Laboratory for Fire Safety

Classification of fire resistance in accordance with EN_13501-2:2023 of pipe and cable penetrations seals through a CLT floor fitted Mulcol® materials

Report incorporates:

Mulcol® Multimastic C system
Mulcol® Multicollar Slim
Mulcol® Multisealant GR
Mulcol® Multimastic SP
Mulcol® Multiwrap
Mulcol® Multidisc

Report number YA 2746-1E-RA-001 dated 1 December 2023

Laboratory for Fire Safety

Classification of fire resistance in accordance with EN_13501-2:2023 of pipe and cable penetrations seals through a CLT floor fitted Mulcol® materials

Report for penetration seals - CLT floor application

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Notified body	NB 2264
Product name	Penetrations seals fitted with Mulcol ® materials for services through a CLT floor
Report number	YA 2746-1E-RA-001
Date	1 December 2023
Reference	HL/RO//YA 2746-1E-RA-001
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1 Introduction

This classification report defines the fire resistance classifications assigned to several pipe and cable penetration seals fitted with Mulcol® materials applied in a CLT floor. This report summarizes the direct and extended field of application with the applicable classifications for several penetration seals.

The systems were tested in three different laboratories:
- Peutz Laboratory for Fire Safety, the Netherlands (NB 2264);
- Efectis Era Avrasya, Türkiye (NB 2184);
- Efectis, the Netherlands (NB 1234).

All tests in accordance with the standard heating curve and in accordance with the procedures given in EN 13501-2:2023, further referenced as EN 13501-2.

For this type of measurements the Laboratory for Fire safety has been accredited by the Dutch "Raad voor Accreditatie" (RvA).

The RvA is member of EA MLA (**EA MLA**: **E**uropean **A**ccreditation Organisation **M**ulti**L**ateral **A**greement: http://www.european-accreditation.org).

EA: "Certificates and reports issued by bodies accredited by MLA and MRA members are considered to have the same degree of credibility, and are accepted in MLA and MRA countries."

2 Normative references and materials used

This classification report incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereinafter in Table 2.1.

t2.1 Used publications

Reference	Summary of title
EN 13501-2:2023	Fire classification of construction products and building elements – classification using data from fire resistance tests.
EN 1366-3:2009	Fire resistance tests for service installations – part 3: penetration seals.
EN 1366-3:2021	Fire resistance tests for service installations – part 3: penetration seals.
EN 1363-1:1999	Fire resistance tests – Part 1 General requirements.
EN 1363-1:2012	Fire resistance tests – Part 1 General requirements.
EN 1363-1:2020	Fire resistance tests – Part 1 General requirements.
EN 10255	Non alloy steel tubes suitable for welding or threading – Technical delivery conditions.
EN 12449	Copper and copper alloys – Seamless, round tubes for general purposes.
EN 1329-1	Plastic piping systems for soil and waste discharge within the building structure – unplasticized poly (vinyl chloride) PVC-U.
EN 1452-1	Plastic piping systems for drinking water within the building structure – unplasticized poly (vinyl chloride) PVC-U.
EN 1453-1	Plastic piping systems with structured-wall pipes inside buildings – unplasticized poly (vinyl chloride) PVC-U.
DIN 8061	Unplasticized polyvinyl chloride (PVC-U) pipes – general quality requirements and testing.
DIN 8062	Unplasticized polyvinyl chloride (PVC-U) pipes – dimensions.
EN 1566-1	Plastic piping systems for soil and waste discharge within the building structure – chlorinated poly (vinyl chloride) PVC-C.
EN ISO 15493	Plastic piping systems for industrial applications – acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) - specifications for components and the system - metric series.
EN ISO 15494	Plastic piping systems for industrial applications – polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), cross-linked polyethylene (PE-X), polypropylene (PP).
DIN 19531-10	Pipes and fittings made of unplasticized polyvinyl chloride (PVC-U) socket for waste and soil discharge systems inside buildings.

This classification report incorporates different Mulcol® Materials. For clearance, the materials used are listed in Table 2.2. When available, the existing European Technical Approval (ETA) and the reaction to fire classification according to EN 13501-1 are given.

t2.2 Used Mulcol® materials and available information

Commercial name	Type of material	Number and date European Technical Approval (ETA)	Reaction to fire classification (EN 13501-1)
Mulcol® Multimastic C system	Mineral wool penetration seal system	ETA-23/0050 dated August, 2023	E
Mulcol® Multicollar Slim	Pipe closure device	ETA-20/1322 dated January 1, 2021	E
Mulcol® Multimastic SP	Acrylic sealant	ETA-23/0060 dated October 13, 2023	E
Mulcol® Multisealant GR	Graphite sealant	ETA-23/0055 dated October 13, 2023	E
Mulcol® Multidisc	Intumescent insulation material	ETA-20/1321 dated January 1, 2021	E
Mulcol® Multiwrap	Intumescent wrap	ETA-23/0054 dated September 29, 2023	C-s1, d0

3 Details of the classified system

3.1 General

The systems, several penetration seals in a horizontal CLT floor, are defined as test specimens of fire resistant service installations in accordance with EN 1366-3:2021, further referenced as EN 1366-3.

The systems were tested in several floors which incorporated other elements. These other elements had no influence on the test results. The systems were tested in accordance with Annex A, C and E of EN 1366-3 to determine the fire resistance of the particular system elements passing through the Mulcol® materials.

The systems additionally were tested in accordance with Annex F of EN 1366-3 to determine and assess in particular the possible interactions between the various types of services / service parts of the penetration seal when installed / arranged in one penetration seal with a particular aperture part of the penetration seal. The tested elements incorporated in the penetrations are selected by the usage of the critical service approach in accordance with Annex G of EN 1366-3.

Careful consideration has been made for the use of historical data of fire resistance tests in accordance with EN 1366-3:2009. The field of application of the standard EN 1366-3:2009 has been checked and compared to the current EN 1366-3:2021, no contradiction is found.

3.2 Product description

The Mulcol® Multimastic C systems are used for sealing mixed penetration seals. The basic material is Mulcol® Multimastic FB1 rock wool panel with a density of at least 150 kg/m^3.

One system is available:

- system Mulcol® Multimastic FB1: this system is made out of two layers with a thickness each 50 mm (total thickness of 100 mm, 2 x 50 mm, no cavity). The boards are treated with coating Mulcol® Multimastic C. The coating is applied on the outwards pointing faces of each panel (no coating between the boards).

It's allowed to seal the following elements with the Mulcol® Multimastic C system:
- sheathed electrical cables;
- non sheathed electrical cables;
- telecommunication cables;
- cable trays (perforated and non-perforated);
- cable ladders;
- steel wire mesh cable trays (baskets);
- plastic pipes, PP-R pipes silent pipes;
- aluminium composite pipes;
- metal pipes;
- drinks combi pipe.

In this report, several penetrations directly through the CLT floor containing the following Mulcol® sealing materials are classified and available:
- Mulcol® Multicollar Slim, intumescent pipe collar with stainless steel casing;
- Mulcol® Multisealant GR, intumescent graphite sealant;
- Mulcol® Multimastic SP, acrylic sealant;
- Mulcol® Multidisc, intumescent insulation material;
- Mulcol® Multiwrap, intumescent pipe wrap.

Details of the mixed penetration seals tested are given in Chapter 4.

4 Test results in support of the classification

4.1 Used reports

An overview of the test reports used is given in Table 4.1.

t4.1 Used reports

Name of laboratory	Name of client	Report reference number and date	Used methods	Test number
Peutz bv	Mulcol International B.V.	Test report Y 1732-1E-RA-001 dated January 31, 2017	EN 1363-1:1999 EN 1366-3:2009	5
Peutz bv	Mulcol International B.V.	Test report Y 1732-2E-RA dated June 15, 2017	EN 1363-1:1999 EN 1366-3:2009	5
Peutz bv	Mulcol International B.V.	Extended application report YD 1518-1E-1E-RA October 20, 2017	EN 15882-3:2009 EN 15725:2010 / AC:2012	Multiple
Peutz bv	Mulcol International B.V.	Test report YB 1732-1E-RA dated February 7, 2017	EN 1363-1:1999 EN 1366-3:2009	7
Peutz bv	Mulcol International B.V.	Test report YB 1732-2E-RA-001 dated June 15, 2017	EN 1363-1:1999 EN 1366-3:2009	7
Efectis Era Avrasya	Mulcol International B.V.	Test report RFTR200008 dated May 15, 2020	EN 1363-1:2012 EN 1366-3:2009	10
Peutz bv	Mulcol International B.V.	Test report Y 1979-4E-RA-002 dated October 5, 2020	EN 1363-1:1999 EN 1366-3:2009	13
Peutz bv	Mulcol International B.V.	Test report Y 2504-3E-RA-001 dated July 11, 2022	EN 1363-1:1999 EN 1366-3:2009	21
Peutz bv	Mulcol International B.V.	Test report Y 2435-2E-RA-001 dated July 11, 2022	EN 1363-1:1999 EN 1366-3:2009	23
Peutz bv	Mulcol International B.V.	Test report Y 2559-2E-RA-001 dated July 11, 2022	EN 1363-1:2020 EN 1366-3:2021	25
Peutz bv	Mulcol International B.V.	Extended application report YB 1979-1E-RA-001 November 7, 2022	EN 15882-3:2009 EN 15725:2010 / AC:2012	Multiple
Peutz bv	Mulcol International B.V.	Test report Y 2560-2E-RA-001 dated October 21, 2022	EN 1363-1:2020 EN 1366-3:2021	28
Peutz bv	Mulcol International B.V.	Test report Y 2619-3E-RA-001 dated October 21, 2022	EN 1363-1:2020 EN 1366-3:2021	30
Peutz B.V.	Mulcol International B.V.	Test report Y 2746-2E-RA-001 dated November 22, 2023	EN 1363-1:2020 EN 1366-3:2021	35

The client has stated that the provided report may be used for this classification report.

General information about the tested standard large mixed penetration seals is given in Paragraph 4.2. For clarity, the numbering of the penetration elements is taken from the test report mentioned in Table 4.1. The number before the dot represents the test number and the number behind the dot represents the penetration number (for example 13.5 means

penetration 5 of test 13). A brief description of test results relevant for this classification report is given in Paragraphs 4.3 to 4.4.

