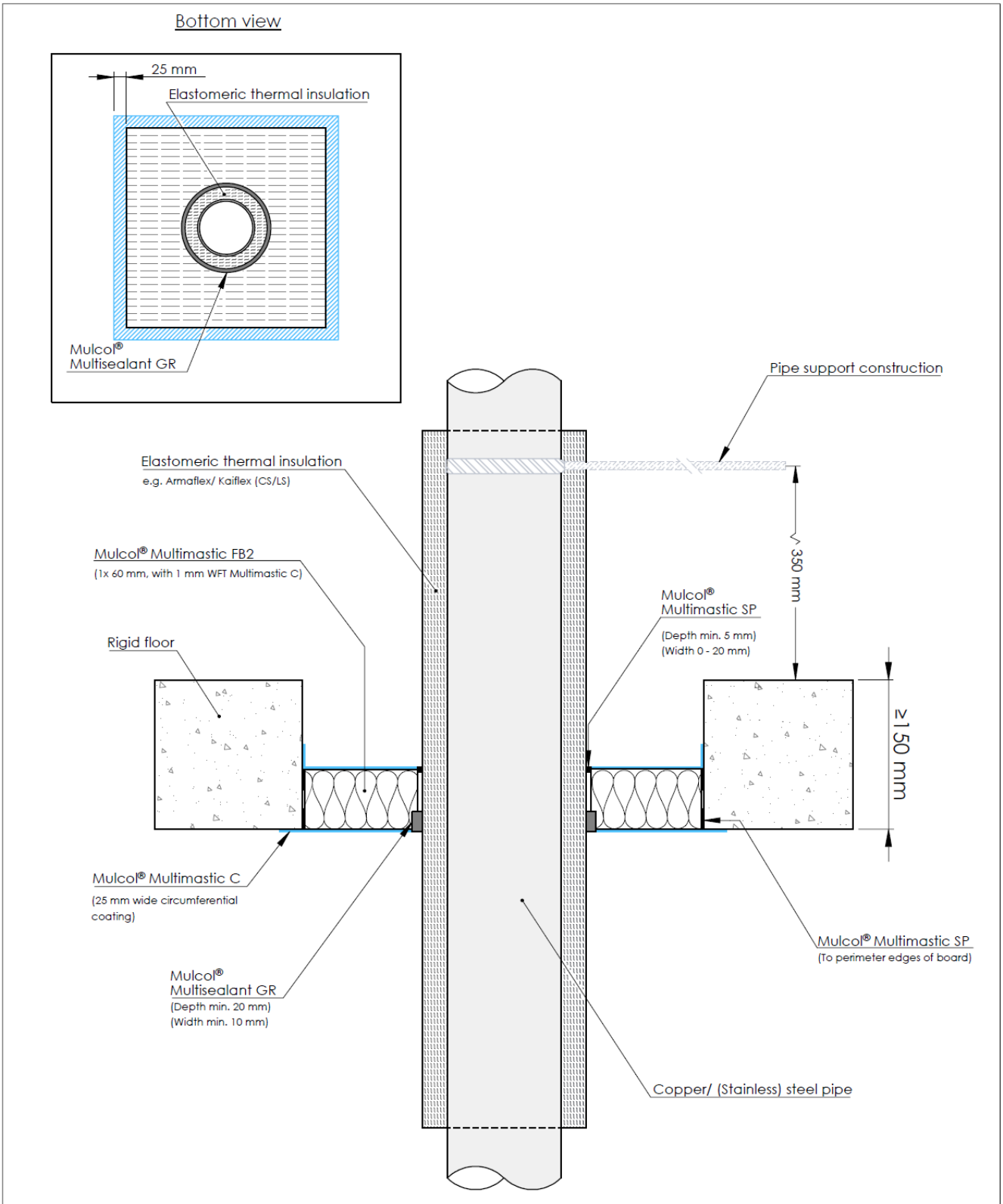
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB2 - 1x 60 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Copper	≤ 22	1	NH/Armaflex	9	D_L-s3,d0	LS 400 / CS	Exposed side	**E 90, EI 60 C/U**
Copper	≤ 22	1	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 90, EI 60 C/U**
Steel	≤ 26,9	2,3	NH/Armaflex	9	D_L-s3,d0	LS 400 / CS	Exposed side	**E 30, EI 30 C/U**
Steel	≤ 26,9	2,3	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**
Copper	≤ 54	1,5	NH/Armaflex	13	D_L-s3,d0	LS 400 / CS	Exposed side	**E 60, EI 60 C/U**
Copper	≤ 54	1,5	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 60, EI 60 C/U**
Steel	≤ 114,3	3,6	NH/Armaflex	19	D_L-s3,d0	LS 400 / CS	Exposed side	**E 30, EI 30 C/U**
Steel	≤ 114,3	3,6	NH/Armaflex	25	D_L-s3,d0	LS 400 / CS	Exposed side	**E 30, EI 30 C/U**

Table 16: Details of the pipes insulated with NH/Armaflex.


Mulcol Multimastic FB2 - Steel
Armaflex NH, LS 400 / CS
EI 30-C/U
114,3; 14,2
114,3; 3,6
22; 1
Titel
Titel
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120


Mulcol Multimastic FB2 - Copper/steel
Armaflex NH, LS 400 / CS
EI 60-C/U
54; 14,2
54; 1,5
22; 1
Pipe wall thickness (mm)
Diameter (mm)
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB2-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 15-6-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.4.3. Steel and copper pipes insulated with Armaflex Ultima

Copper and steel pipes insulated with elastomer insulation, penetrated through Mulcol Multimastic FB2. Insulation material Armaflex Ultima. All pipes are sealed with Mulcol Mutlisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. Further details are given in the drawings. See Table 17 for details and the graphs for wall thickness-diameter range.

Classification

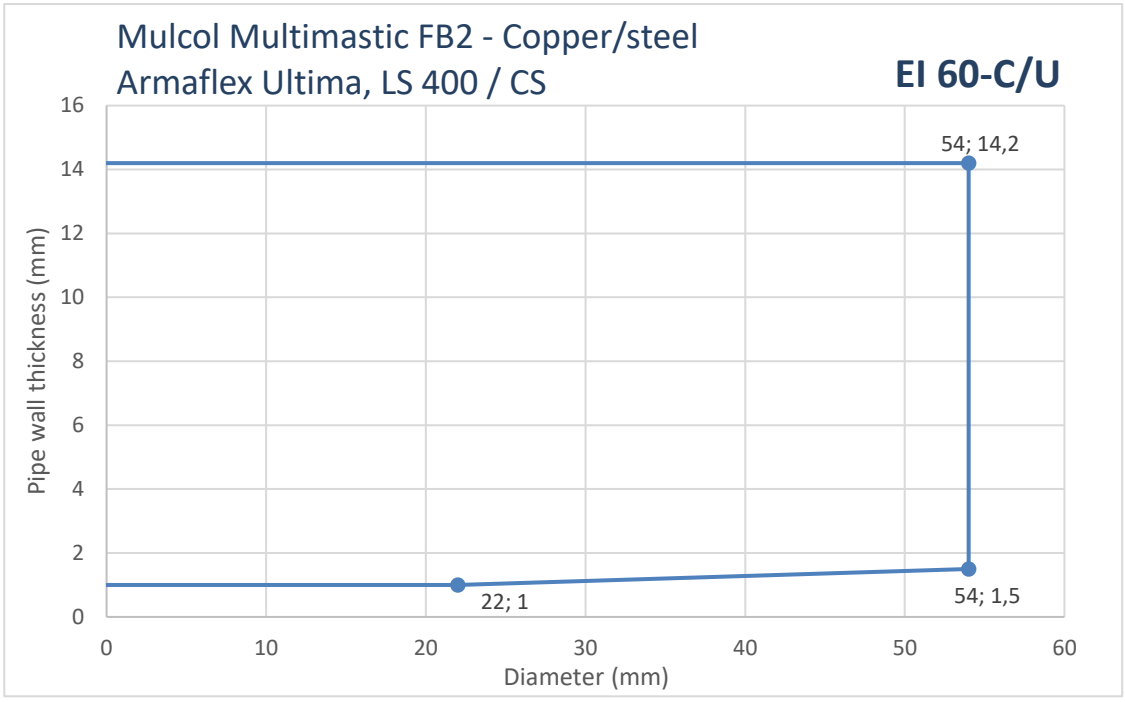
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

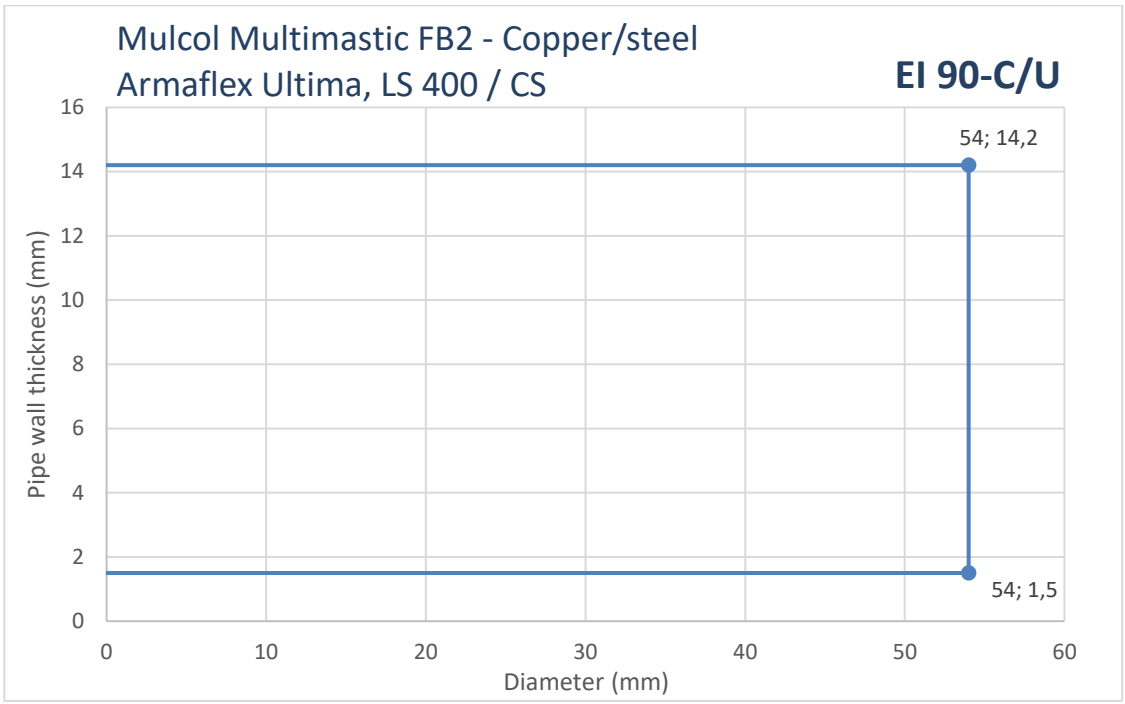
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

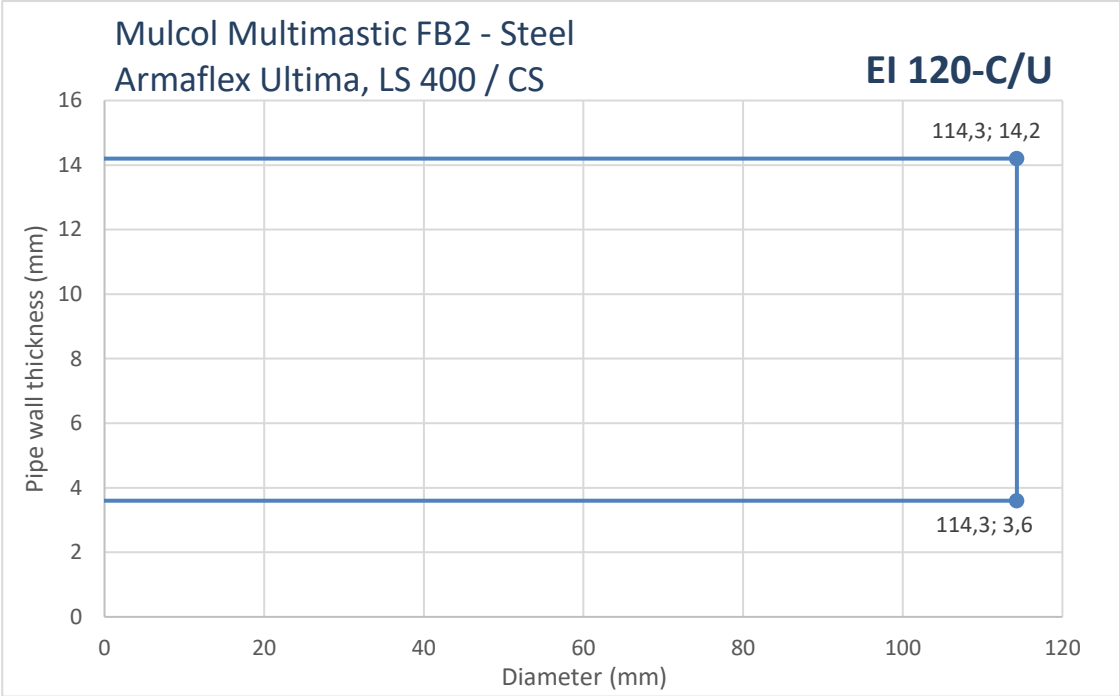
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