4.2 General details for Mulcol® Multimastic C systems (FB1)

In several tests, standard cable penetration seals in accordance with Annex A and standard mixed penetration seals in accordance with Annex F were tested. Within the standard configurations for mixed penetration seals the services given in Paragraph 3.2 are tested. The standard configurations are derived from EN 1366-3:2009 and EN 1366-3:2021. The tested elements incorporated in the penetrations for Annex F were selected using the critical service approach in accordance with Annex G of EN 1366-3.

Furthermore, several penetration element were tested in accordance with Annex C and E of EN 1366-3 to determine the fire resistance of the particular system elements passing through the Mulcol® Multimastic C systems.

The floors consisted of a CLT floor with a thickness of 140 mm.

In the systems made out of Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), the coating Mulcol® Multimastic C is applied with a thickness of 1.0 mm (wet film thickness, further referenced as WFT) on the outwards pointing faces of each panel (no coating between the boards).

It's allowed to have joints between the different Mulcol® Multimastic board elements. The joints and the aperture edge are glued together with Mulcol® Multimastic SP.

In general the distance to the first support was:
- cables and cable carriers: distance 250 mm on top of the floor;
- metal pipes: distance 450 mm on top of the floor;
- multiple penetrations and other: distance 450 mm on top of the floor;
- aluminium composite pipes: distance 450 mm on top of the floor;
- plastic pipes: distance 450 mm on top of the floor.

4.3 Results Mulcol® Multimastic FB1 (2 x 50 mm, no cavity)

The summary of the test results relevant for this classification are shown in Table 4.2. For a full description of the test results see the reports summarized in Table 4.1.

t4.2 Relevant test results in minutes (Mulcol® Multimastic FB1 - 2 x 50 mm, no cavity)

Test method	**Parameter**	**5.45**	**5.46**	**5.47**	**5.48**	**5.50**	**5.51**	**5.52**	**5.54**	**5.56**
EN 1366-3:2009	Integrity (E)	96[1]	96[1]	96[1]	96[1]	96[1]	65	96[1]	62	84
	Insulation (I)	34	33	57	56	96[1]	65	96[1]	56	50
Test method	**Parameter**	**5.57**	**5.58**	**7.41**	**7.42**	**7.43**	**7.44**	**10.1b**	**10.1c**	**10.1d**
EN 1366-3:2009	Integrity (E)	96[1]	96[1]	130	133[1]	133[1]	68	101	120[1]	120[1]
	Insulation (I)	96[1]	96[1]	21	104	56	48	74	120[1]	118
Test method	**Parameter**	**10.1e**	**10.1f**	**10.1g**	**10.1h**	**10.2a**	**10.2b**	**10.2c**	**10.2d**	**10.2e**
EN 1366-3:2009	Integrity (E)	120[1]	120[1]	120[1]	101	120[1]	120[1]	120[1]	120[1]	110
	Insulation (I)	106	116	109	100	120[1]	120[1]	120[1]	120[1]	109
Test method	**Parameter**	**10.2f**	**10.2g**	**10.2h**	**10.3a**	**10.3b**	**10.3c**	**10.3d**	**10.3e**	**10.3f**
EN 1366-3:2009	Integrity (E)	120[1]	120[1]	120[1]	120[1]	120[1]	90	120[1]	108	120[1]
	Insulation (I)	120[1]	120[1]	56	69	116	64	69	103	90
Test method	**Parameter**	**10.3h**	**10.5**	**10.6**	**10.7**	**10.8**	**10.9**	**10.10**	**10.16**	**13.3**
EN 1366-3:2009	Integrity (E)	120[1]	120[1]	120[1]	75	53	68	84	120[1]	120[1]
	Insulation (I)	115	60	111	71	49	50	71	36	120[1]
Test method	**Parameter**	**13.3a**	**13.3a1**	**13.3a2**	**13.3a3**	**13.3a4**	**13.3a5**	**13.3a6**	**13.3a7**	**13.3a8**
EN 1366-3:2009	Integrity (E)	120[1]	120[1]	120[1]	120[1]	120[1]	120[1]	120[1]	120[1]	120[1]
	Insulation (I)	109	110	110	110	110	62	108	79	65
Test method	**Parameter**	**13.3b**	**21.1**	**21.2**	**21.7**	**21.7a**	**21.7b**	**21.8**	**21.8a**	**21.8b**
EN 1366-3:2009	Integrity (E)	120[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]
	Insulation (I)	60	105	122[1]	122[1]	64	84	122[1]	122[1]	122[1]
Test method	**Parameter**	**21.8c**	**21.8d**	**21.9**	**21.9a**	**21.9b**	**21.9c**	**21.11**	**21.11a**	**21.11b**
EN 1366-3:2009	Integrity (E)	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]
	Insulation (I)	122[1]	122	122[1]	122[1]	95	67	122[1]	122[1]	122[1]
Test method	**Parameter**	**21.11c**	**21.11d**	**21.12**	**21.12a**	**21.12b**	**21.12c**	**21.12d**	**21.12d1**	**21.11d2**
EN 1366-3:2009	Integrity (E)	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]
	Insulation (I)	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	68	63	68
Test method	**Parameter**	**21.12d3**	**21.12d4**	**21.12d5**	**21.12e1**	**21.12e1**	**21.13**	**21.13a**	**28.2**	**28.2a**
EN 1366-3:2009	Integrity (E)	122[1]	122[1]	122[1]	122[1]	122[1]	122[1]	122[2]	242[2]	242[2]

1 Criterion passed at the end of the test
2 Criterion passed at the end of the test

	Insulation (I)	68	68	68	122[1]	122[1]	122[1]	122[2]	121[2]	137
Test method	**Parameter**	**28.2b**	**28.2c**	**30.2**	**30.2a**	**30.2b**	**30.2c**	**30.2**	**30.2d**	**30.2e**
EN 1366-3:2009 / EN 1366-3:2021	Integrity (E)	242[2]	105	242[2]	242[2]	242[2]	242[2]	242[2]	242[2]	242[2]
	Insulation (I)	47	96	242[2]	242[2]	242[2]	242[2]	242[2]	242[2]	242[2]
Test method	**Parameter**	**35.1**	**35.2a**	**35.2a1**	**35.2a2**	**35.2a3**	**35.2a4**	**35.2c**	**35.2d**	**35.3a**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]
	Insulation (I)	120[2]	120[2]	107	79	89	120[2]	120[2]	120[2]	120[2]
Test method	**Parameter**	**35.3b**	**35.3c**	**35.3d**	**35.3e**					
EN 1366-3:2021	Integrity (E)	120[2]	53	120[2]	120[2]					
	Insulation (I)	120[2]	53	117	11					

4.4 Results directly through the CLT floor

The summary of the test results relevant for this classification are shown in Table 4.3. full description of the test results see the reports summarized in Table 4.1.

t4.3 Relevant test results in minutes (penetration seals directly through the CLT floor)

Test method	**Parameter**	**35.4a1**	**35.4a2**	**35.4b1**	**35.4b2**	**35.4b3**	**35.4b4**	**35.4c1**	**35.4c2**	**35.4c3**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]
	Insulation (I)	120[2]	120[2]	120[2]	117	120[2]	90	99	50	120[2]
Test method	**Parameter**	**35.4c4**	**35.4c5**	**35.4d1**	**35.4d2**	**35.4d3**	**35.4d4**	**35.4e1**	**35.4e2**	**35.4e3**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	105	106
	Insulation (I)	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	105	106
Test method	**Parameter**	**35.4e4**	**35.4e5**	**35.4e6**	**35.4e7**	**35.4e8**	**35.4e9**	**35.4e10**	**35.4e11**	**35.4e12**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	95	120[2]	120[2]	120[2]	120[2]	16	71
	Insulation (I)	120[2]	120[2]	95	120[2]	120[2]	120[2]	120[2]	15	59
Test method	**Parameter**	**35.4f1**	**35.4f2**	**35.4f3**	**35.4f4**	**35.4g1**	**35.4g2**	**35.4g3**	**35.4g4**	**35.4g5**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]	120[2]	120[2]	120[3]	120[2]	120[2]	120[2]
	Insulation (I)	120[2]	120[2]	120[2]	120[2]	120[2]	39	120[2]	107	120[2]
Test method	**Parameter**	**35.4g6**	**35.4i1**	**35.4i2**	**35.4i3**	**35.4j1**	**35.4j2**	**35.4m1**	**35.4m2**	**35.4m3**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[3]
	Insulation (I)	108	120[2]	120[2]	120[2]	120[2]	90	120[2]	72	120[2]
Test method	**Parameter**	**35.4m4**	**35.4m5**	**35.4n1**	**35.4n2**	**35.4n3**	**35.4n4**	**35.4n5**	**35.4n6**	**35.4n7**
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]	120[2]
	Insulation (I)	120[2]	114	120[2]	120[2]	108	80	120[2]	6	120[2]
Test method	**Parameter**	**35.4n8**	**35.4w1**	**35.4w2**						
EN 1366-3:2021	Integrity (E)	120[2]	120[2]	120[2]						
	Insulation (I)	120[2]	120[2]	120[2]						

5 Classification and field of application for floor application

5.1 Reference of classification

This classification has been carried out in accordance with Paragraph 7.5.8 of EN 13501-2 and is valid for the field of application as given in this classification document. The requested field of application is based on the direct field of application in accordance with EN 1366-3 and the extended field of application in accordance with EN 15882-3:2009, further referenced as EN 15882.

Note: As stated in the EN 1366-3, if several penetration seals are included in a single test construction, then the performance of each penetration seal shall be judged separately. Therefore the applicable classifications of the Mulcol® Multimastic C system are stated in different Chapters 5.3 to 5.6.

The classifications given in this Chapter also cover lower classification classes with the same combinations of criteria (for example EI 60 also cover EI 45 and lower). The classifications given in this Chapter with the criteria E and I (EI) also cover the same classification with only the criterion E (for example EI 60 also covers E 60).

5.2 General conditions

In this Chapter the general conditions are given of the classified systems Chapter 5.3 to 5.6. The fire resistance classifications are valid with a fire exposure from below.