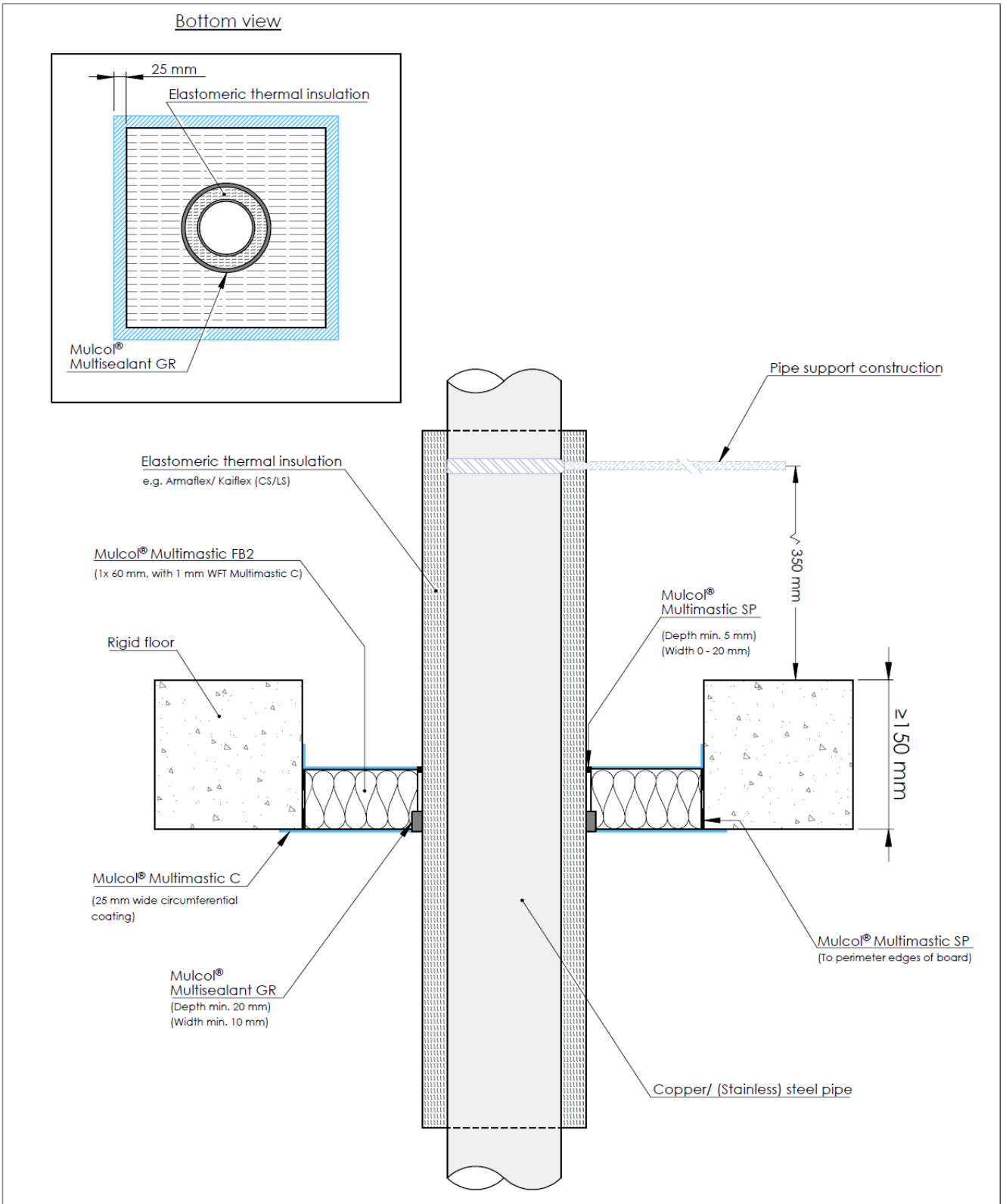
Mulcol Multimastic FB2 - 1x 60 mm								
Penetration	**Dia.**	**Wall thick ness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, Cl LS, LI**	**Side of app.**	**Classification**
Copper	≤ 22	1	Armaflex Ultima	9	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 30 C/U**
Copper	≤ 22	1	Armaflex Ultima	25	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**
Steel	≤ 26,9	2,3	Armaflex Ultima	9	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 60 C/U**
Steel	≤ 26,9	2,3	Armaflex Ultima	25	B_L-s1,d0	LS 400 / CS	Exposed side	**E 120, EI 90 C/U**
Copper	≤ 54	1,5	Armaflex Ultima	13	B_L-s1,d0	LS 400 / CS	Exposed side	**E 45, EI 45 C/U**
Copper	≤ 54	1,5	Armaflex Ultima	32	B-s2,d0	LS 400 / CS	Exposed side	**E 90, EI 90 C/U**
Steel	≤ 114,3	3,6	Armaflex Ultima	13	B-s2,d0	LS 400 / CS	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 114,3	3,6	Armaflex Ultima	32	B-s2,d0	LS 400 / CS	Exposed side	**E 60, EI 60 C/U**

Table 17: Details of the pipes insulated with Armaflex Ultima.


Mulcol Multimastic FB2 - Copper/steel
Armaflex Ultima, LS 400 / CS
EI 60-C/U
Pipe wall thickness (mm)
Diameter (mm)
54; 14,2
22; 1
54; 1,5
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60


Mulcol Multimastic FB2 - Copper/steel
Armaflex Ultima, LS 400 / CS
EI 90-C/U
Pipe wall thickness (mm)
Diameter (mm)
54; 14,2
54; 1,5
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60


Mulcol Multimastic FB2 - Steel
Armaflex Ultima, LS 400 / CS
EI 120-C/U
114,3; 14,2
114,3; 3,6
Pipe wall thickness (mm)
Diameter (mm)
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB2-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 15-6-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.4.4. Steel and copper pipes insulated with Stone wool

Steel pipes insulated with mineral wool insulation, penetrated through Mulcol Multimastic FB2. Insulation material stone wool RW810, thickness 25 mm. All pipes are sealed with Mulcol Multimastic C System. Further details are given in the drawings. See Table 18 for details and the graphs for wall thickness-diameter range.

Classification

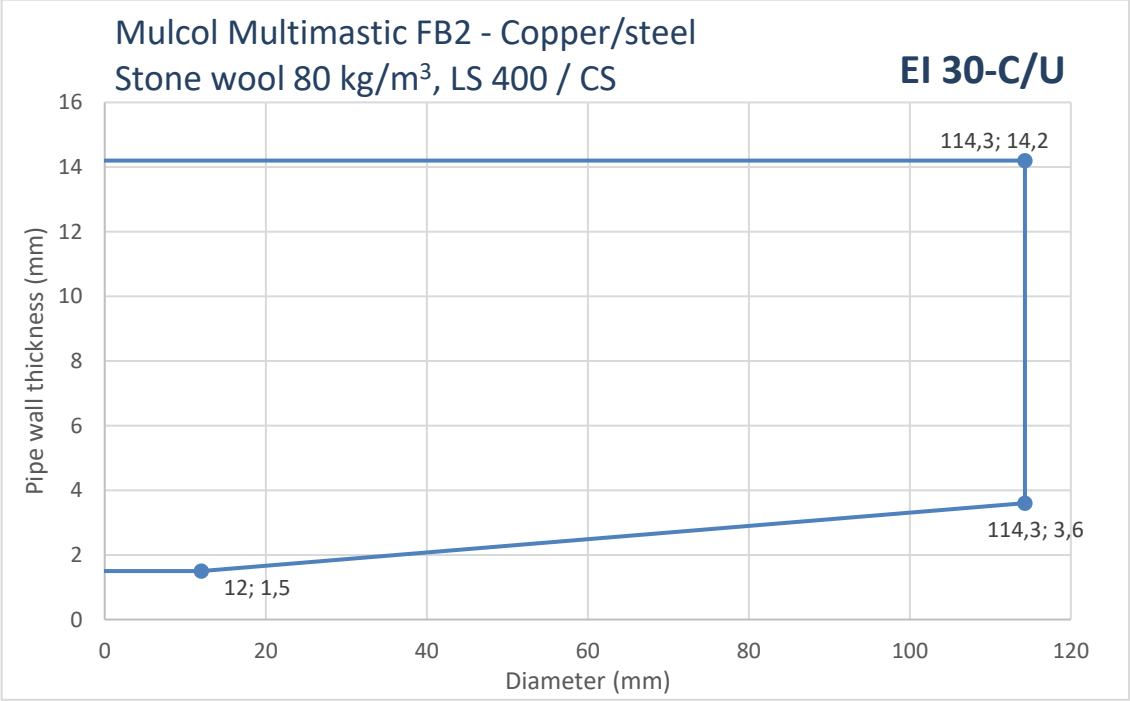
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

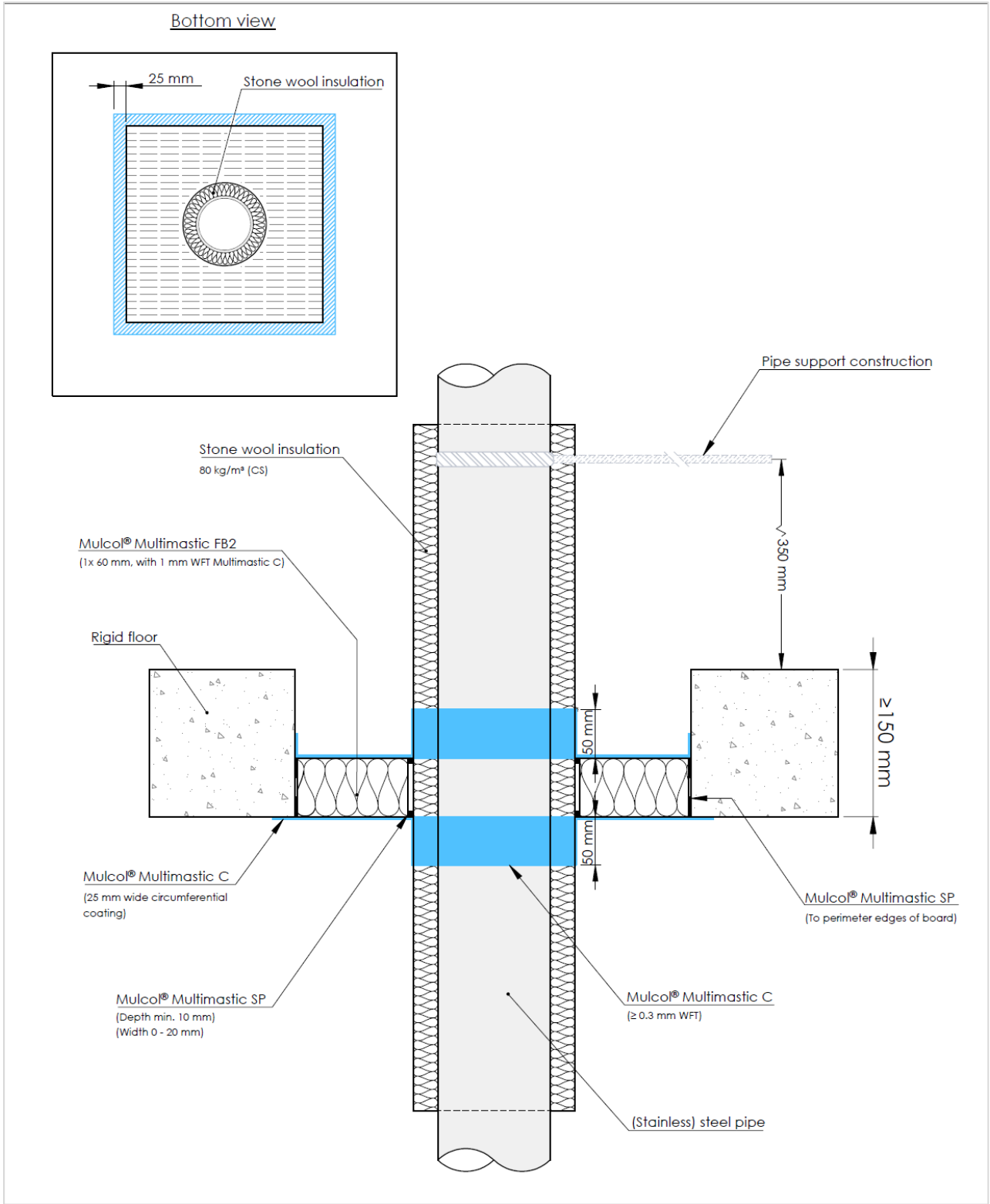
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB2 - 1x 60 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Steel	≤ 12	1,5	Stone wool 80 kg/m³	25	A2	LS 400 / CS	bs	**E 120, EI 90 C/U**
Steel	≤ 114,3	3,6	Stone wool 80 kg/m³	25	A2	LS 400 / CS	bs	**E 120, EI 30 C/U**

Table 18: Details of the pipes insulated with stone wool.





American projection	Scale :	Company : Mulcol International B.V.	PBrf-ST-MFB2.1.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic C System
Installation in rigid floor

2.3.4.5. Steel and copper pipes insulated with Kaiflex KK Plus

Steel pipes insulated with elastomer insulation with a diameter of 26,9 mm, penetrated through Mulcol Multimastic FB2. Insulation material Kaiflex KK Plus KK+1/028, thickness 8,5 mm. All pipes are sealed with Mulcol Multisealant GR, applied in a width of min. 10 mm and a depth of min. 20 mm. See Table 19 for details.

Classification

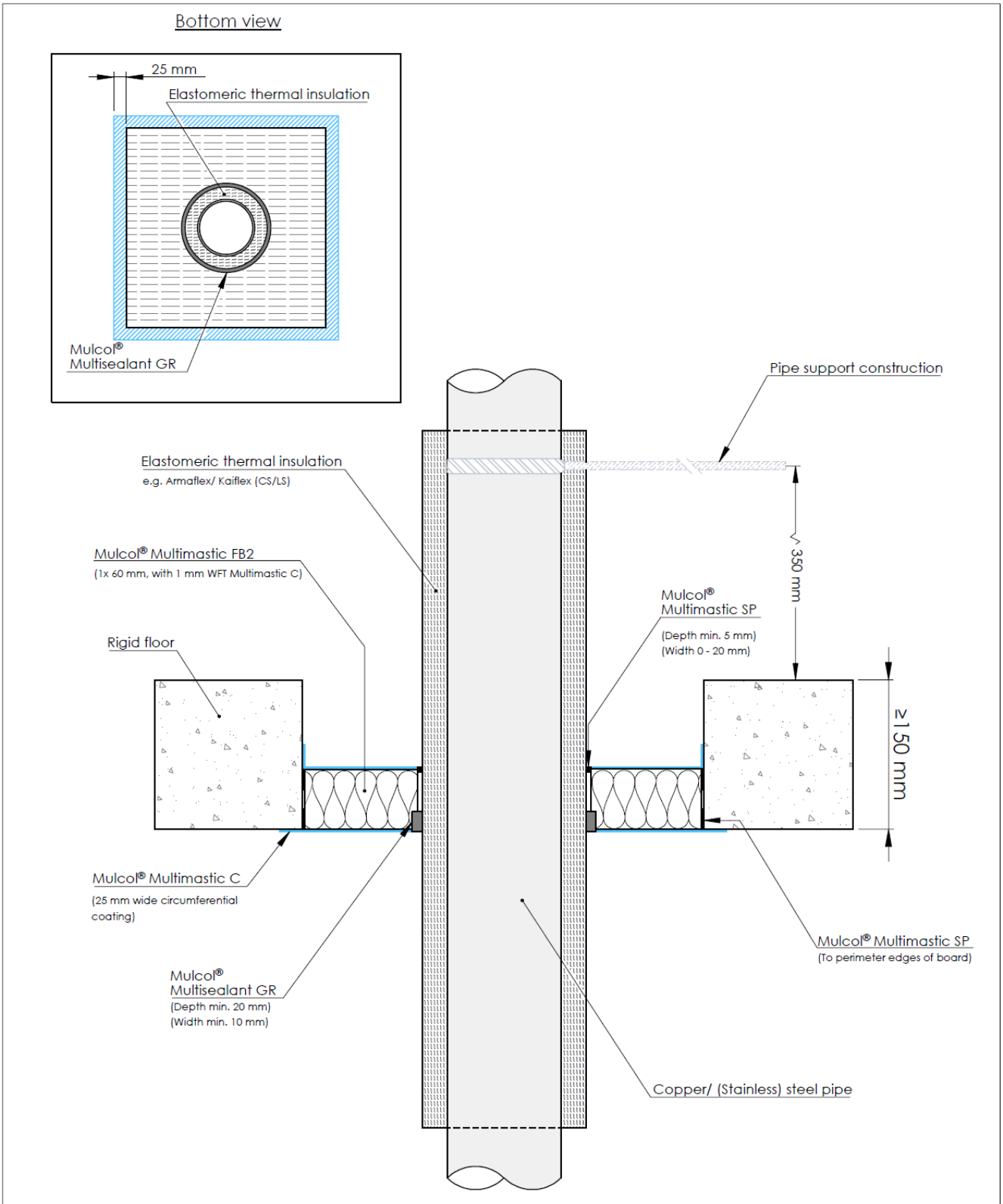
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Mulcol Multimastic FB2 - 1x 60 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, Cl LS, LI**	**Side of app.**	**Classification**
Steel	≤ 26,9	2,3	Kaiflex KK Plus KK+1/028	8,5	BL-s2,d0	LS 400 / CS	Exposed side	**E 45, EI 45 C/U**

Table 19: Details of the pipes insulated with Kaiflex KK Plus.



American projection	Scale :	Company : Mulcol International B.V.	PBrf-CU-MFB2-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 15-6-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.5. Mulcol Multimastic FB2 – 1x60 mm – with combustible (combined) pipes

2.3.5.1. Combustible pipes sealed with Multicollar Slim

PE-HD pipes with a diameter of 110 mm, penetrated through Mulcol Multimastic FB2. All pipes are sealed with one Mulcol Multicollar Slim. The aperture sealed with Multimastic SP. Clamp fixed with Multiscrew FB – 40 mm. Further details are given in the drawings. See Table 20 for details.

Classification

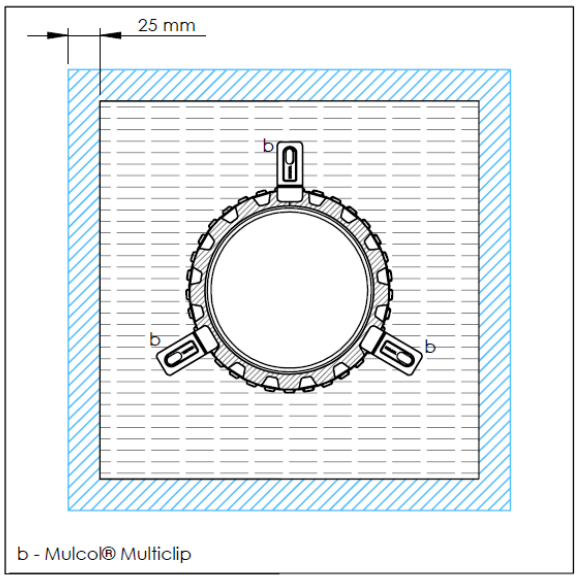
Mulcol® Multimastic C System, in combination with Multicollar Slim is classified according to the following combinations of performance parameters and classes:

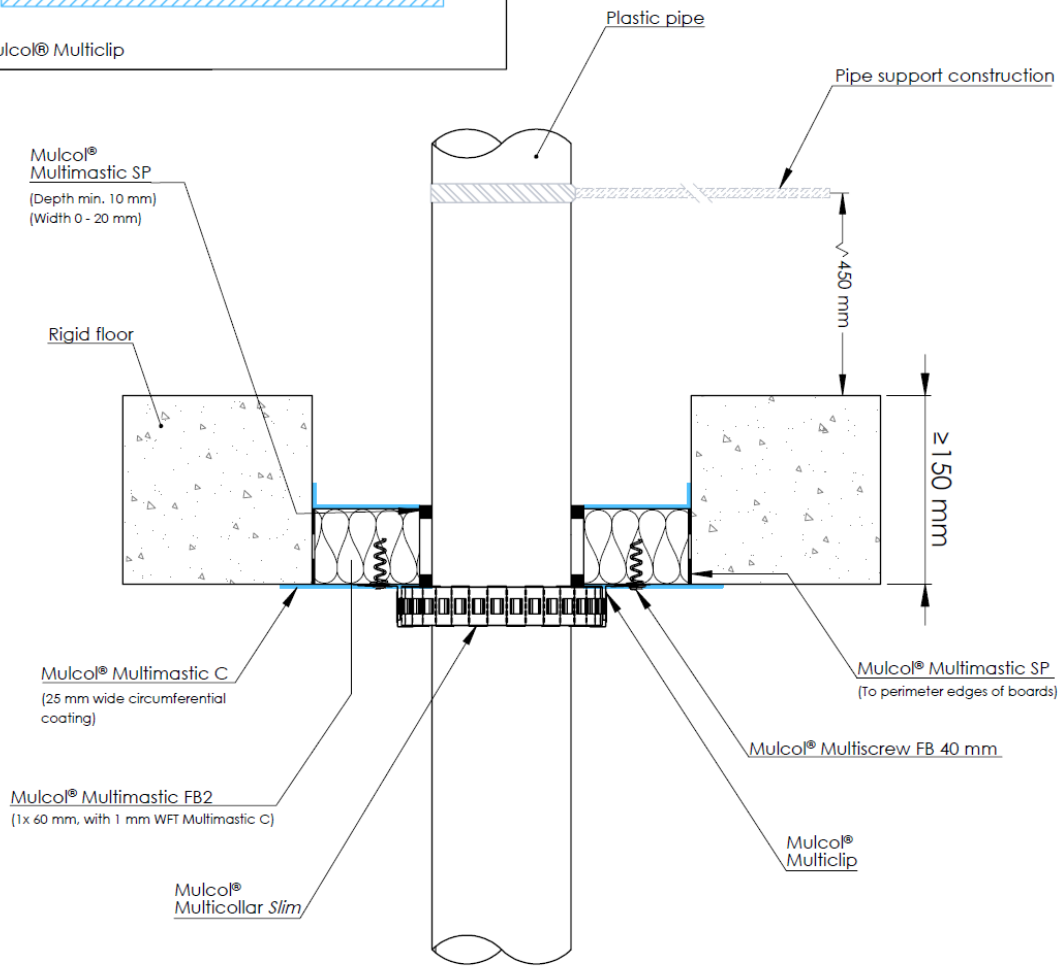
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multicollar Slim provide the following classification:

Mulcol Multimastic FB2 - 1x 60 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, Cl LS, LI**	**Side of app.**	**Classification**
PE-HD	≤ 110	2,7	-	-	-	-	Exposed side	**E 120, EI 120 U/U**

Table 20: Details of non-insulated PE-HD pipes.





American projection	Scale :	Company : Mulcol International B.V.	PBrf-PP-MFB2.1.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 12-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multicollar *Slim*
Installation in rigid floor

2.3.6. Directly through the floor - with steel and copper pipes

2.3.6.1. Steel and copper pipes coated with Multisealant GR

Insulated copper and steel pipes, penetrated directly through the floor. Insulation material Multisealant GR, and WFT, thickness 1,5 mm. Further details are given in the drawings. See Table 21 for details and the graphs for wall thickness-diameter range.

Classification

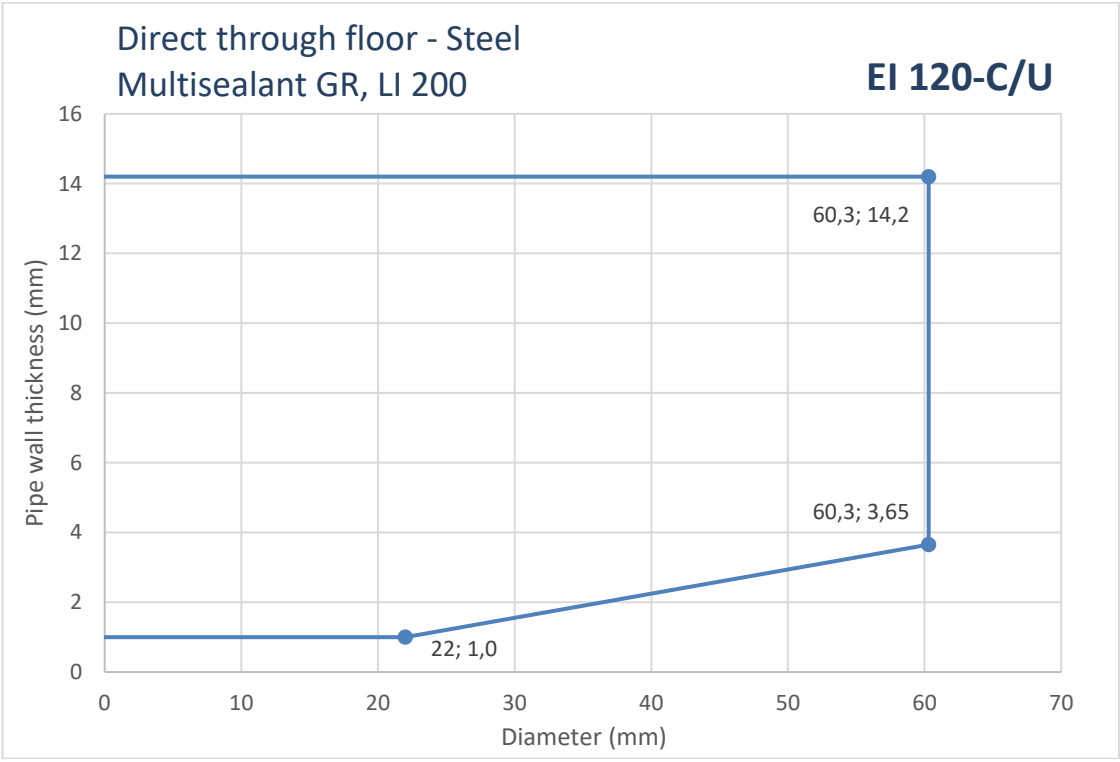
Mulcol® Multimastic C System, in combination with Multisealant GR is classified according to the following combinations of performance parameters and classes:

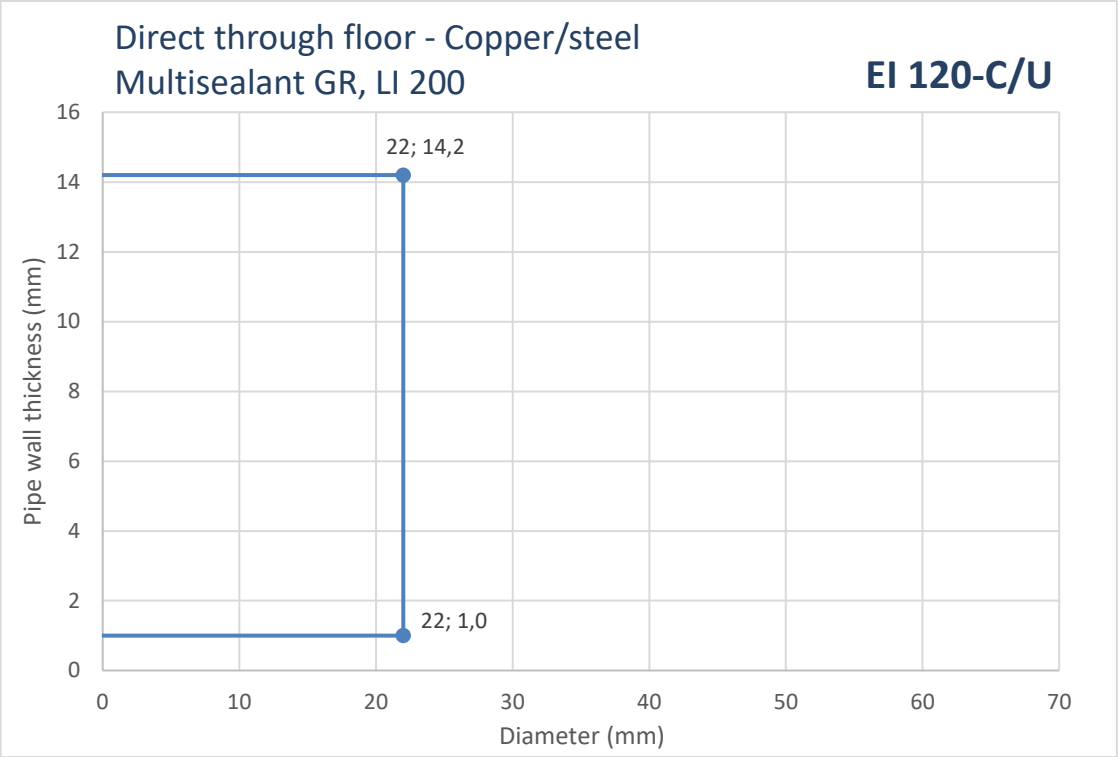
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

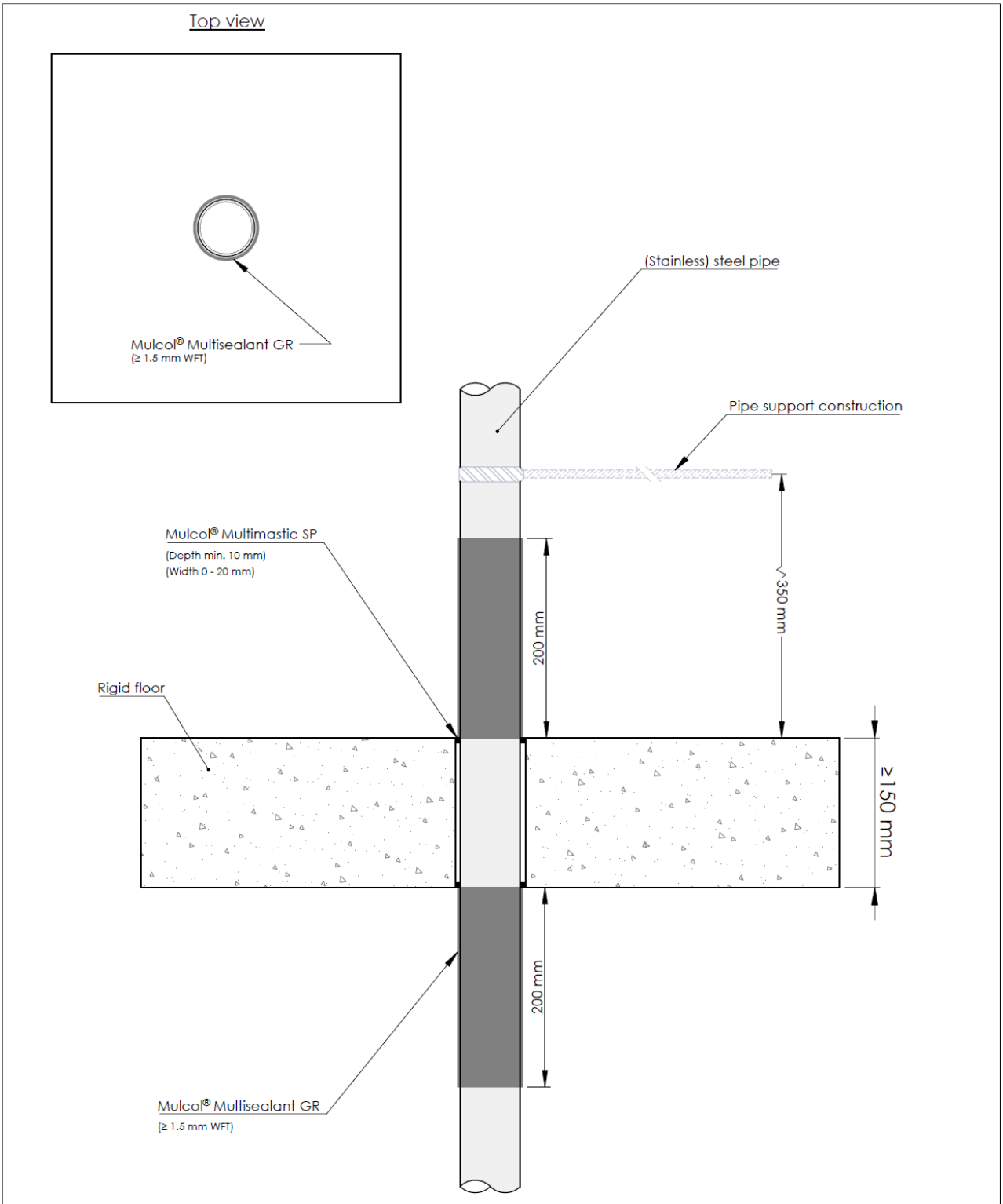
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multisealant GR provide the following classification:

Directly through the floor								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Copper/ Steel	≤ 15	1,0	Multisealant GR	1,5 mm WFT	-	LI 200	bs	**E 120, EI 45 C/U**
Copper/ Steel	≤ 22	1,0	Multisealant GR	1,5 mm WFT	-	LI 200	bs	**E 120, EI 120 C/U**
Steel	≤ 60,3	3,65	Multisealant GR	1,5 mm WFT	-	LI 200	bs	**E 60, EI 60 C/U**
Steel	≤ 60,3	3,65	Multisealant GR	1,5 mm WFT	-	LI 200	bs	**E 120, EI 120 C/U**

Table 21: Details of the pipes coating with Multisealant GR.