5.2.1 Orientation

The classifications are valid for elements passing through perpendicular to a horizontal CLT floor.

Single metal pipes with a high melting point (further referenced as hmp) or single coated metal pipes (hmp) may pass through floors under an angle between 90 and 45 degrees, in all directions. In case of an insulated metal pipe with a minimum insulation length, the length of the insulation shall be the same as classified, measured from the shortest length from the separating element. Every metal with a melting temperature ≥ 1153 °C is acceptable, otherwise see table H.1 of EN 1366-3:2021 for furnace temperature at intended classification time. These rules apply specifically for Chapter 5.6.

5.2.2 CLT floor

The penetrations may be applied in cross-laminated timber floors with a minimum thickness of 140 mm (density 350 kg/m^3 or heavier). The CLT floor consists of 5 layers (40 mm+20 mm+20 mm+20 mm+40 mm) and is glued with a PU adhesive.

The Mulcol® Multimastic C systems may be used for all CLT floor constructions, if their construction is in accordance with the rules given below.

Field of direct application rules for CLT floor constructions.
Constructions covered:

- CLT floor constructions as tested;
- CLT floor constructions have the same fire resistance class or higher;
- CLT floor constructions are classified in accordance with EN 13501-2;
- CLT floor constructions are made of the same solid wood slabs than that tested;
- The solid wood slabs have reaction to fire class D-s2, d0 or higher;
- The strength class in accordance with EN 338 of the timber boards is equal or higher than C24 for the cover layers and for the inner layer C16 (≤ 10%) C24 (≥ 90%);
- The charring rate in accordance with EN 1995-1-2 of the solid wood slab is equal or higher than tested;
- The thickness of the solid wood slab is 140 mm or higher.

f5.1 Build-up CLT

Figure 1: Principle structure of the solid wood slab

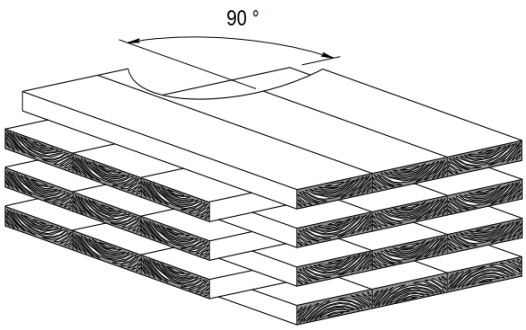
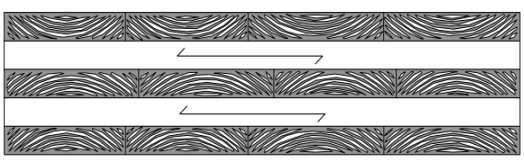


Figure 2: Principle structure of cross laminated timber with 5 layers



5.2.3 Distance to wall, corner or different floor

A distance of at least 200 mm from the edge of the aperture of the penetration seal to a different floor, corner, wall or transfer to another type of floor (adjacent constructions) shall be taken into account. A distance of at least 100 mm between the aperture edges of penetration seals shall be taken into account.

5.2.4 Thickness of the coating Mulcol® Multimastic C

The thickness of the coating Mulcol® Multimastic C is given as a wet film thickness, also referenced as WFT. The dry film thickness in practice can be slightly thinner after drying of the coating.

In the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), the coating Mulcol® Multimastic C is applied with a thickness of at least 1.0 mm (WFT) on the outwards pointing faces of each panel (no coating between the boards).

It is not necessary to apply Mulcol® Multimastic C over the circumferential over the opening of the mineral wool of the adjacent construction. Nevertheless if this coating is desired for optical reasons it is allowed to add Mulcol® Multimastic C.

It's allowed to have joints between the different Mulcol® Multimastic board elements. The joints and the aperture edges are glued together with Mulcol® Multimastic SP.

When it is mandatory to add coating Mulcol® Multimastic C on penetration elements such as cables it is described in the specific Chapter 5.3.1.

5.2.5 Size Mulcol® Multimastic FB1 (2 x 50 mm, no cavity)

For the maximum size see Table below, the seal may be smaller, there is no limit in filling degree of the penetration area (e.g. up to 100%), taking into account the minimum working distances.

It's allowed to have joints between the different Mulcol® Multimastic board elements. The joints and the aperture edge are glued together with Mulcol® Multimastic SP.

For the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), a classification according to the following combinations of performance parameters and classes apply.

Fire resistance classification **Mulcol® Multimastic C system (FB1 2 x 50 mm, no cavity)**	
Maximum seal size 500 x 800 mm **Maximum circular seal size Ø713 mm**	**EI 120**

The fire resistance classifications are applicable to a placement at the exposed side of the floor.

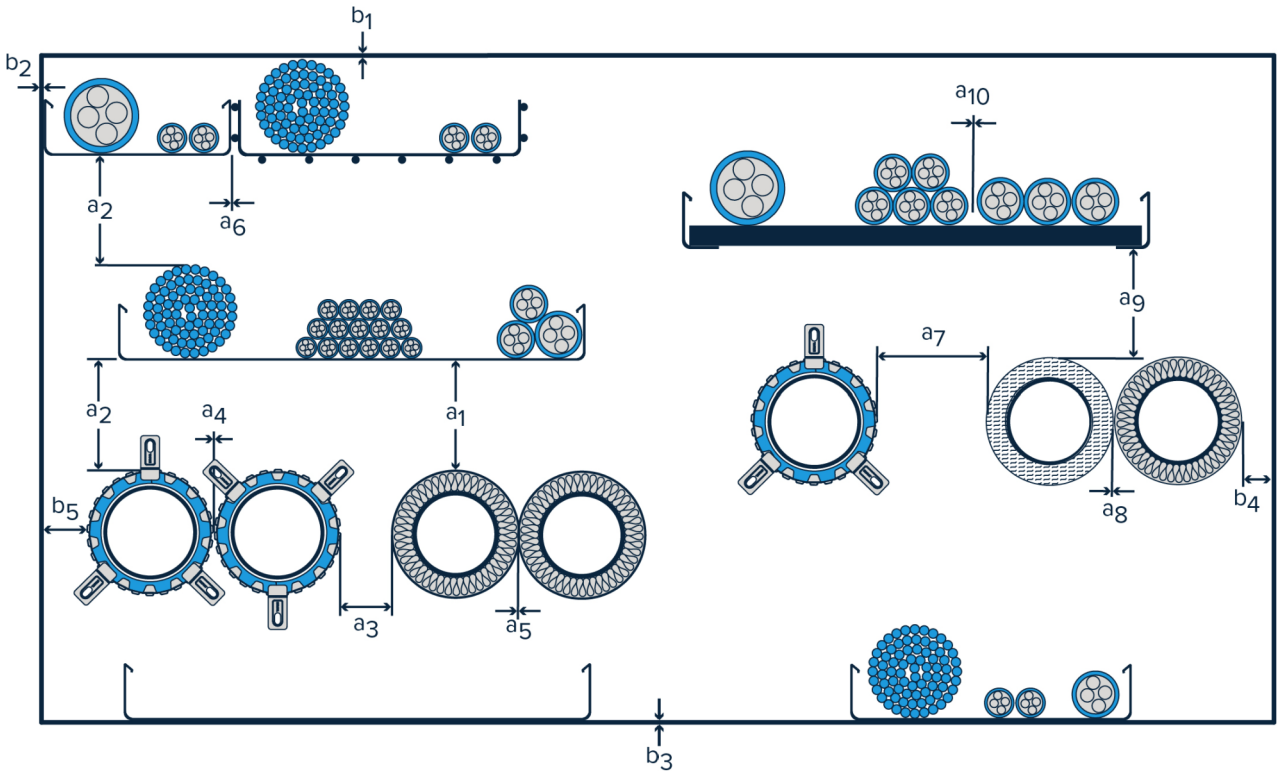
The fire resistance classification above is given for the Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) seal itself and is leading with respect to the penetration elements given in the Chapters 5.3 to 5.6. It must be handled as the maximum performance class of a mixed seal, envisaged performance classes of penetrating elements must be lower or equal.

5.2.6 Distances inside systems FB1 (2 x 50 mm)

For the mutual distances a_1 to a_{10} and b_1 to b_5 between the cables / cable carriers, conduits and pipes see Table 5.1. In Table 5.1 the standard configuration for a large mixed penetration seal is shown. The configuration in practice may derive from this Figure as long as the mutual distances are applied.

t5.1 Distances cables, cable carriers, conduits and pipes (with combustible or non-combustible insulation)

Description distance (see Figure RF/RW-Annex F on the next page)	Mutual general distances (mm)
Distance metal pipe with non-combustible insulation to cable / cable carrier / conduit – a_1	30
Distance plastic pipe to cable / cable carrier / conduit – a_2	30
Distance metal pipe with non-combustible insulation to plastic pipe – a_3	25
Mutual distance plastic pipes – a_4	0
Mutual distance metal pipes non-combustible insulation – a_5	0
Mutual distance cable carriers – a_6	0
Distance plastic pipe and metal pipe with combustible insulation – a_7	25
Distance metal pipe with non-combustible insulation to metal pipe with combustible insulation – a_8	0
Distance metal pipe with combustible insulation to cable / cable carrier / conduit – a_9	30
Mutual distance cables in a row – a_{10}	0
Distance cable / cable carrier / conduit to adjacent construction – b_1	40
Distance cable / cable carrier / conduit to adjacent construction – b_2	40
Distance cable carrier to adjacent construction – b_3	40
Distance metal pipe with non-combustible insulation to adjacent construction – b_4	50
Distance plastic pipe to adjacent construction – b_5	50



Mutual distances – CLT

a_1	Distance between cables/cable trays and metal pipes
a_2	Distance between cables/cable trays and plastic pipes
a_3	Distance between metal pipes and plastic pipes
a_4	Distance between plastic pipes
a_5	Distance between metal pipes with non-combustible insulation
a_6	Distance between cable trays
a_7	Distance between plastic pipes and pipes with combustible insulation
a_8	Distance between pipes with non-combustible insulation and pipes with combustible insulation
a_9	Distance between cables/cable trays and pipes with combustible insulation
a_{10}	Distance between cables stacked together or in a row
b_1	Distance between cables/cable trays and the adjecent construction
b_2	Distance between cables/cable trays and the adjecent construction
b_3	Distance between cables/cable tray and the adjecent construction
b_4	Distance between metal pipes and all adjacent constructions
b_5	Distance between plastic pipes and all adjacent constructions

Service support construction
First support for all services at 450 mm, except cable trays at 250 mm.