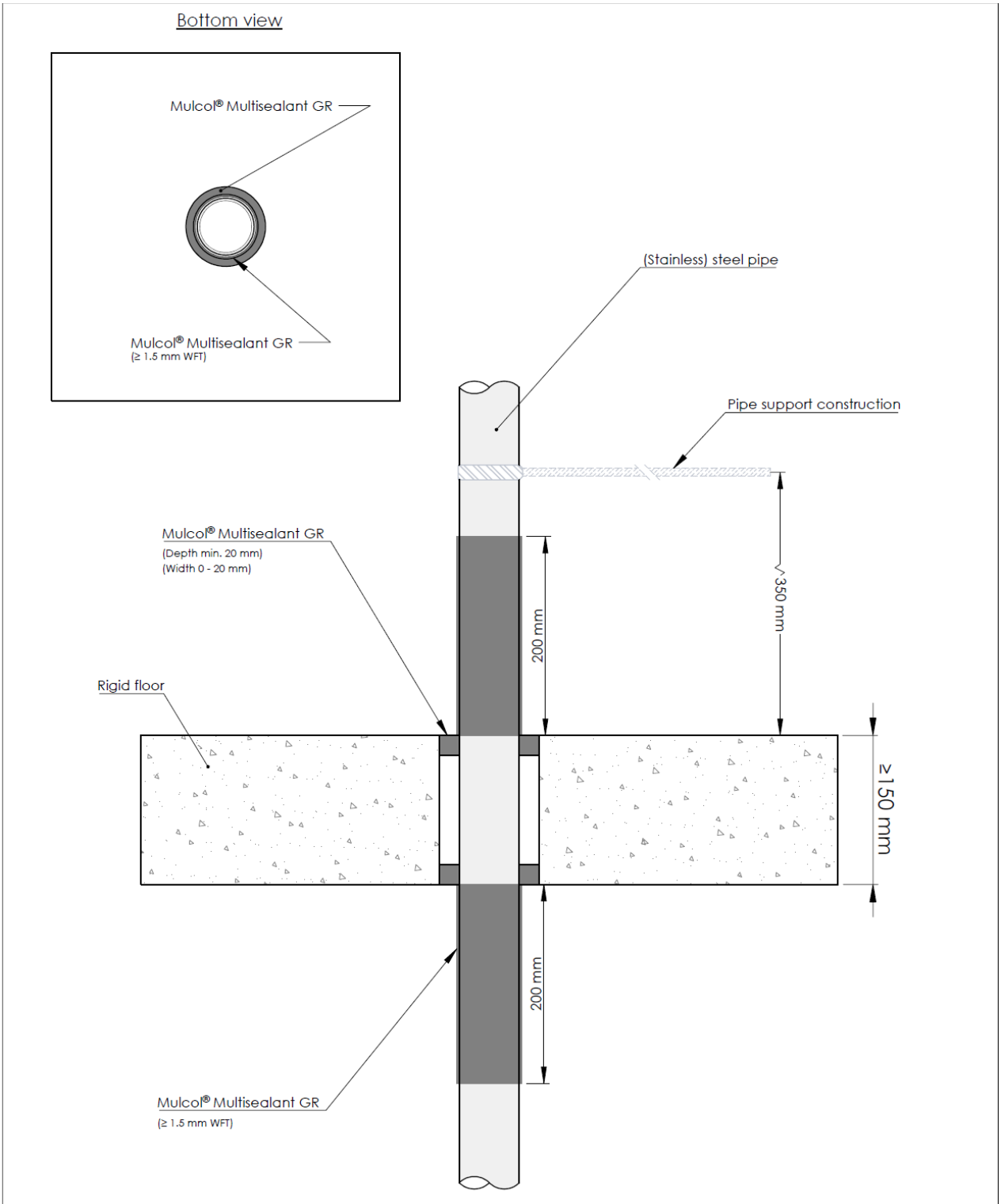

Direct through floor - Copper/steel
Multisealant GR, LI 200
EI 120-C/U
22; 14,2
22; 1,0
Pipe wall thickness (mm)
Diameter (mm)
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60
70



American projection	Scale : 1:5	Company : Mulcol International B.V.	RF-ST-MFB1-GRC.1.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 9-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor



American projection	Scale : 1:5	Company : Mulcol International B.V.	RF-ST-GRC-G2.6.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 9-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multisealant GR
Installation in rigid floor

2.3.7. Directly through the floor - with combustible (combined) pipes

2.3.7.1. Combustible pipes sealed with Multicollar Slim

Insulated multilayer pipes penetrated directly through the floor. Insulation material Kooltherm FM / PIR. All pipes are sealed with one or two Mulcol Multicollar Slim. The aperture sealed with Multisealant A or mortar. Clamp fixed with Multiscrew (7,5 x 40 mm). See Table 22 for details.

Classification

Mulcol® Multimastic C System, in combination with Multicollar Slim is classified according to the following combinations of performance parameters and classes:

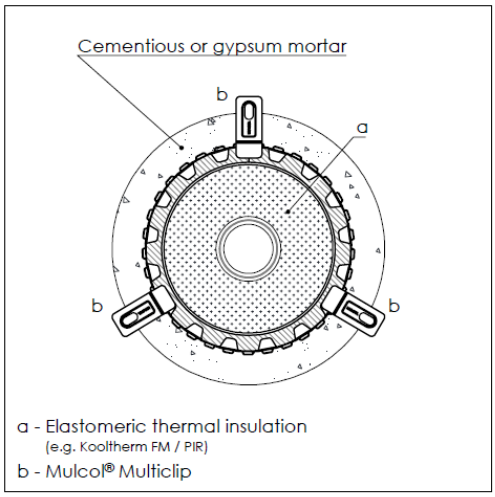
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

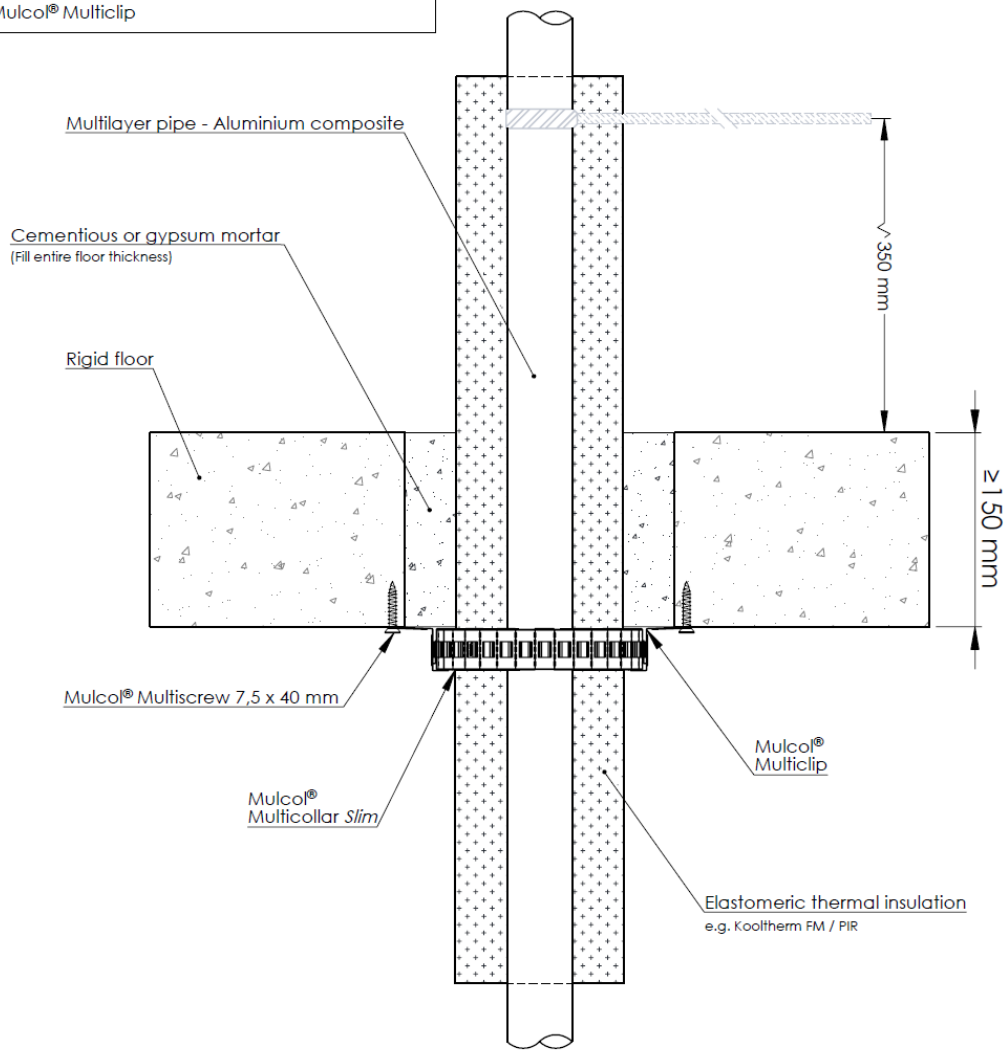
Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multicollar Slim provide the following classification:

Directly through the floor									
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, Cl LS, LI**	**No. of Multicollar**	**Side of app.**	**Classification**
Henco	≤ 26	3,0	Kooltherm FM / PIR	25	B_L-s1, d0	LS 400 / CS	One Multicollar	Exposed side	**E 90, EI 45 U/C**
Henco	≤ 32	3,0	Kooltherm FM / PIR	47	B_L-s1, d0	LS 400 / CS	One Multicollar	Exposed side	**E 120, EI 120 U/C**
Henco	≤ 50	6,0	Kooltherm FM / PIR	40	B_L-s1, d0	LS 400 / CS	One Multicollar	Exposed side	**E 90, EI 60 U/C**
Henco	≤ 50	6,0	Kooltherm FM / PIR	60	B_L-s1, d0	LS 400 / CS	Double Multicollar	Exposed side	**E 60, EI 30 U/C**
Henco	≤ 90	6,0	Kooltherm FM / PIR	60	B_L-s1, d0	LS 400 / CS	Double Multicollar	Exposed side	**E 120, EI 90 U/C**

Table 22: Details of the combustible pipes sealed with Multicollar Slim.

Bottom view



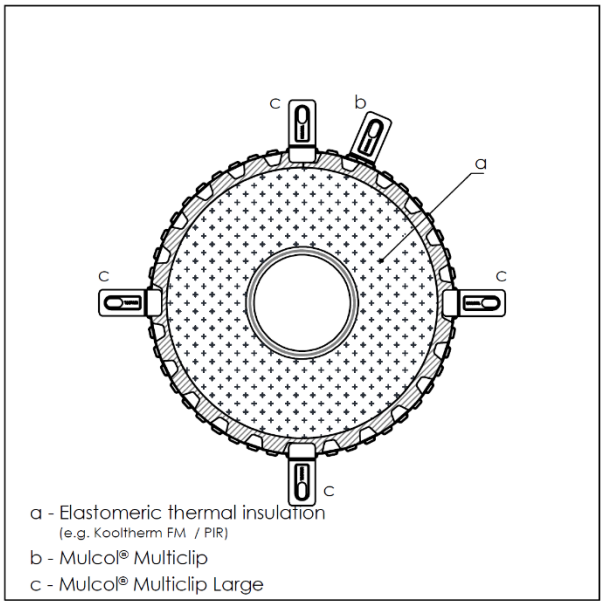


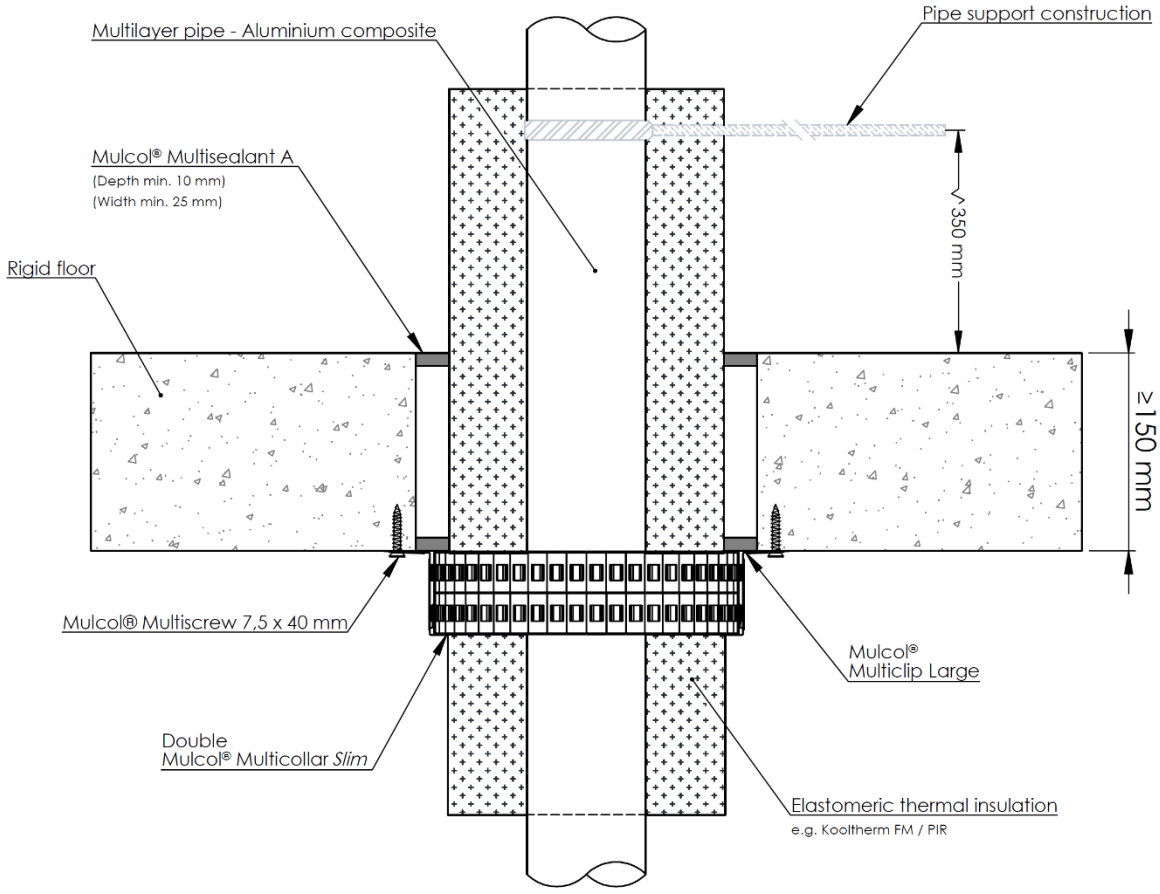
American projection	Scale :	Company : Mulcol International B.V.	RF-MLA-MM-11.0.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 12-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multicollar *Slim*
Installation in rigid floor

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	RF-MLA-21.0.22
	Unit of measure : mm	Department : Research & Development	
	Date : 12-3-2020	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multicollar *Slim*
Installation in rigid floor

PE, PP and PVC pipes penetrated directly through the floor, with two 45 degrees elbows, 0 mm pipe distance to the soffit of the floor. Sealed with a double U-shape Mulcol Multicollar Slim. Multiclip L fixed with Multiscrew FB – 40 mm. Further details are given in the drawings. See Table 23 for details.

Classification

Mulcol® Multimastic C System, in combination with Multicollar Slim is classified according to the following combinations of performance parameters and classes:

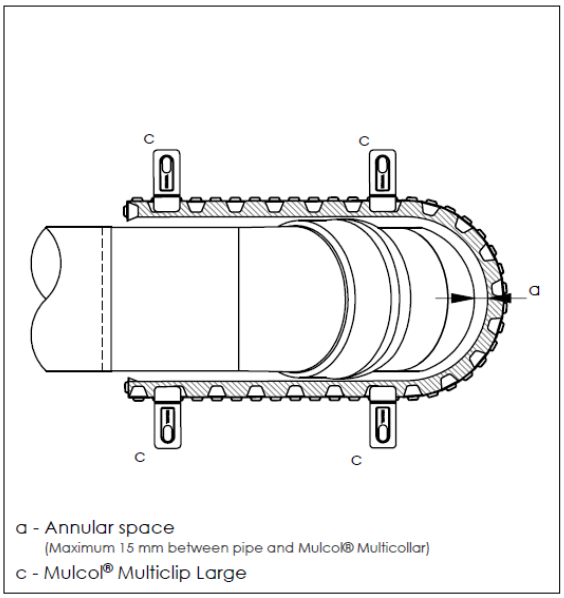
R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multicollar Slim provide the following classification:

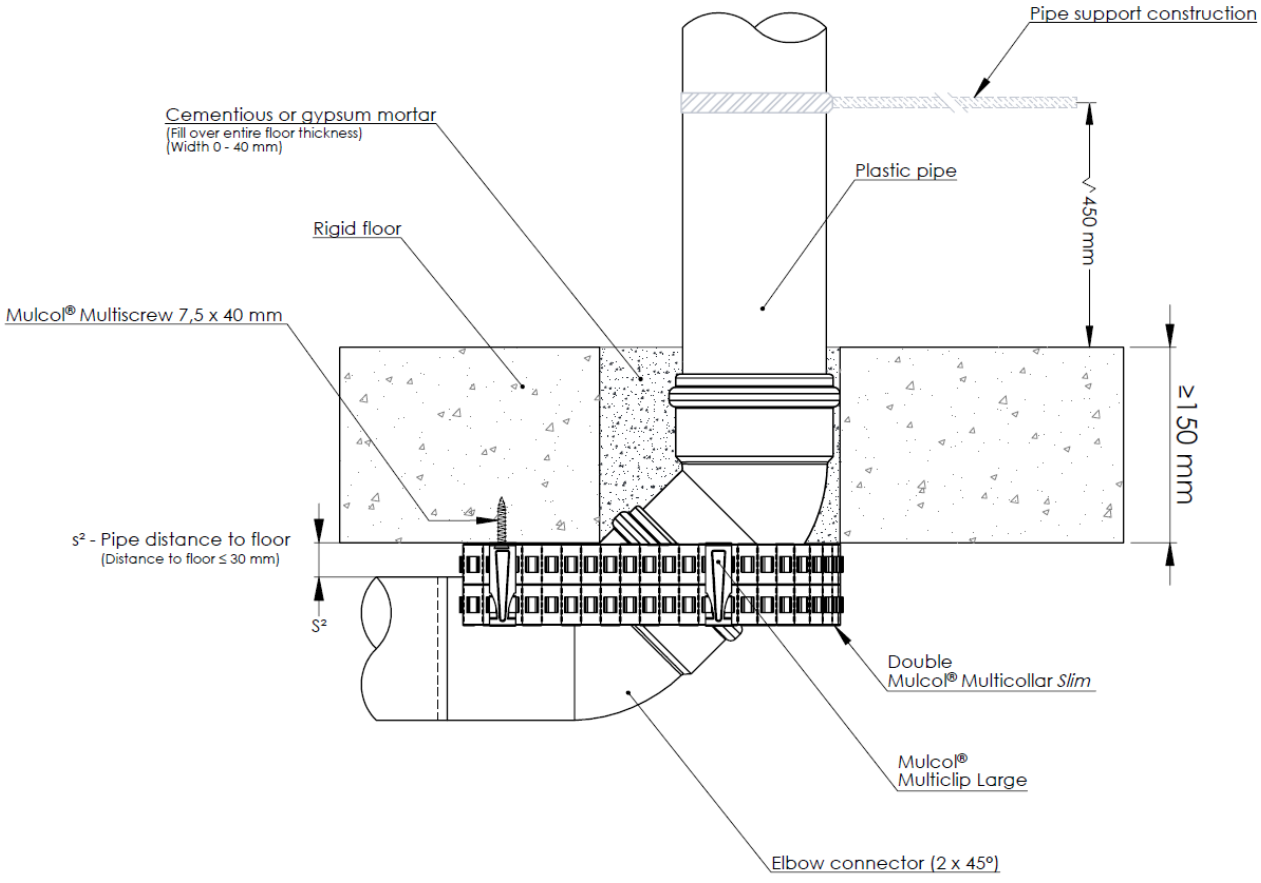
Directly through the floor								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**CS, CI LS, LI**	**No. of Multicollar**	**Side of app.**	**Classification**
PVC	≤ 110	2,2	-	-	-	One Multicollar	Exposed side	**E 120, EI 120 U/U**
PE	≤ 125	3,1	-	-	-	Double Multicollar	Exposed side	**E 120, EI 60 U/U**

Table 23: Details of the combustible pipes sealed with Multicollar Slim.

Bottom view



a - Annular space
(Maximum 15 mm between pipe and Mulcol® Multicollar)
c - Mulcol® Multiclip Large

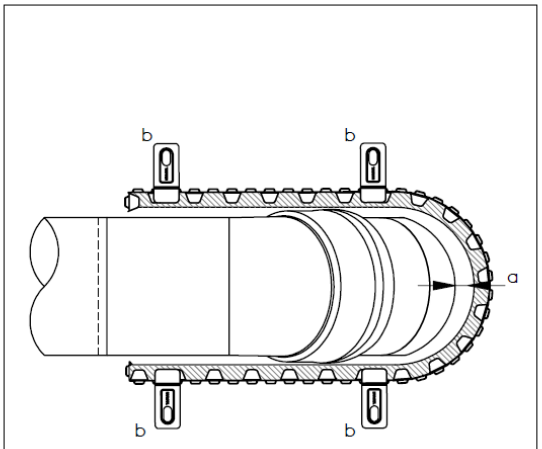


American projection	Scale	: 1:5	Company	: Mulcol International B.V.	RF-PP-52.0.80
	Unit of measure	: mm	Department	: Research & Development	
	Date	: 9-3-2020	Draftsman	: K.J.	A4

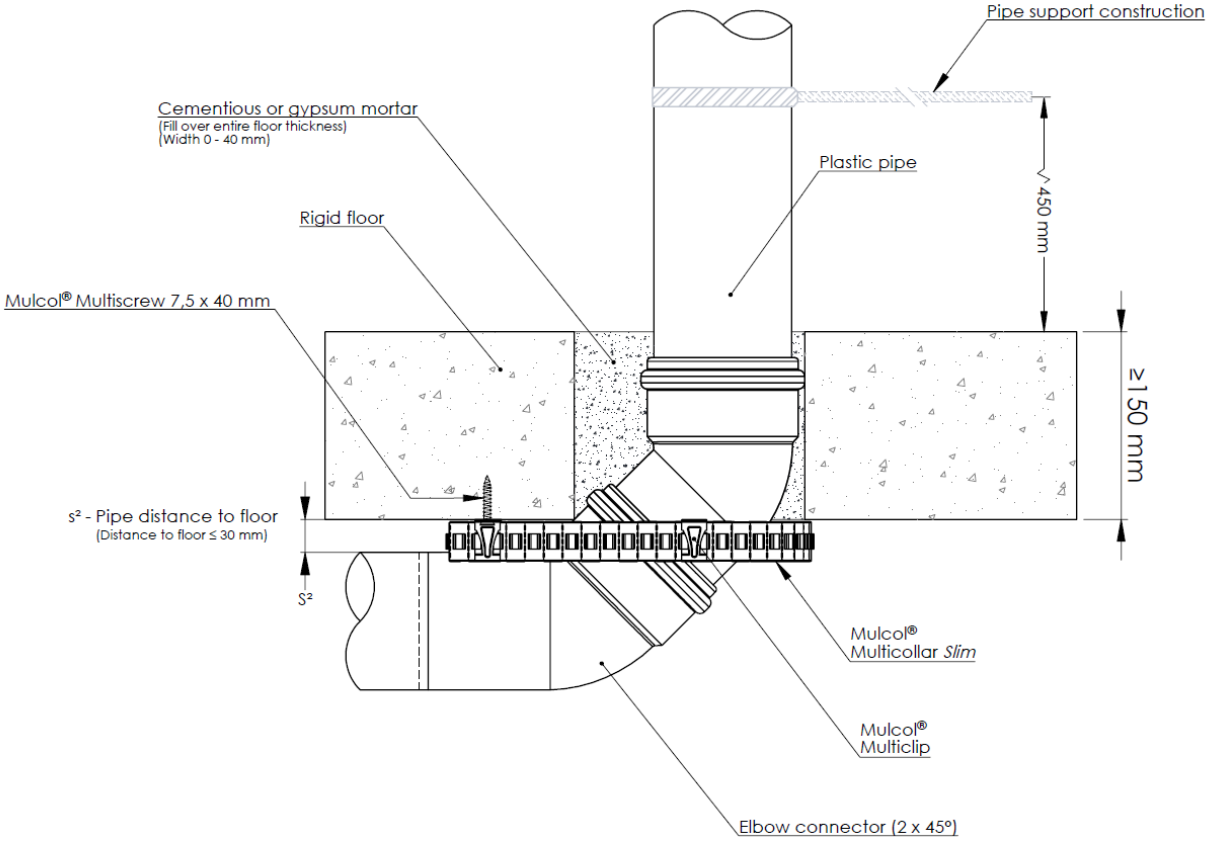
MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multicollar *Slim*
Installation in rigid floor

Bottom view



a - Annular space
(Maximum 15 mm between pipe and Mulcol® Multicollar)
b - Mulcol® Multiclip



American projection	Scale : 1:5	Company : Mulcol International B.V.	RF-PP-51.0.80
	Unit of measure : mm	Department : Research & Development	A4
	Date : 9-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multicollar *Slim*
Installation in rigid floor

2.3.7.2. Multilayer pipes sealed with Multidisc

Copper and steel pipes penetrated directly through the floor. Pipes are sealed with Mulcol Multidisc. Further details are given in the drawings. See Table 24 for details.

Classification

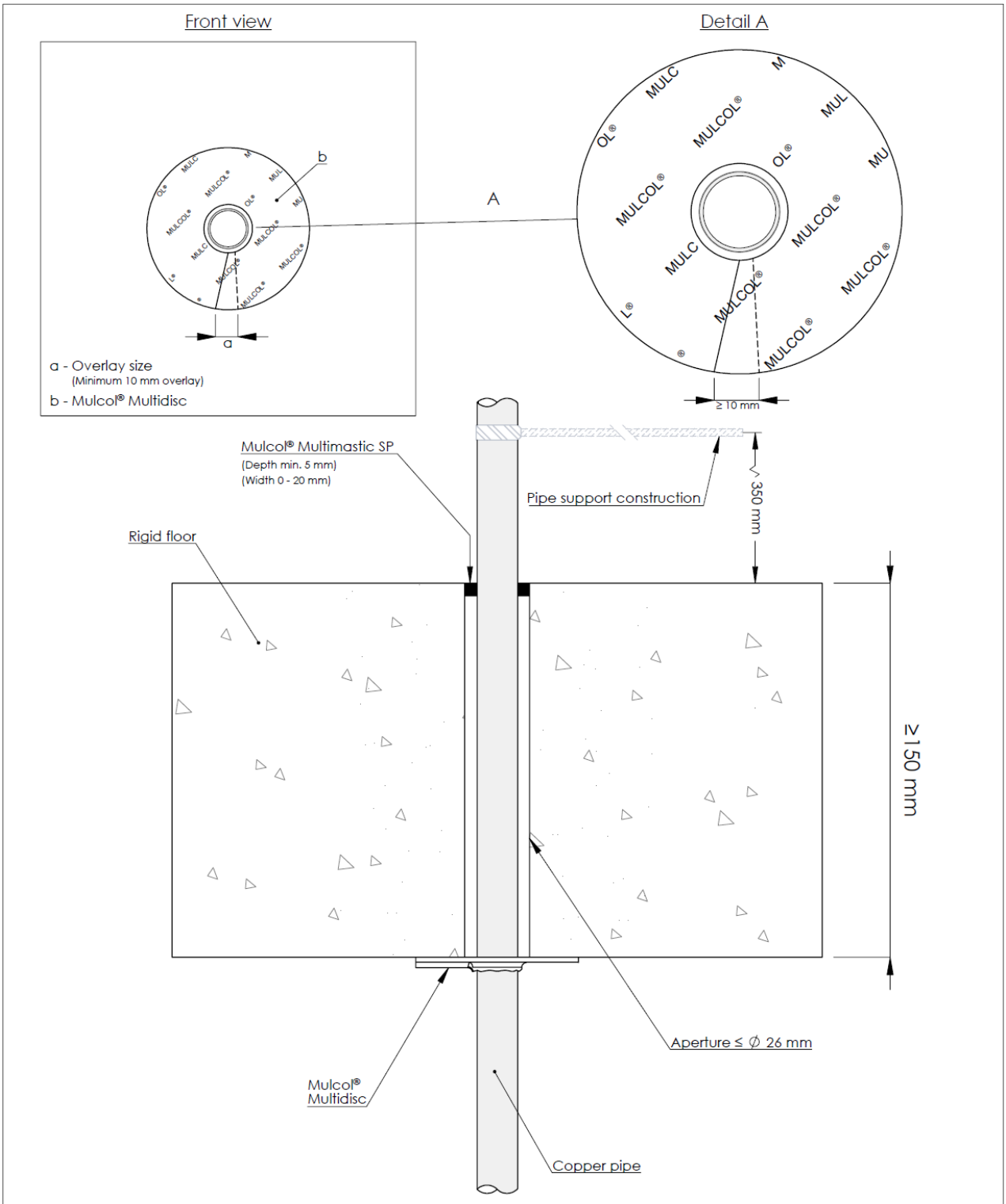
Mulcol® Multimastic C System, in combination with Multidisc is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multimastic C System, in combination with Multidisc provide the following classification:

Directly through the floor								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Copper/Steel	≤ 15	1,0	-	-	-	-	Exposed side	**E 120, EI 120 C/U**
Steel	≤ 17,2	2,35					Exposed side	**E 120, EI 90 C/U**

Table 24: Details of the non-insulated metal pipes sealed with Multidisc.