American projection	Scale : -	Company : Mulcol International B.V.	FW/RW-Annex F
	Unit of measure : mm	Department : Research & Development	A4
	Date : 10-2-2021	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Mutual distances C L T

5.2.7 Cable carriers and cables

The classifications are valid for cable penetrations seals in a horizontal floor and cable carriers passing through perpendicular to the floor. The classifications are valid for all metal cable carriers (trays, baskets and / or ladders) with a melting point higher than the furnace temperature at the classification time (for example stainless or galvanised steel). The cable carriers may be omitted. No lid on top of the cable carrier is allowed passing through the sealing system.

Every metal with a melting temperature ≥ 1153 °C is acceptable, otherwise see table H.1 of EN 1366-3:2021 for furnace temperature at intended classification time.

The cables used in the tests comply to the list of cables used for the standard configuration, Table A.4 of EN 1366-3:2021, see Table 5.2.

t5.2 Cables for standard configuration (from EN 1366-3)

Cable	Cable type	Service group	Number of cables	Cable dimension	Designation	Standard	Insulation / sheath material	Diameter range [mm]	Nominal weight [kg/km][a, b]
A1	small sheathed	1	3 [c]	5 x 1,5	see Table A.6	HD 603.3	PVC / PVC	14 [a, b]	300
A3	small sheathed	1	3 [c]	5 x 1,5	see Table A.6	HD 604.5	PE-X / EVAC	13 [a,e] (≤14,0 [e])	230
B	small sheathed	1	2	1 x 95	see Table A.6	HD 603.3	PVC / PVC	18 - 21 [a, f]	1150
C1	medium sheathed	2	1 c	4 x 95	see Table A.6	HD 603.3	PVC / PVC	40 - 47 [a, f]	5300
C3	medium sheathed	2	1	4 x 95	see Table A.6	HD 604.5	PE-X / EVAC	42 [a,d] (≤45,5 [e])	4050
D1	large sheathed	3	1	4 x 185	see Table A.6	HD 603.3	PVC / PVC	52 [a, g]	9900
D3	large sheathed	3	1	4 x 185	see Table A.6	HD 604.5	PE-X / EVAC	58 [a,d] (≤62,5 [e])	7750
E	medium sheathed	2	2	1 x 185	see Table A.6	HD 603.3	PVC / PVC	23 - 27 [a, f]	2050
F	cable bundle, (telecommunication cable, optional)	4	1 tied bundle of 100 mm diameter [h]	20 x 2 x 0,6 screened [k]		-	PE / PE [m]	15 - 17 [a, n, o]	275 to 320 [o]
G	non-sheathed (wire, optional)	5	2	1 x 185	H07V-R	EN 50525-2-31	PVC / -	19,3 - 23,3 [a, p]	1890

NOTE For an illustration of the construction of the tables see Figure H.1

[a] For information only
[b] Average value from technical data sheets of manufacturers
[c] For penetration seals with a width smaller than 600 mm the number of cables shall be reduced to 6
[d] Nominal diameter of HD 604.5C
[e] Maximum diameter of HD 604.5C
[f] Values for minimum and maximum diameter from HD 603.3G
[g] Nominal diameter from HD 603.3L
[h] Depending on the actual diameter of the single cables 30 to 43 cables may be necessary to produce a tied bundle of 100 mm diameter
[k] Construction: solid bare copper conductors of 0,6 mm diameter, core insulation of polyethylene, cores stranded to quads and the quads stranded to bundles, one layer of plastic foil, static screen of plastic-laminated aluminium tape, polyethylene outer sheath. See also H.4.1.2.
[m] PE = Polyethylene, solid or cellular
[n] Values from technical data sheets of manufacturers; actual values shall be used to calculate the number of cables necessary to form a tied bundle of 100 mm diameter
[o] The given value relates to the single cable, not the cable bundle, and depends on the construction details of the cable (solid-PE or cellular PE)
[p] Values for minimum and maximum diameter from EN 50525-2-31

5.2.8 Distance to first support

The minimum distance to the first support shall be:

- cables and cable carriers: distance 250 mm on top of the floor;
- metal pipes: distance 450 mm on top of the floor;
- multiple penetrations and other: 450 mm on top of the floor;
- aluminium composite pipes: distance 450 mm on top of the floor;
- plastic pipes: distance 450 mm on top of the floor.

5.2.9 Pipe end configuration

The classification of plastic, PP-R, silent and aluminium composite pipes applies to a certain pipe end configuration. In Table 5.3, the configuration to be tested versus intended use is given.

t5.3 Pipe end configuration versus intended use

Intended use	Plastic and aluminium composite pipers	
	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

The classification of metal pipes applies to a certain pipe end configuration. In Table 5.4, the configuration to be tested versus intended use is given.

t5.4 Pipe end configuration versus intended use

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

*Shown by test or calculation (e.g. Eurocodes)

5.2.10 Means of fixing Mulcol® Multicollar Slim

The Mulcol® Multicollar Slim shall be attached to the underside of the rock wool of the Mulcol® Multimastic C system using the Mulcol® Multiclip and Mulcol® Multiscrew FB40. In Table 5.5, the exact assembly instructions are given sorted by installation diameter of the collar (outer diameter of the pipe, cable or insulation).

It is also allowed to use rods and bolts M6.

t5.5 Assembly instructions fixing

Outer diameter pipe or cable (mm)	Number of Mulcol® Multiclips	Allowed fastenings
≤ 90	2	Mulcol® Multiscrew FB 40 or threaded rod and bolts M6
> 90 and < 160	3	

5.3 Cables – Multimastic FB1 (2 x 50 mm, no cavity)

The Mulcol® Multimastic FB1 board system has a total thickness of 100 mm (2 x 50 mm, no cavity). For the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), a classification according to the following combinations of performance parameters and classes applies.

The envisaged fire resistance classification needed in practise must correspond to both the fire resistance of the penetrating element as the Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) system in Paragraph 5.2.5.

The drawings in this Chapter show the location of the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) at the lowest position in the floor.

5.3.1 Mulcol® Multimastic C, length coating 150 mm

On the next pages, classifications, conditions and drawing FCLT-CT-MFB1.2.10 of this system in a mixed seal are given.

Fire resistance classification Drawing FCLT-CT-MFB1.2.10	
Cable groups and conduits	**Maximum seal size see 5.2.5**
Sheathed cables up to Ø80 mm (including optical fibres and coaxial cables)	**EI 60 / E 120**
Telecommunication cables up to Ø21 mm (bundle ≤ Ø100 mm) **Plastic conduits up to Ø16 mm**	**EI 90 / E 120**
Non sheathed cables up to Ø24 mm	**EI 45 / E 120**

Fire resistance classification Drawing FCLT-CT-MFB1.2.10	
Cable carriers	**Maximum seal size see 5.2.5**
Metal cable ladders **Metal (non-)perforated cable trays** **Steel wire mesh cable trays (baskets)**	**EI 90 / E 120**

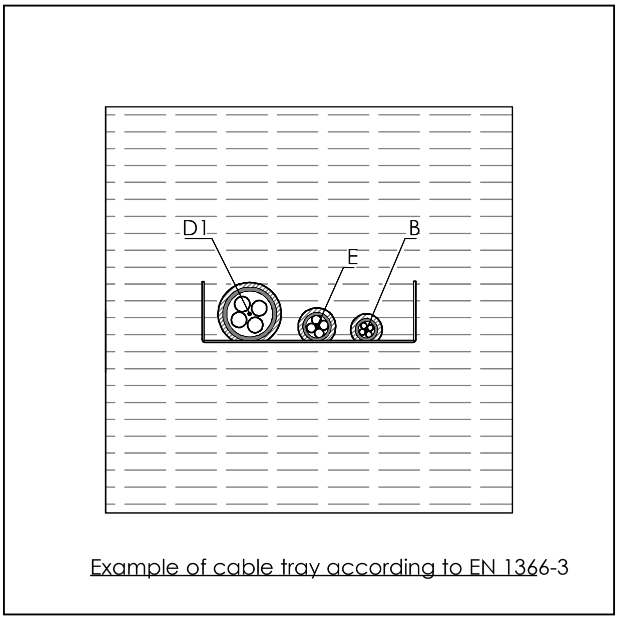
Multiple cables and conduits are allowed per cable carrier in any number or combination. The classifications are valid for cable carriers with a filling degree up to 100%. On the next pages drawings of cable penetrations in the seal are given. The actual type and number of cables inside the cable carrier may derive from these drawings and any combination of elements mentioned in the Tables from this Paragraph are allowed.