American projection	Scale : 1:2	Company : Mulcol International B.V.	RF-CU-M2.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 5-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multidisc
Installation in rigid floor

2.3.8. Multifoam 2K - 100 mm – with cables and trays

2.3.8.1. Cables sealed with Multifoam 2K

Cables with a diameter of 21 mm, penetrated through a cast in plastic pipe sleeve, filled with 100 mm Mulcol Multifoam 2K. Aperture around the pipe sleeve sealed with Mulcol Multimortar. Further details are given in the drawings. See Table 25 for details.

Classification

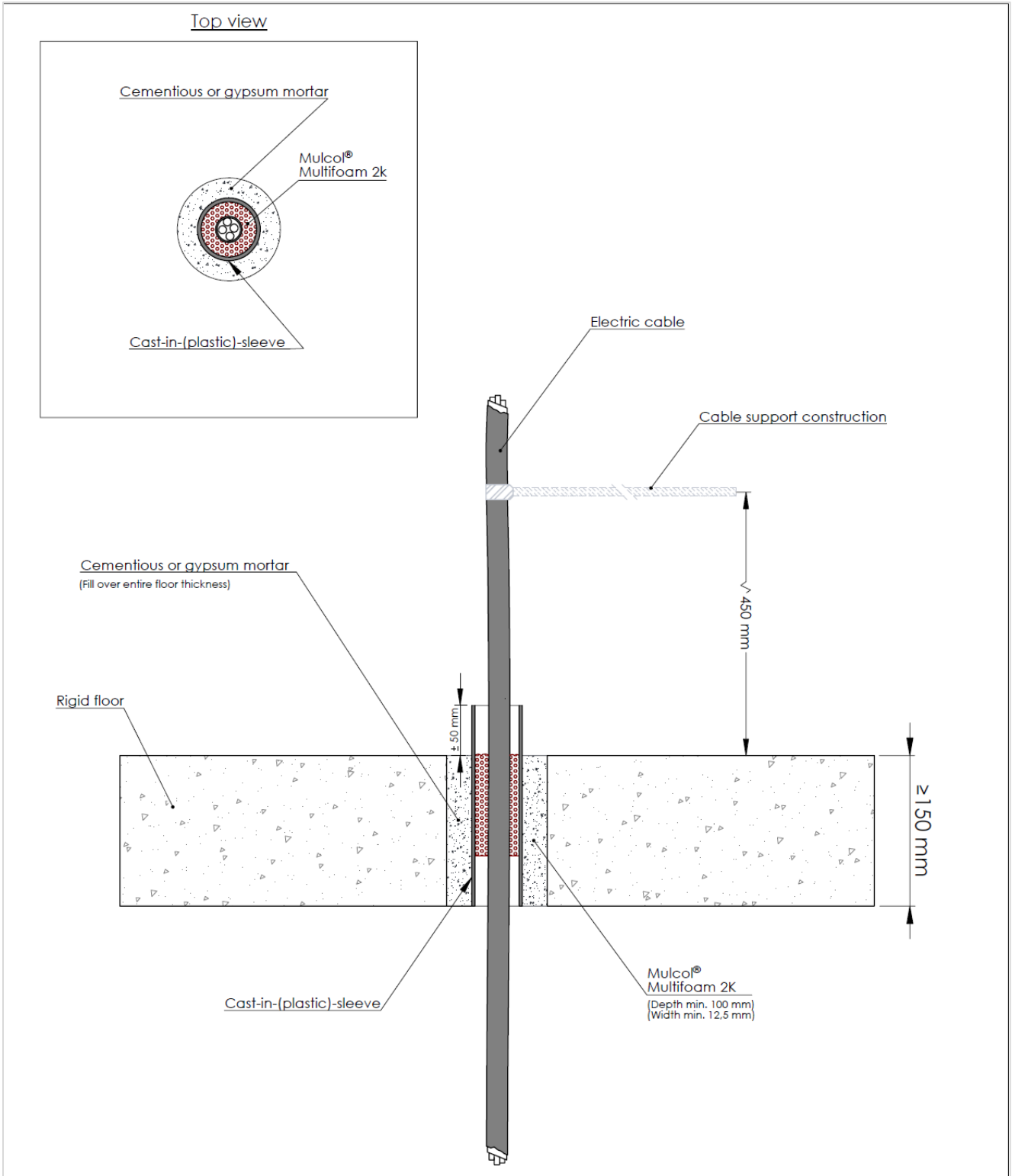
Mulcol® Multifoam 2K, in combination with Multimortar is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multifoam 2K, in combination with Multimortar provide the following classification:

Multifoam 2K - 100 mm							
Service	**Dimensions**	**Wall thick ness**	**Insulation type**	**Insulation thickness**	**Side of app.**	**Sealing Product**	**Classification**
Cables	≤ 21	1,0	-	-	bs	100 mm Multifoam 2K in pipe sleeve around service, Mortar around pipe sleeve	**E 120, EI 90 C/U**

Table 25: Cables sealed with Multifoam 2K details.



American projection	Scale :	Company : Mulcol International B.V.	RFmk-EC21-MF.1.31
	Unit of measure : mm	Department : Research & Development	
	Date : 13-3-2020	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multifoam 2K
Installation in rigid floor

2.3.8.2. Various bundled cables sealed with Multifoam 2K

Cable bundle with a total diameter of max. 40 mm, penetrated through a cast in plastic pipe sleeve, filled with 100 mm Mulcol Multifoam 2K. Aperture around the pipe sleeve sealed with Mulcol Multimortar. Further details are given in the drawings. See Table 26 for details.

Classification

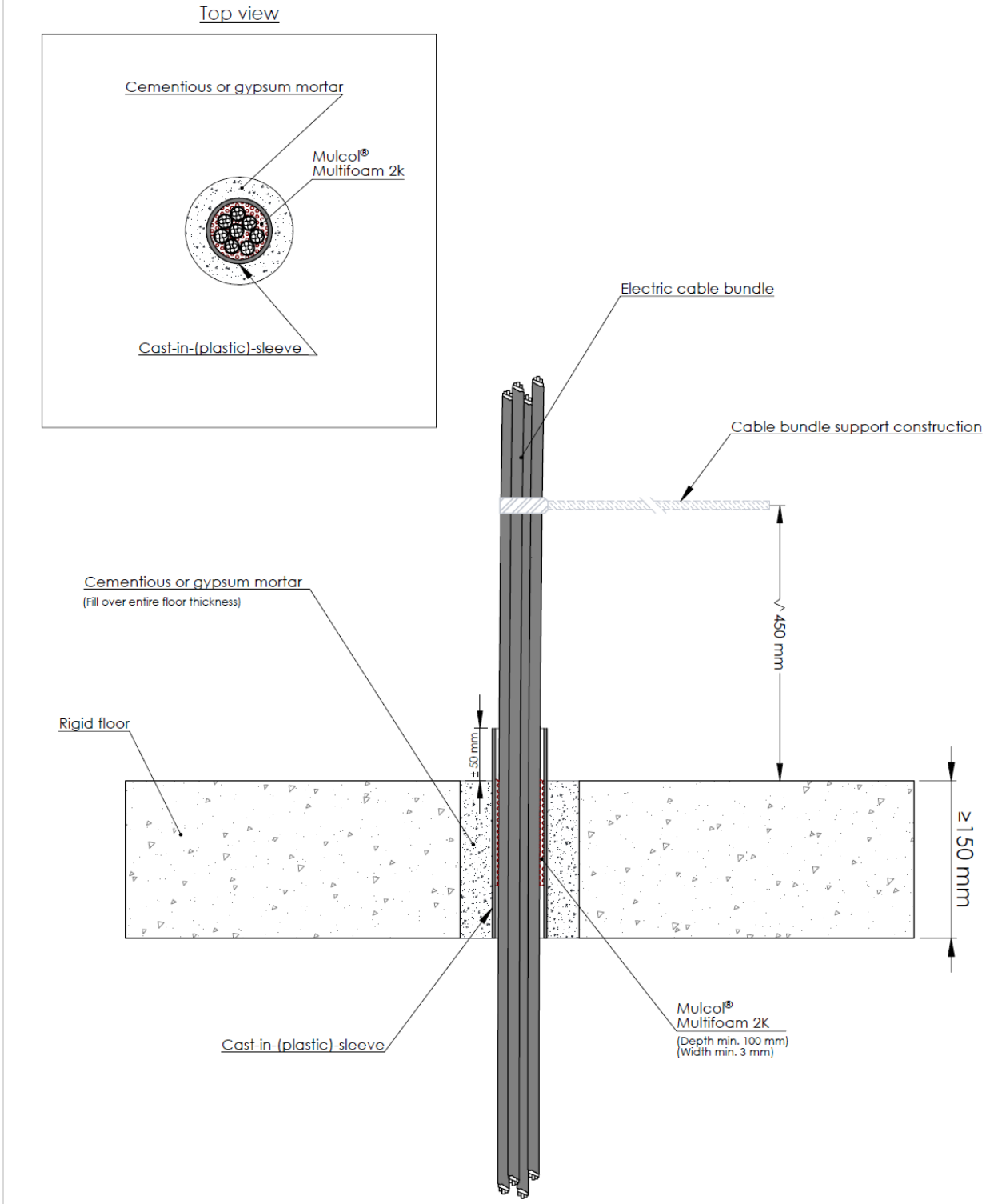
Mulcol® Multifoam 2K, in combination with Multimortar is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multifoam 2K, in combination with Multimortar provide the following classification:

Multifoam 2K - 100 mm							
Service	**Dimensions**	**Wall thick ness**	**Insulation type**	**Insulation thickness**	**Side of app.**	**Sealing Product**	**Classification**
Cable bundle	≤ 40	-	-	-	bs	100 mm Multifoam 2K in pipe sleeve around service, Mortar around pipe sleeve	**E 60, EI 60 C/U**

Table 26: Cables sealed with Multifoam 2K details.



American projection	Scale :	Company : Mulcol International B.V.	RFmk-ECB40-MF.1.31
	Unit of measure : mm	Department : Research & Development	
	Date : 13-3-2020	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multifoam 2K
Installation in rigid floor

2.3.8.3. Cable hose sealed with Multifoam 2K

Cable hose diameter 63 with cable bundle, penetrated through a cast in plastic pipe sleeve, filled with 100 mm Mulcol Multifoam 2K. Aperture around the pipe sleeve sealed with Mulcol Multimortar. Further details are given in the drawings. See Table 27 for details.

Classification

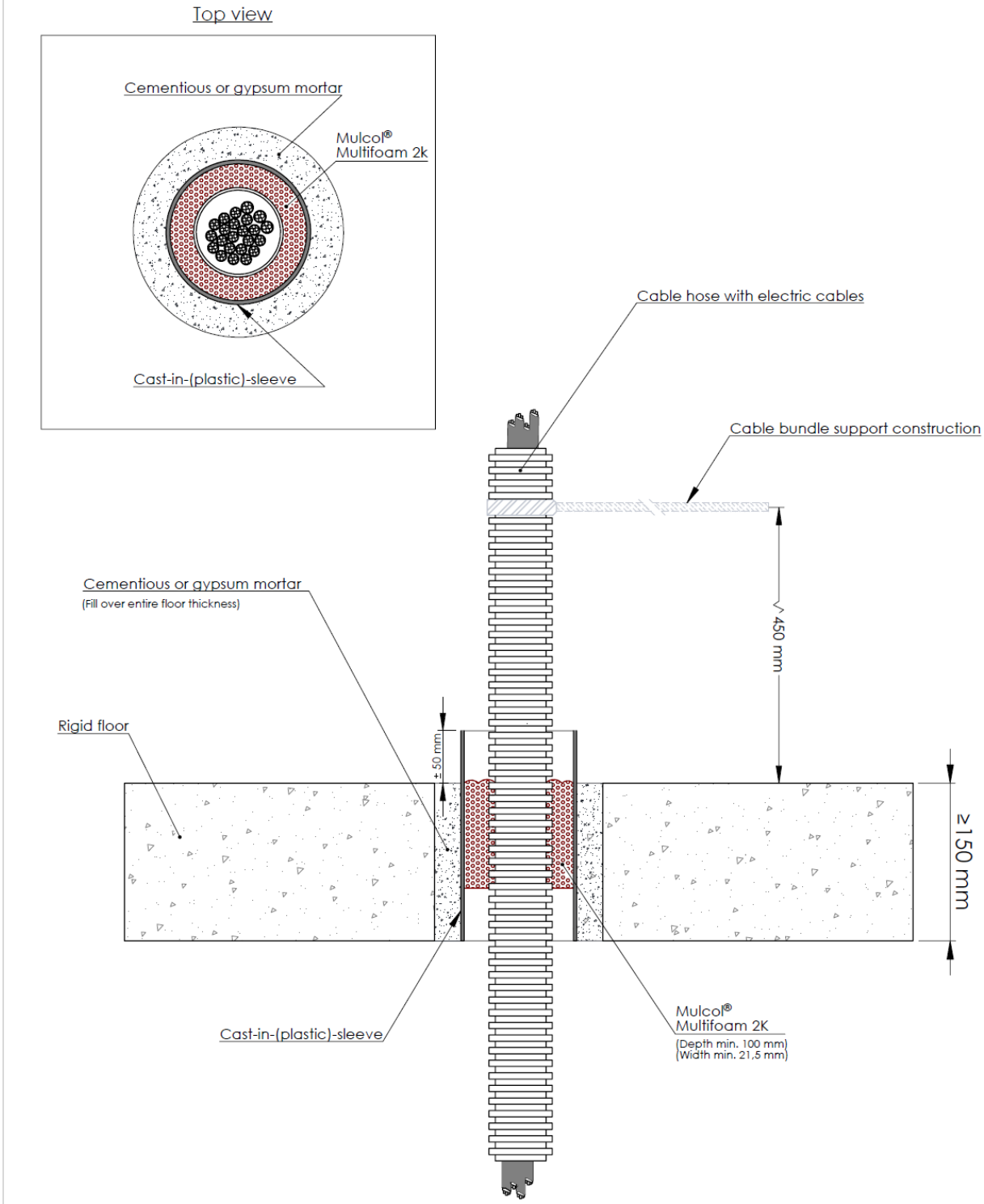
Mulcol® Multifoam 2K, in combination with Multimortar is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multifoam 2K, in combination with Multimortar provide the following classification:

Multifoam 2K - 100 mm							
Service	**Dimensions**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Side of app.**	**Sealing Product**	**Classification**
Cable hose with cables	≤ 63	1,0	-	-	bs	100 mm Multifoam 2K in pipe sleeve around service, Mortar around pipe sleeve	**E 120, EI 90 C/U**

Table 27: Cables sealed with Multifoam 2K details.