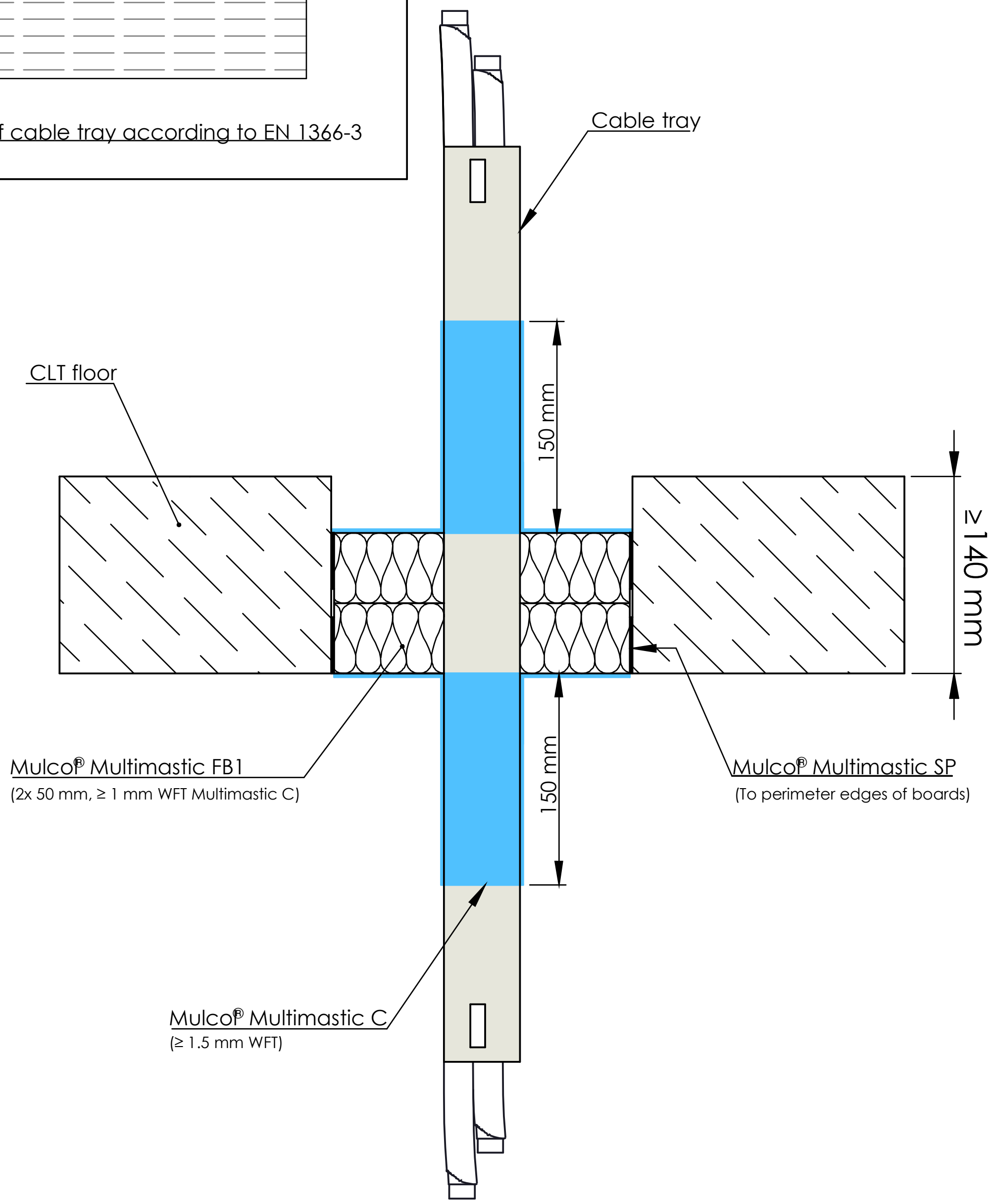
Drawings FCLT-ECB-MFB1.2.10 and FCLT-EC47-MFB1.2.10 show the configuration without cable carriers (the cable carriers may be omitted). Single or multiple bundled cables (maximum outer bundle diameter Ø100 mm) are allowed in any number or combination. On the next pages drawings of cable penetrations in the seal are given. The actual type and number of cables inside the bundle may derive from these drawings and any combination of elements mentioned in the Tables from this Paragraph are allowed.

The coating Mulcol® Multimastic C must be applied over a minimum distance of 150 mm with a minimal thickness of 1.0 mm (WFT) over the cables, conduits and cable carriers.

The minimum working distances between the elements apply according Table 5.1.

Bottom view



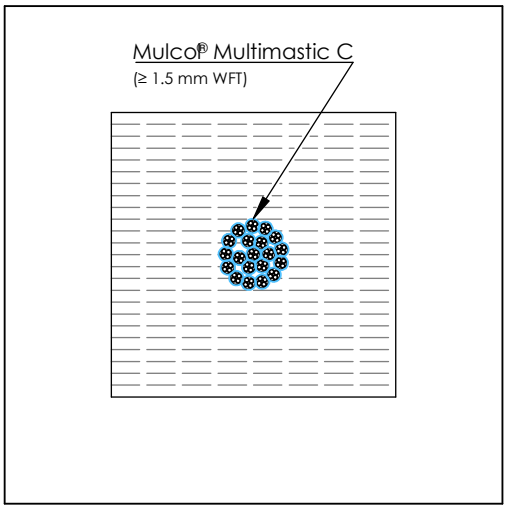


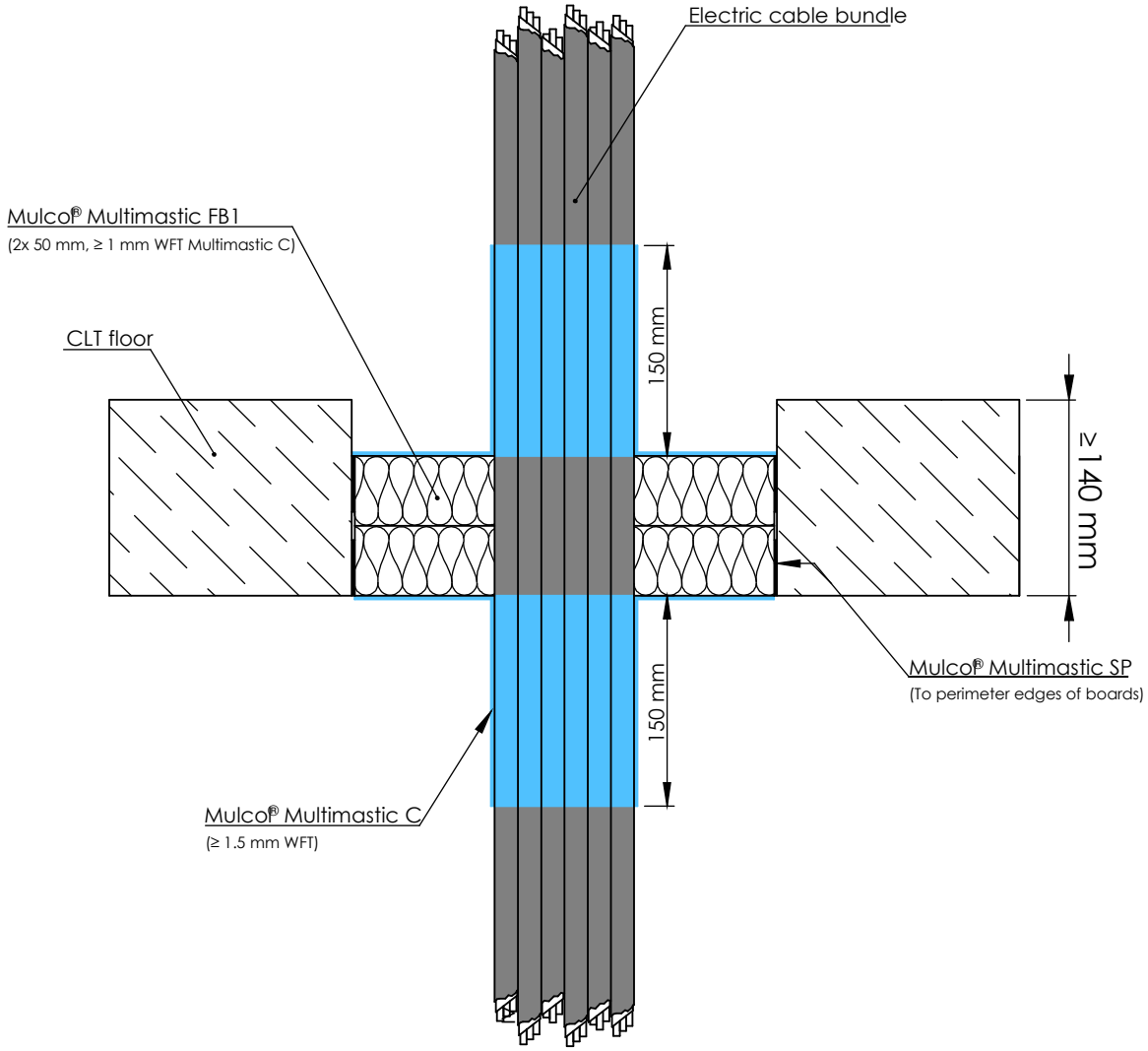
American projection	Scale :	Company : Mulcol International B.V.	FCLT-CT-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view