American projection	Scale :	Company : Mulcol International B.V.	RFmk-ECH63-MF.1.31
	Unit of measure : mm	Department : Research & Development	A4
	Date : 13-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multifoam 2K
Installation in rigid floor

2.3.9. Multifoam 2K - 100 mm – with steel and copper pipes

2.3.9.1. Steel and copper pipes insulated with Multitherm Bandage

Copper pipes with a diameter of 35 mm, penetrated through a cast in plastic pipe sleeve, filled with 100 mm Mulcol Multifoam 2K. Insulation material Multitherm bandage, 150 mm, thickness 6 mm (At unexposed side). The aperture around the pipe sleeve sealed with Mulcol Multimortar. Further details are given in the drawings. See Table 28 for details.

Classification

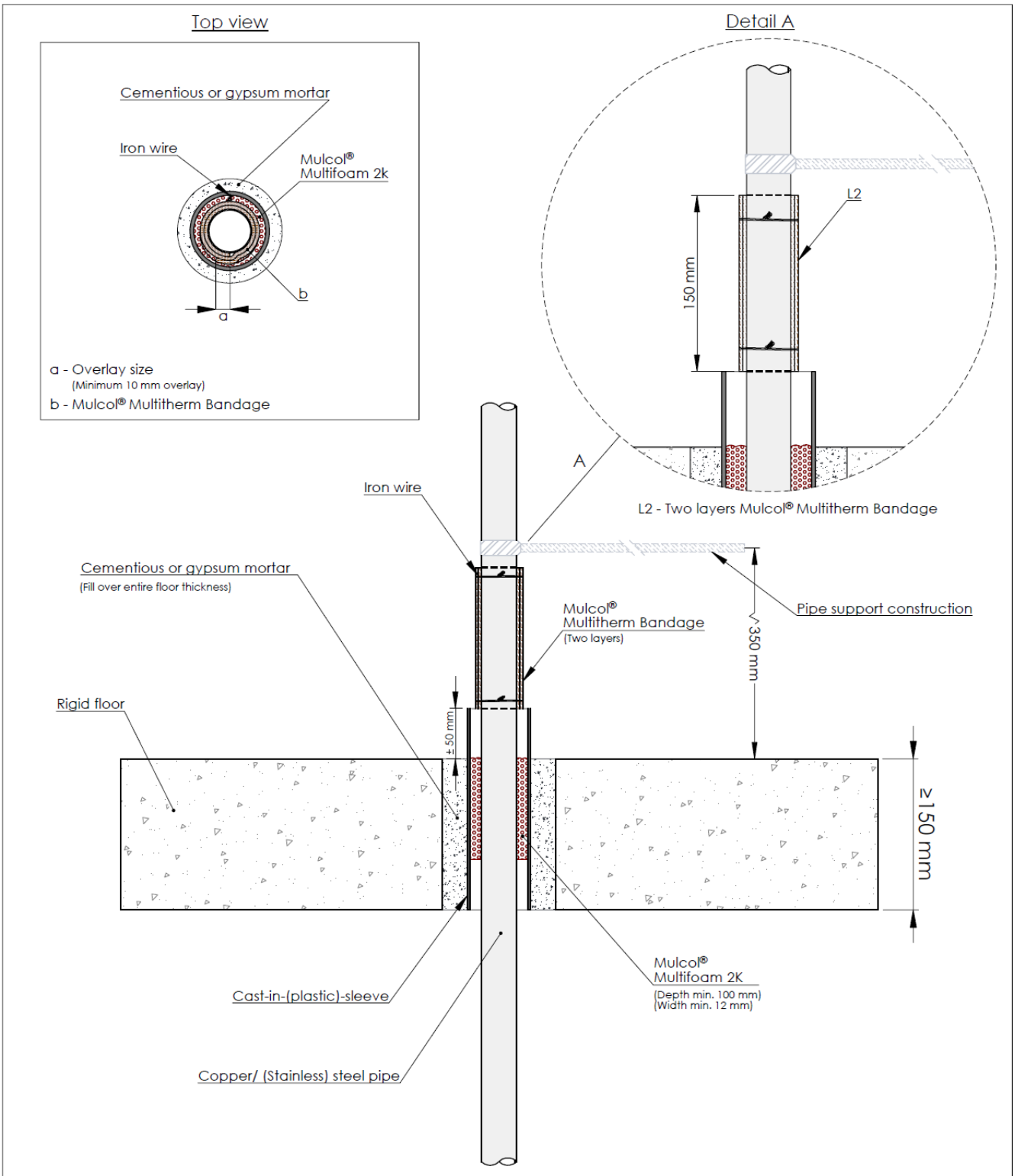
Mulcol® Multifoam 2K, in combination with Multimortar and Multitherm Bandage is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multifoam 2K and Multitherm Bandage, in combination with Multimortar provide the following classification:

Multifoam 2K - 100 mm								
Penetration	**Dia.**	**Wall thickness**	**Insulation type**	**Insulation thickness**	**Fire rating**	**CS, CI LS, LI**	**Side of app.**	**Classification**
Steel	≤ 150	0,4	Multitherm Bandage	One layer	-	LI 150	Unexposed side	**E 120, EI 90, C/U**

Table 28: Details of the pipes insulated with Multitherm Bandage.



American projection	Scale :	Company : Mulcol International B.V.	RFmk-CU-MF.1.31.B1
	Unit of measure : mm	Department : Research & Development	A4
	Date : 13-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multifoam 2K
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2.3.10. Multifoam 2K - 100 mm – with combustible (combined) pipes

2.3.10.1. Multilayer pipes sealed with Multifoam 2K

Multilayer pipes penetrated through a cast in plastic pipe sleeve, filled with 100 mm Mulcol Multifoam 2K. The aperture around the pipe sleeve sealed with Mulcol Multimortar. Further details are given in the drawings. See Table 29 for details.

Classification

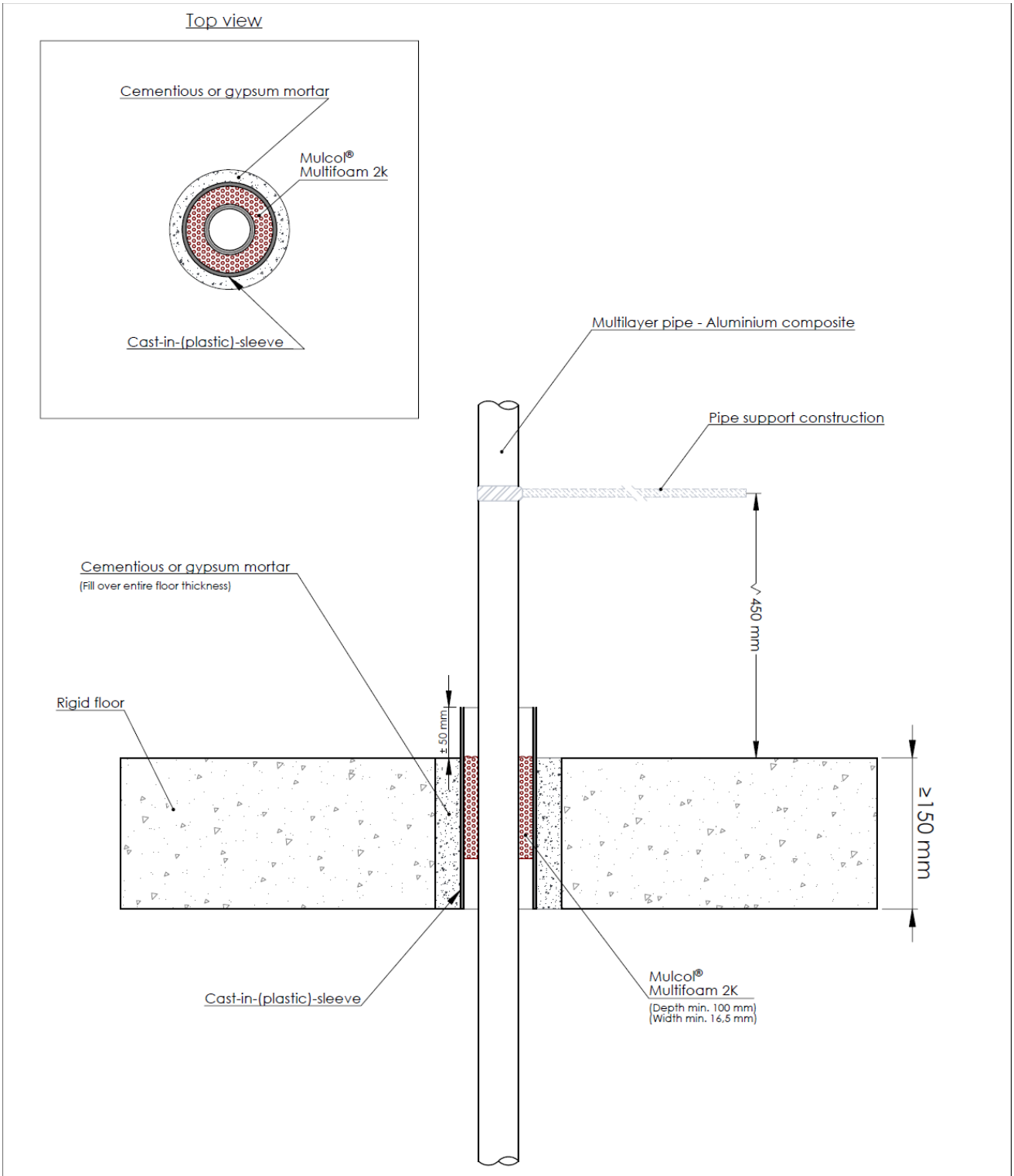
Mulcol® Multifoam 2K, in combination with Multimortar is classified according to the following combinations of performance parameters and classes:

R	E	I	W		t	t	-	M	S	C	IncSlow	sn	ef	r

Considering the test evidence submitted for classification, Mulcol® Multifoam 2K, in combination with Multimortar provide the following classification:

Multifoam 2K - 100 mm							
Service	**Dimensions**	**Wall thick ness**	**Insulation type**	**Insulation thickness**	**Side of app.**	**Sealing Product**	**Classification**
Henco	≤ 26	3,0	-	-	bs	100 mm Multifoam 2K in pipe sleeve around service, Mortar around pipe sleeve	**E 120, EI 90 U/C**
Henco	≤ 40	3,5	-	-	bs	100 mm Multifoam 2K in pipe sleeve around service, Mortar around pipe sleeve	**E 120, EI 90 U/C**

Table 29: Details of the multilayer pipes sealed with Multifoam 2K.



American projection	Scale :	Company : Mulcol International B.V.	RFmk-MLA-MF.1.31
	Unit of measure : mm	Department : Research & Development	A4
	Date : 13-3-2020	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multifoam 2K
Installation in rigid floor

3. REPORTS AND RESULTS IN SUPPORT OF CLASSIFICATION

3.1. Reports

Name of laboratory	Name of sponsor	Test report ref. no.	Test method
EFECTIS ERA AVRASYA Test ve Belgelendirme A.Ş	MULCOL INTERNATIONAL BV	RFTR20008	EN 1366-3:2009

4. FIELD OF APPLICATION

4.1. Field of application

4.1.1.General

This report details the method of construction, the test conditions and the results obtained when the specific elements of construction described herein was tested following the procedure outlined in EN 1366-3:2009. Any significant deviation with respect to size, constructional details, load stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

4.1.2. Orientation

The classification is valid for pipe and cable penetration seals passing through perpendicular to a vertical wall.

4.1.3. Flexible wall

Test results obtained with the standard flexible wall constructions according to EN 1366-3:2009 cover all flexible wall constructions of the same fire resistance classification provided

- the construction is classified in accordance with EN 13501-2;

- the construction has an overall thickness not less than 94 mm. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides;

- in the case of penetration seals installed within the wall and where a flexible wall with insulation was used in the test an aperture framing shall be used in practice. The aperture frame and aperture lining shall be made of studs and boards of the same specification as those used in the wall in practice. The thickness of the aperture lining shall be minimum 12,5 mm. This rule does not apply in the case where the insulation was removed around the penetration seal(s).

- the number of board layers and the overall board layer thickness is equal or greater than that tested when no aperture framing is used;

- flexible wall constructions with timber studs are constructed with at least the same number of layers as given in EN 1366-3:2009 Table 4, no part of the penetration seal is closer than 100 mm to a stud, the cavity is closed between the penetration seal andthe stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 is provided within the cavity between the penetration seal and the stud.

An aperture framing is considered as being part of the penetration seal. Tests without an aperture framing cover applications with aperture framing but not vice versa.

The standard flexible wall construction does not cover sandwich panel constructions and flexible walls where the lining does not cover the studs on both sides. Penetrations in such constructions shall be tested on a case by case basis.

Test results obtained with flexible supporting walls may be applied to concrete or masonry elements of an overall thickness equal to or greater than that of the element used in the tests. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides.

4.1.4. Pipe and configuration

The classification of plastic and aluminium composite pipes applies to a certain pipe end configuration. In Table 30, the configuration to be tested versus intended use is given.

Intended use	Plastic,aluminium composite and PP-R multilayer pipes	
	Uncapped/Uncapped (U/U)	Uncapped/Capped (U/C)
Fluids	Allowed	Allowed
Gasses	Allowed	Allowed
Rainwater pipes	Allowed	Not allowed
Ventilated sewage pipes	Allowed	Not allowed
Unventilated sewage pipes	Allowed	Allowed

Table 30: Pipe end configuration versus intended use

Classification of metal pipes applies to a certain pipe end configuration. In Table 31, the configuration to be tested versus intended use is given.

Intended use	Metal pipes	
	Capped/Uncapped (C/U)	Uncapped/Capped (U/C)
Fluids, supported by fire rated suspension system	Allowed	Allowed
Fluids, supported by non fire rated suspension system	Not allowed	Allowed
Gasses, supported by fire rated suspension system	Allowed	Allowed
Gasses, supported by non fire rated suspension system	Not allowed	Allowed

Table 31: Pipe end configuration versus intended use.

4.1.5. Services

The direct field of application rules apply to the nominal dimensions of services.

4.1.5.1. Large cable penetrations

i. Cable type (construction characteristics)

The configuration options "Small", "Medium" and "Large" cover all cable types currently and commonly used in building practice in Europe subject to the rules in EN 1366-3:2009 A.3.2, except tied bundles, waveguides according to EN 1366-3:2009 3.23 and non-sheathed cables (wires). Optical fibre cables are covered

Test results achieved using cable group 5 according to EN 1366-3:2009 Table A.1 are valid for all non-sheathed cables (wires) subject to the rules in EN 1366-3:2009 A.3.2.

Test results achieved using a tied bundle made from F-cables according to EN 1366-3:2009 Table A.1 are valid for all tied bundles of cables subject to the rules in EN 1366-3:2009 A.3.2

ii. Cable size

Test results for the configuration option "Large" cover cables to a maximum diameter of 80 mm.

Test results for the configuration option "Medium" cover cables to a maximum diameter of 50 mm.

Test results for the configuration option "Small" cover cables to a maximum diameter of 21 mm.

Results of a tied bundle made from F-cables are valid for tied bundles with a diameter of less than or equal to the bundle tested made from cables of a diameter not greater than 21 mm.

Test results for cable G1 are valid for all non-sheathed cables with a diameter equal to or less than 17 mm, test results for cable G2 are valid for all non-sheathed cables with a diameter equal to or less than 24 mm.

iii. Cable support

Results obtained from tests where the supports pass through the seal are applicable to those situations where the support does not. The reverse of this situation does not apply.

The test results obtained using standard configurations for cable penetration systems are not valid for lidded cable trays/trunkings where the lid passes through the penetration seal (see also EN 1366-3:2009 E.3).

iv. Service group 6 according to EN 1366-3:2009 Table A.2

Test results achieved using service type H (conduit or tube) according to EN 1366-3:2009 Table A.2 are valid for all steel conduits and steel tubes up to a diameter of 16 mm.

Test results for tubes made from copper cover tubes made from steel but not vice versa.

Test results achieved using service type I according to EN 1366-3:2009 Table A.2 are valid for all plastic conduits and plastic tubes up to a diameter of 16 mm.

For rules regarding the pipe end condition see EN 1366-3:2009 E.1.5.5 for metal conduits or tubes and EN 1366-3:2009 E.2.7.3 for plastic conduits.

4.1.6. Large cable penetrations

Tests of rectangular seals cover circular seals of the same area but not vice versa.

The field of direct application rules according to EN 1366-3:2009 13.5, A.3.1, A.3.2, A.3.3 and A.3.4 apply.

The test results obtained using standard configurations for cable penetration systems are valid for any penetration size equal to or smaller than that tested, provided the total amount of cross sections of the cables (core and insulation) does not exceed 60 % of the penetration and the working clearances are not smaller than the minimum working clearances (a1, a2, see Figures B.1 to B.7 in EN 1366-3:2009) used in the test.

Results from tests with the specimen combination given in EN 1366-3:2009 B.1.3 are valid for all distance options and combinations. Results from tests according to option 1 or 2 are also valid for situations represented by option 3 but not vice versa.

4.1.7. Pipe penetrations

i. Metal pipes

- **Pipe diameter and pipe wall thickness**

Results of tests conducted as specified in the standard configurations may be interpolated for pipes with diameters and wall thicknesses between those tested, based upon the lowest result achieved (see Figure E.3 given in EN 1366-3:2009), provided the minimum pipe diameter is greater than or equal to 40 mm. If pipe A according to Figure E.3 given in EN 1366-3:2009 was not included in the test the maximum wall thickness is restricted to 14,2 mm.

- **Type of pipe material**

Results of tests conducted as specified in the standard configurations, on a particular pipe material covers pipe materials with a thermal conductivity lower than that tested, subject to the material having a melting point at least equal to that of the material tested or greater than the furnace temperature achieved at the required Classification period.

- **Pipe arrangement**

The results of a test conducted as specified in Option 1 of the standard configurations does not cover 'clusters' of pipes, unless the distances a3 (Figure E.1 given in EN 1366-3:2009) or a2 (Figure E.2 given in EN 1366-3:2009) are >100 mm in practice.

The results of a test conducted as specified in Option 2 of the standard configurations covers pipes with linear separation.

- **Number of pipes**

Results from a multiple penetration seal may be extended to a single penetration seal of the same type but not vice versa.

- **Pipe end configuration**

A test with pipe end configuration *U/C* covers all pipe end situations of Table 2 given in EN 1366-3:2009.

- **Pipes fitted with an insulation material having class A1 or A2 according to EN 13501- 1 made from glass wool or stone wool**

A test conducted on insulated pipes does not cover non-insulated pipes

A test conducted on non-insulated pipes covers the integrity criterion of pipes with interrupted insulation (cases LI and CI).

Thicknesses of insulation between tested dimensions (tests with a specific pipe dimension) for all arrangements of insulation according to EN 1366-3:2009 3.13 (cases CS, CI, LS and LI) may be used. Where EN 1366-3:2009 E.1.4.3 allows testing only at minimum insulation thickness, there is no limit for the maximum thickness of the insulation.

In case of floor applications the thickness and the length of an asymmetrical local insulation as shown in Figure E.5 given in EN 1366-3:2009 may be increased.

The length of a local insulation may be increased but may not be reduced

The density of the insulation may be increased but may not be reduced

A test conducted on pipes insulated with glass wool covers pipes insulated with stone wool but not vice versa.

If a single pipe was tested perpendicular to the supporting construction all angles between 90° and 45° are covered.

If a pipe was tested perpendicular to the supporting construction as well as oblique, the result is valid for each angle between a right-angle and the angle tested.

- **Pipes fitted with an insulation material having class B to F according to EN 13501-1**

A test conducted on insulated pipes does not cover non-insulated pipes.

A test conducted on non-insulated pipes does not cover insulated pipes.

Thicknesses of insulation between tested dimensions (tests with a specific pipe dimension) for all arrangements of insulation according to EN 1366-3:2009 3.13 (cases CS, CI, LS and LI) may be used. Where E.1.4.3 given in EN 1366-3:2009 allows testing only at minimum insulation thickness, there is no limit for the maximum thickness of the insulation.

The length of a local insulation may be increased but may not be reduced.

In the case where a pipe closure device is used, the maximum pipe closure device size within a design group determined according to EN 1366-3:2009 E.2.2.1 covers smaller sizes. If the thickness of the active component of the pipe closure device is changed (length remains constant) the maximum pipe closure device sizes from the design groups comprising the smallest and the largest pipe closure device sizes cover the size range / design groups in between provided the thickness of their active components is higher than the calculated value from the straight line that connects the maximum and minimum size in a thickness - pipe diameter diagram (see Figure E.8 given in EN 1366-3:2009). In this situation pipe diameter includes the insulation.

No extension to the range of pipe insulation materials is permissible beyond that tested.

If a pipe was tested perpendicular to the supporting construction as well as oblique, the result is valid for each angle between a right-angle and the angle tested.

ii. Plastic pipes

Results from a multiple penetration seal may be extended to a single penetration seal of the same type but not vice versa.

- **Pipe closure devices**

The maximum pipe closure device size within a design group determined according to EN 1366-3:2009 E.2.2.1 covers smaller sizes of this design group.

If the thickness of the active component of the pipe closure device is changed (length remains constant) the maximum pipe closure device sizes from the design groups comprising the smallest and the largest pipe closure device sizes cover the size range/design groups in between provided the thickness of their active components is higher than the calculated value from the straight line that connects the maximum and minimum size in a thickness - pipe diameter diagram (see Figure E.8 given in EN 1366-3:2009). This interpolation is only permissible if the inner diameter of the smallest pipe closure device included in the test is greater than or equal to 40 mm.

➢ **Pipe end configuration**

Test results obtained from tests with "plastic pipes" having both ends uncapped (see Table 43, test condition "U/U") are valid for all other test conditions of Table 32. Test results obtained from tests where a flue gas recovery system was used are valid for pipe end conditions U/C and C/C.

	Tested				
		U/U	C/U	U/C	C/C
Covered		Y	N	N	N
	C/U	Y	Y	N	N
	U/C	Y	Y	Y	Y
	C/C	Y	Y	Y	Y
Y:acceptable, N:not acceptable					

Table 32: Pipe end configuration.

➢ **Pipe and insulation material**

The pipe and/or insulation material range permitted is the range covered by the test including the critical pipe approach results where applicable.

Test results on pipes made from PVC-U according to EN 1329-1, EN 1453-1 or EN 1452-1 are valid for pipes made from PVC-U according to EN 1329-1, EN 1453-1 and EN 1452-1 as well as pipe made from PVC-C according to EN 1566-1.

Test results on pipes made from PE-HD according to EN 1519-1 or EN 12666-1 are valid for pipes made from PE according to EN 12201-2, EN 1519-1 and EN 12666-1, for pipes made from ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1.

➢ **Pipe wall thickness**

Pipe closure devices for pipes without insulation: The range between that tested is covered for a particular size of the pipe closure device. The maximum thickness tested with the maximum size within a design group (see E.2.2.1 given in EN 1366-3:2009) of pipe closure device sizes is valid for smaller sizes within the design group. For a design group not included in the test, either a linear interpolation between the corner points tested or a step approach as illustrated in Figure E.9 given in EN 1366-3:2009 may be used. Where the minimum wall thickness remains the same over several design groups, the design groups representing the maximum and minimum sizes cover the intermediate ones.

Seals other than pipe closure devices: Results of tests conducted as specified in the standard configurations may be interpolated for pipes with diameters between those tested and wall thicknesses between those tested.

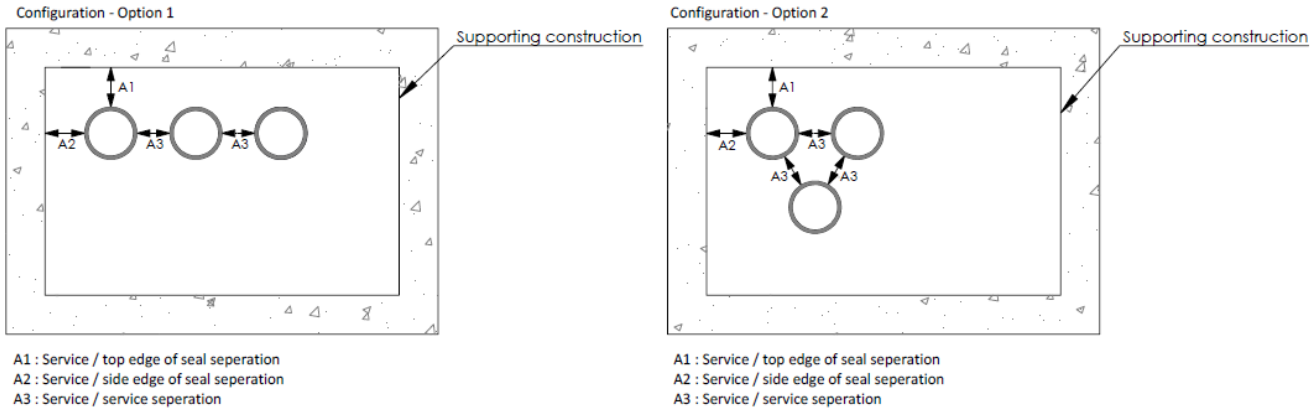
➢ **Pipe orientation**

If a pipe was tested perpendicular to the seal as well as oblique, the result is valid for each angle between a right-angle and the angle tested.

➢ **Separation**

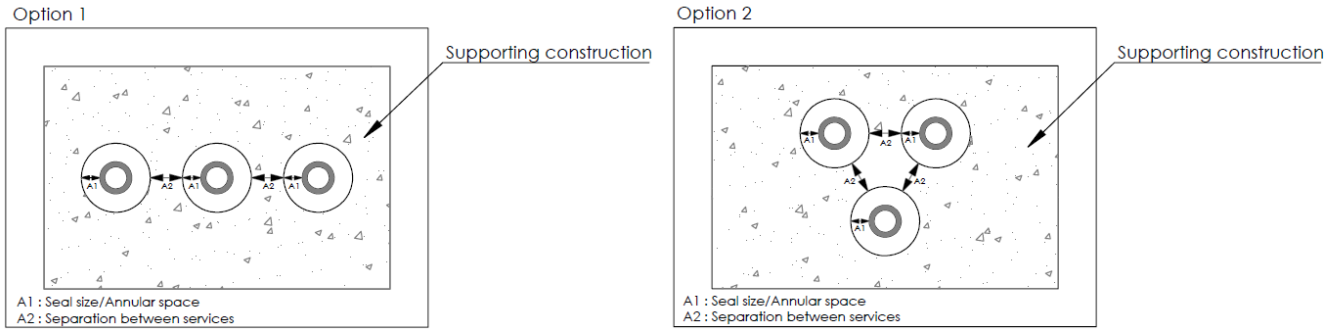
Separation for services in Multimastic C System

The following minimum distances between the apertures edges and between the pipes shall be applied (distance A1 to A3 according to Figure E.1 of EN 1366-3:2009):
− distance A_1 = 30 mm;
− distance A_2 = 30 mm;
− distance A_3 = 100 mm;



Separation for services directly through the floor

The following minimum distances between the apertures edges and between the pipes shall be applied (distance A1 to A3 according to Figure E.1 of EN 1366-3:2009):
− distance A_1 = 100 mm;
− distance A_2 = 100 mm;



For seals other than pipe closure devices the results of a test conducted as specified in Option 1 of the standard configurations does not cover 'clusters' of pipes, unless the distances a_3 (Figure E.1 given in EN 1366-3:2009) or a_2 (Figure E.2 given in EN 1366-3:2009) are > 100 mm in practice. The results of a test conducted as specified in Option 2 of the standard configurations covers pipes with linear separation.

➢ **Additional rules for pipes fitted with an insulation**

Pipe closure devices: In the case where a pipe closure device is used, the maximum pipe closure device size within a design group determined according to EN 1366-3:2009 E.2.2.1 covers smaller sizes. If the thickness of the active component of the pipe closure device is changed (length remains constant), the maximum pipe closure device sizes from the design groups comprising the smallest and the largest pipe closure device sizes cover the size range/design groups in between provided the thickness of their active components is higher than the calculated value from the straight line that connects the maximum and minimum size in a thickness - pipe diameter diagram (see Figure E.8 given in EN 1366-3:2009). In this situation, pipe diameter as shown in Figure E.9 equals the sum of the actual pipe diameter and twice the thickness of the insulation.

Tests on non-insulated pipes do not cover insulated pipes.

Tests with sustained insulation cover interrupted insulation but not vice versa. Tests with sustained insulation do not cover interrupted insulation where the pipe closure device is in direct contact with the pipe.

Seals other than pipe closure devices: The thickness of the insulation may be interpolated between tested dimensions.

4.1.8. Service Supporting Construction

The standard cable ladders/trays as defined in EN 1366-3:2009 Annex A cover metal trays with a melting point higher than the furnace temperature at the Classification time, e.g. stainless steel, galvanised steel. For all other ladders/trays (e.g. plastic, aluminium) separate evidence is necessary.

Steel ladders/trays with organic coatings are covered by the standard ladders/trays if their overall Classification is minimum A2 according to EN 13501-1.

The distance from the surface of the separating element to the nearest support position for services shall be as tested or less.

4.1.9. Seal size and distances

The test results obtained using standard wall and floor configurations for penetration seals are valid for any penetration seal size (in terms of linear dimensions) equal to or smaller than that tested, provided the total amount of cross sections of the services (including insulation) does not exceed 60 % of the penetration area, the working clearances are not smaller than the minimum working clearances (as defined in EN 1366-3:2009-Annexes A, B, E and F) used in the test and a blank penetration seal of the maximum seal size desired was tested in addition.

A blank penetration seal test may be omitted for mortar seals, seals made from rigid boards and mineral wool boards of a density of minimum 150 kg/m^3 and for single service penetration seals.

For floor constructions, results from tests with a penetration seal length of minimum 1 000 mm apply to any length as long as the perimeter length to seal area ratio is not smaller than that of the tested penetration seal.

The distance between a single service and the seal edge (annular space, e.g. a1 according to EN 1366-3:2009-Figures B.7 and E.2) shall remain within the tested range.

5. LIMITATIONS

This classification report does not represent any type approval or certification of the product.

Prepared by:

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Yiğitcan KEPİR
Person in charge of tests

Efectis

Approved by:

.....
Ali BAYRAKTAR
Laboratory Manager