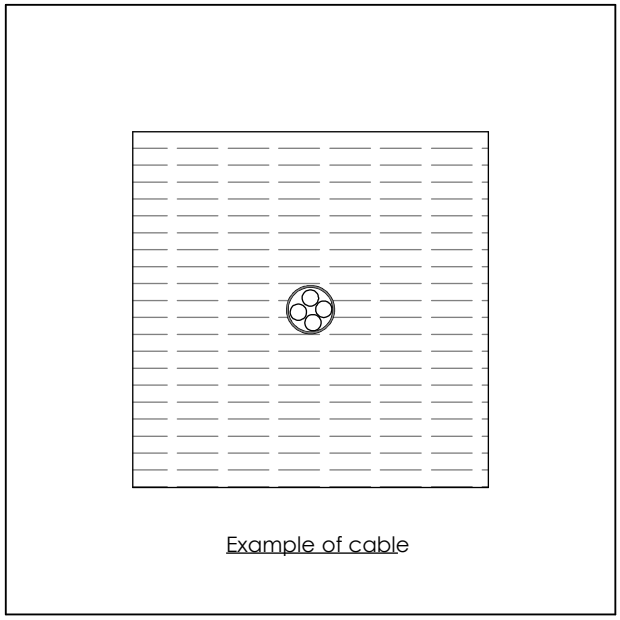


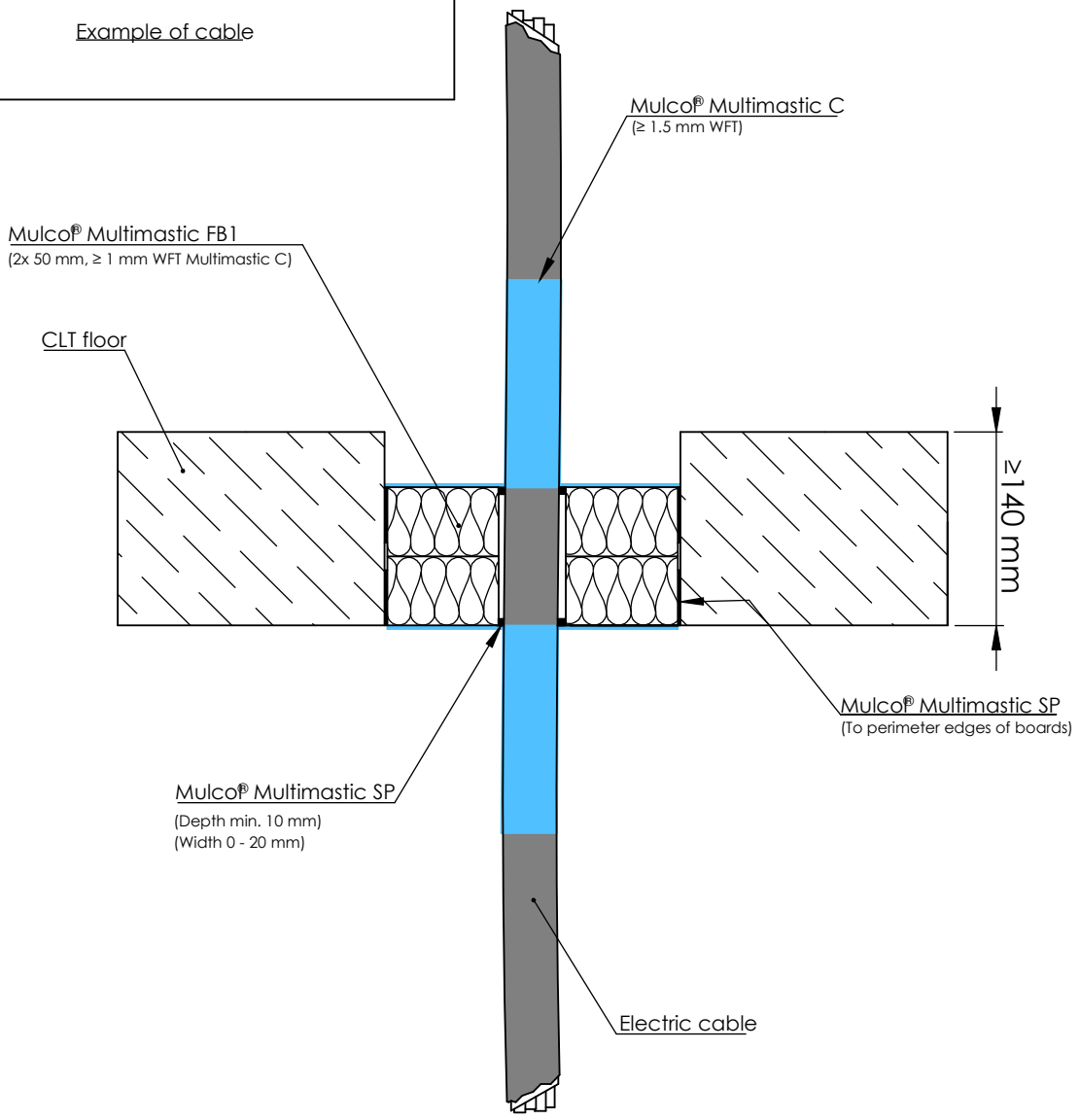
American projection	Scale :	Company : Mulcol International B.V.	FCLT-ECB-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-EC47-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

5.3.2 Mulcol® Multidisc

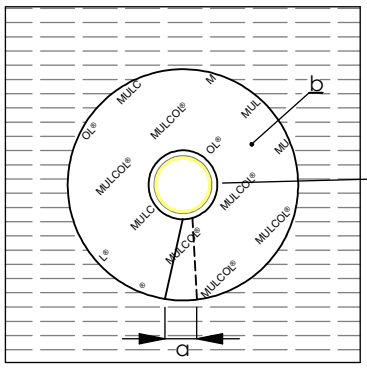
On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification			
Outer diameter pipe / cable (mm or inch)	**Performance class with pipe end configuration**	**Pipe / cable material**	**System**
Drawing FCLT-MFB1-EP19-M2.0.10			
≤ 3/4" **≤ 19 mm**	**E 60–U/C**	**Electrical pipes PVC-U / PVC-C**	**Mulcol® Multidisc**
Drawing FCLT-MFB1-EC-M2.0.10			
Single electrical cable	**E 60**	**YMVK 5 x 2.5 mm²**	**Mulcol® Multidisc**

The holes for the penetrations seals fitted with the Mulcol® Multidisc shall be less than Ø26 mm. The Mulcol® Multidisc must be fitted below the floor.

The minimum working distances between the elements apply according Table 5.1.

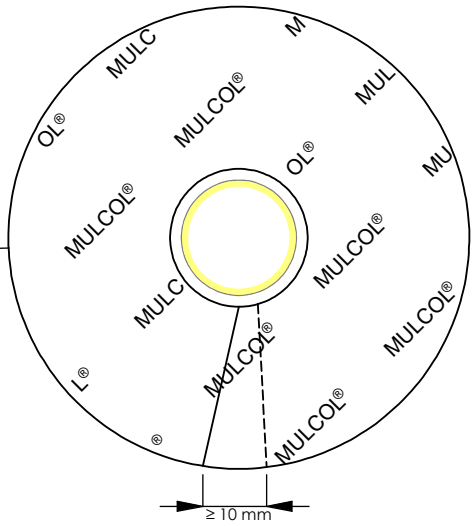
Bottom view

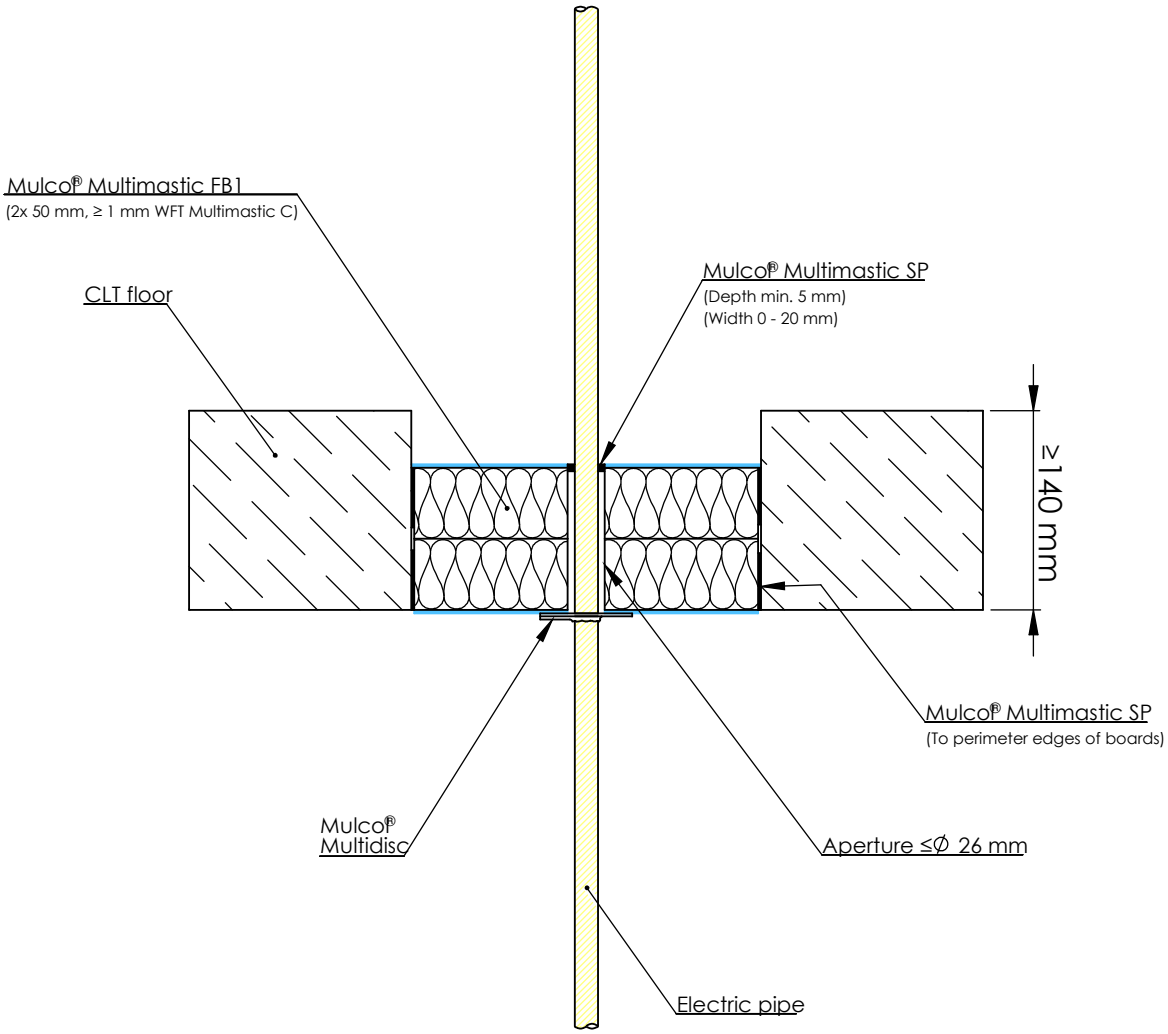


a - Overlay size
(Minimum 10 mm overlay)
b - Mulcol® Multidisc

A

Detail A

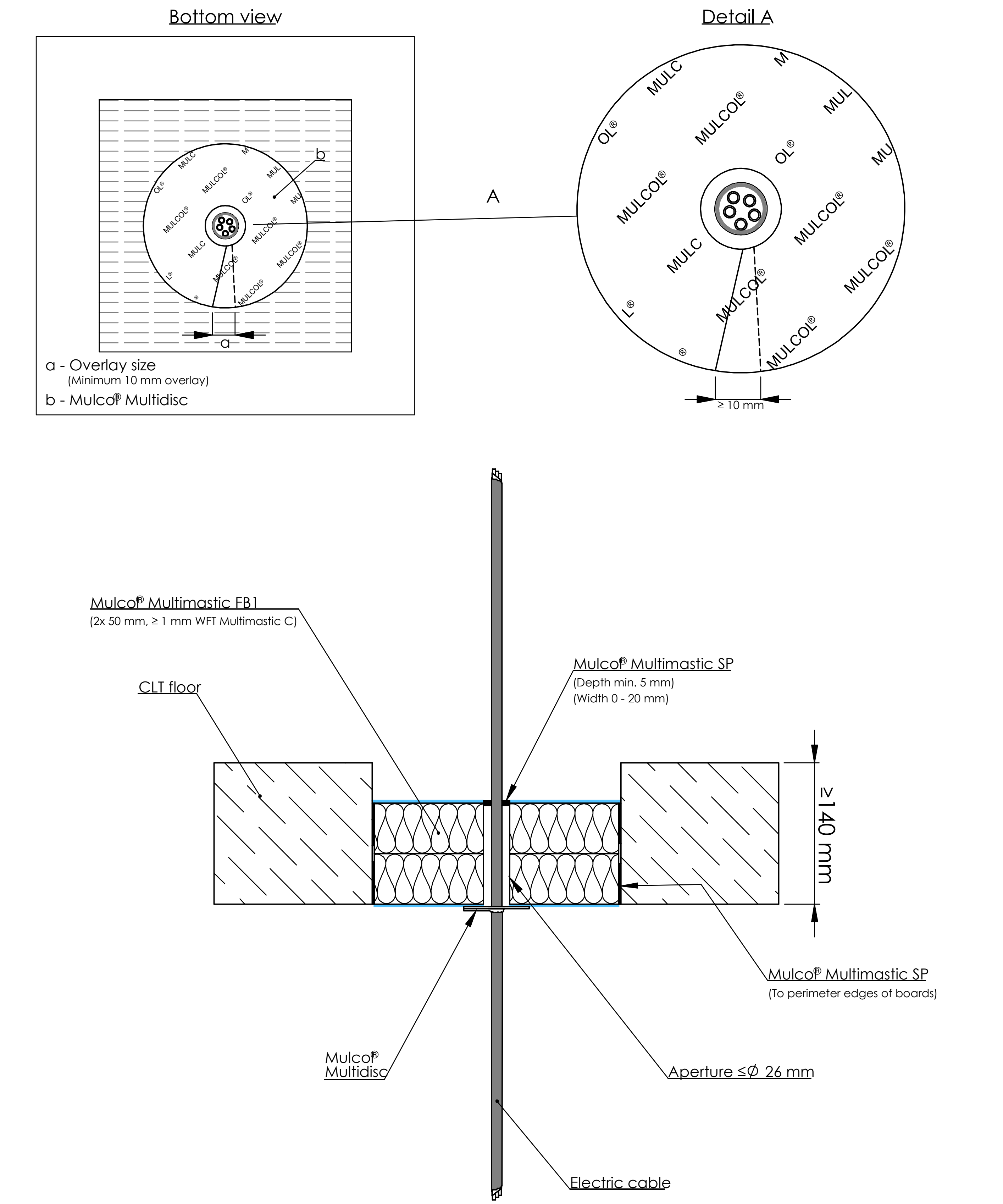




American projection	Scale :	Company : Mulcol International B.V.	FCLT-MFB1-EP19-M2.0.10
	Unit of measure : mm	Department : Research & Development	
	Date : 22-5-2023	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multidisc
Installation wooden CLT floor



American projection	Scale :	Company : Mulcol International B.V.	FCLT-MFB1-EC-M2.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test cable penetration seal
Mulcol® Multidisc
Installation in wooden CLT floor

5.4 Plastic pipes – Multimastic FB1 (2 x 50 mm, no cavity)

The Mulcol® Multimastic FB1 board system has a total thickness of 100 mm (2 x 50 mm, no cavity). For the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), a classification according to the following combinations of performance parameters and classes applies.

The envisaged fire resistance classification needed in practise must correspond to both the fire resistance of the penetrating element as the Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) system in Paragraph 5.2.5.

The drawings in this Chapter show the location of the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) at the lowest position in the floor.

5.4.1 Mulcol® Multicollar Slim

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

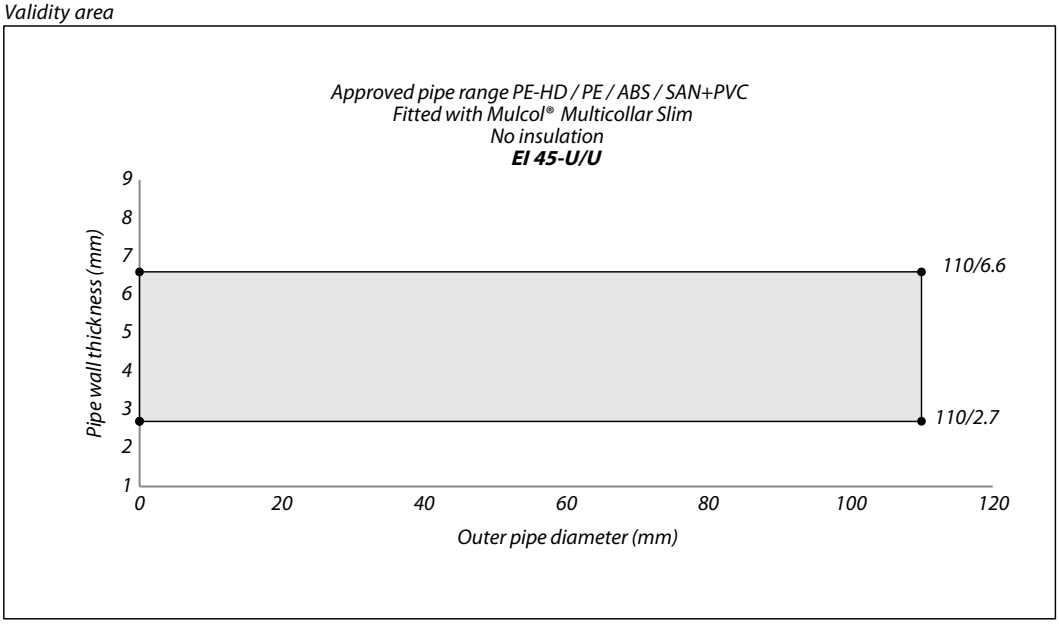
Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System	See figure
Outer diameter	Wall thickness				
Drawing FCLT-MC30-PP-MFB1.2.10					
≤ 110	2.7	EI 45–U/U	PE-HD/ PE / ABS / SAN+PVC	Mulcol® Multicollar Slim	N.a.
≤ 110	2.7 to 6.6	EI 45–U/U			5.2
≤ 110	2.7	EI 45–U/U	PP		N.a.
≤ 110	2.7 to 6.3	EI 45–U/U			5.3
≤ 110	2.7	EI 45–U/U	PVC-U / PVC-C		N.a.
≤ 110	2.7 to 6.3	EI 45–U/U			5.4
Drawing FCLT-MC30-PP-MFB1.2.10					
≤ 110	6.0	EI 45–U/U	Geberit Silent dB 20	Mulcol® Multicollar Slim	N.a.

Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System	See figure
Outer diameter	Wall thickness				
Drawing FCLT-MC30-MLF-MFB1.2.10					
≤ 50	6.9	EI 45–U/C	Aquatherm Green-MF	Mulcol® Multicollar Slim	N.a.
≤ 110	10.0	EI 45–U/C	Aquatherm Blue-MF		

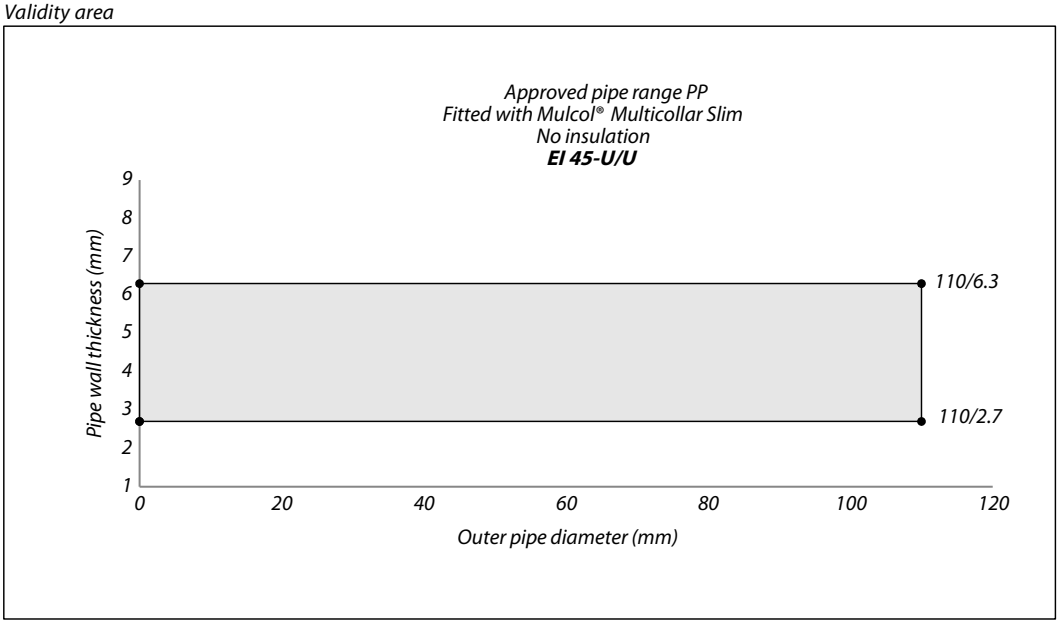
For plastic pipes and PP-R multilayer pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

The minimum working distances between the elements apply according Table 5.1.

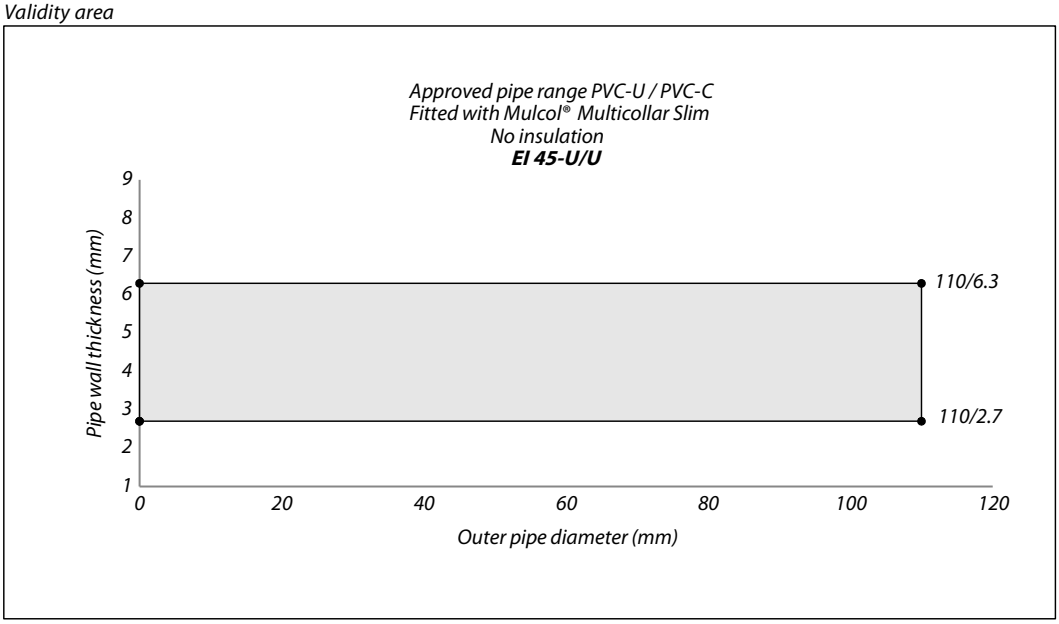
f5.2 *Validity area*



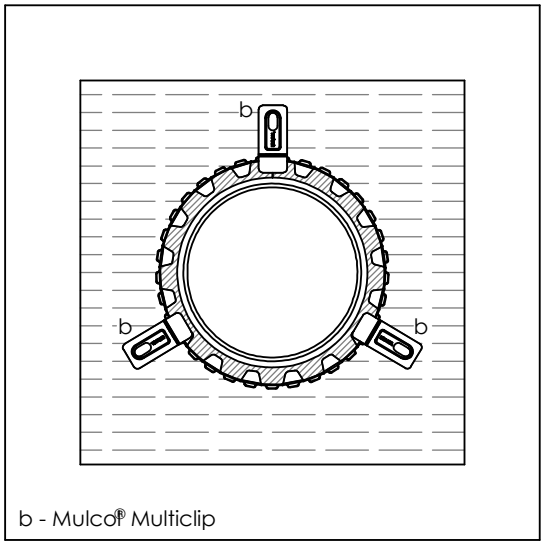
f5.3 *Validity area*



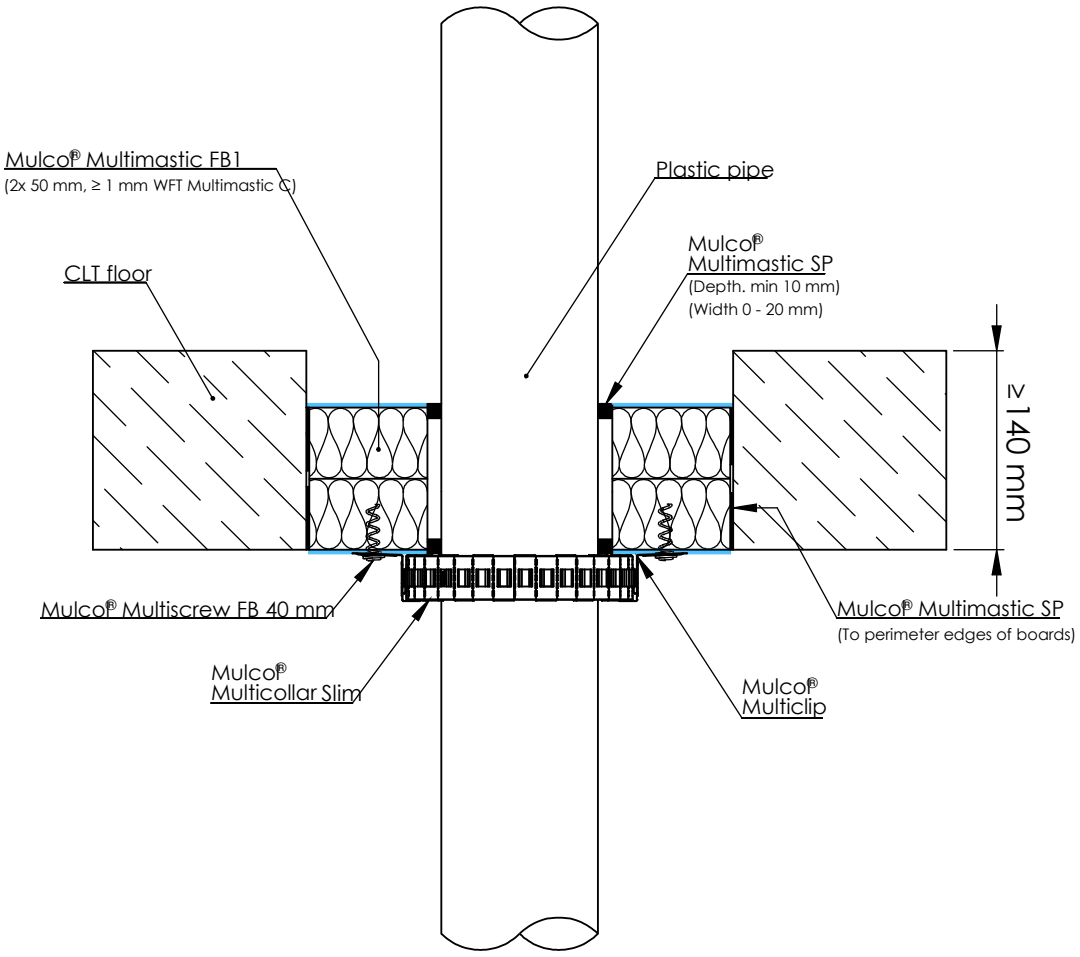
f5.4 *Validity area*



Bottom view



b - Mulcol® Multiclip

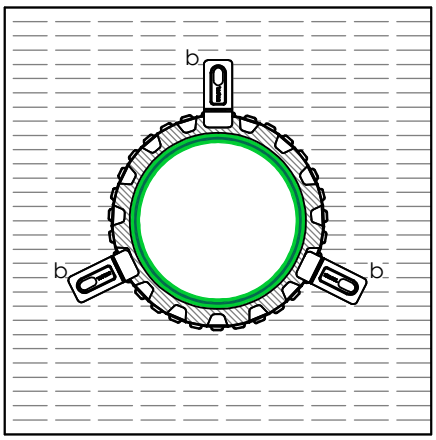


American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-PP-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 24-5-2023	Draftsman : K.J.	

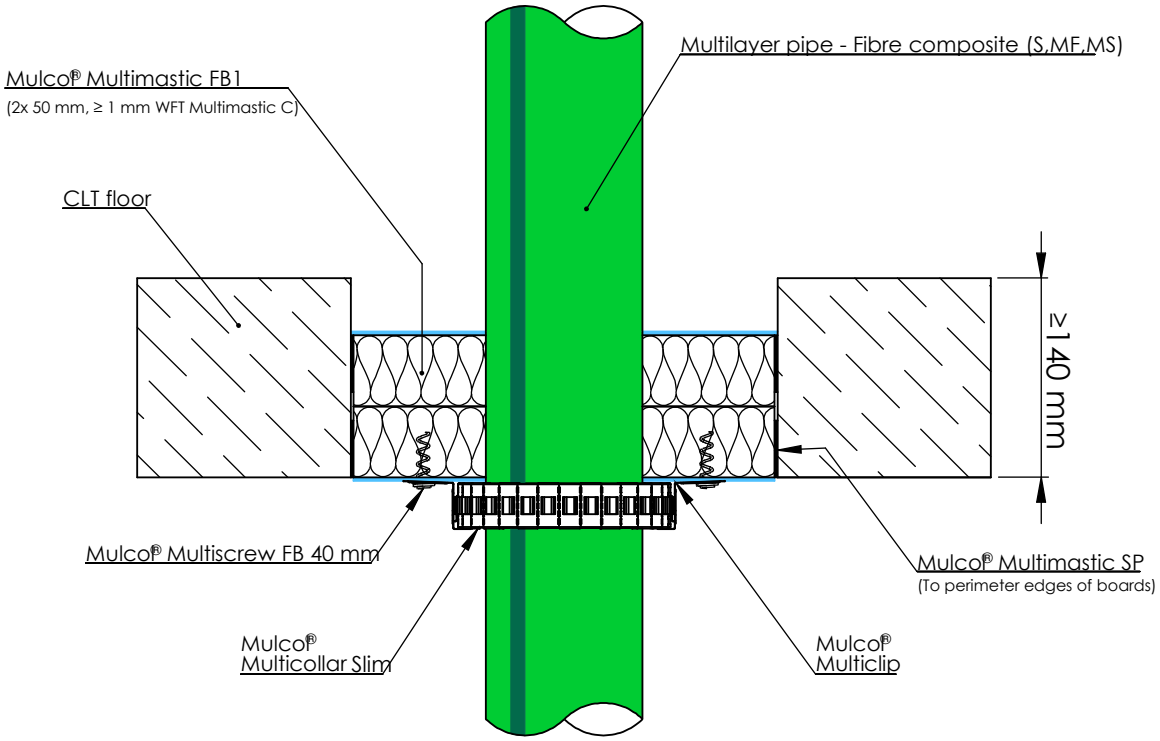
MULCOL FIRE PROTECTION

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

Bottom view



b - Mulcol® Multiclip



American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-MLF-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

5.4.2 Mulcol® Multiwrap

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System	See figure
Outer diameter	Wall thickness				
Drawing FCLT-PP-MW2-MFB1.2.10					
≤ 110	3.2	EI 120–U/C	PVC-U / PVC-C	Mulcol® Multiwrap (2 layers)	N.a.
≤ 50	2.0	EI 120–U/U	Poloplast PoloKal NG		5.5
≤ 110	3.4				
≤ 56	3.2	EI 120–U/U	Geberit Silent dB 20		N.a.
≤ 56	3.2	EI 120–U/C			5.6
≤ 110	6.0				
Drawing FCLT-PPS-MW4-MFB1.2.10					
≤ 125	3.9	EI 120–U/C	Poloplast PoloKal NG	Mulcol® Multiwrap (4 layers)	N.a.

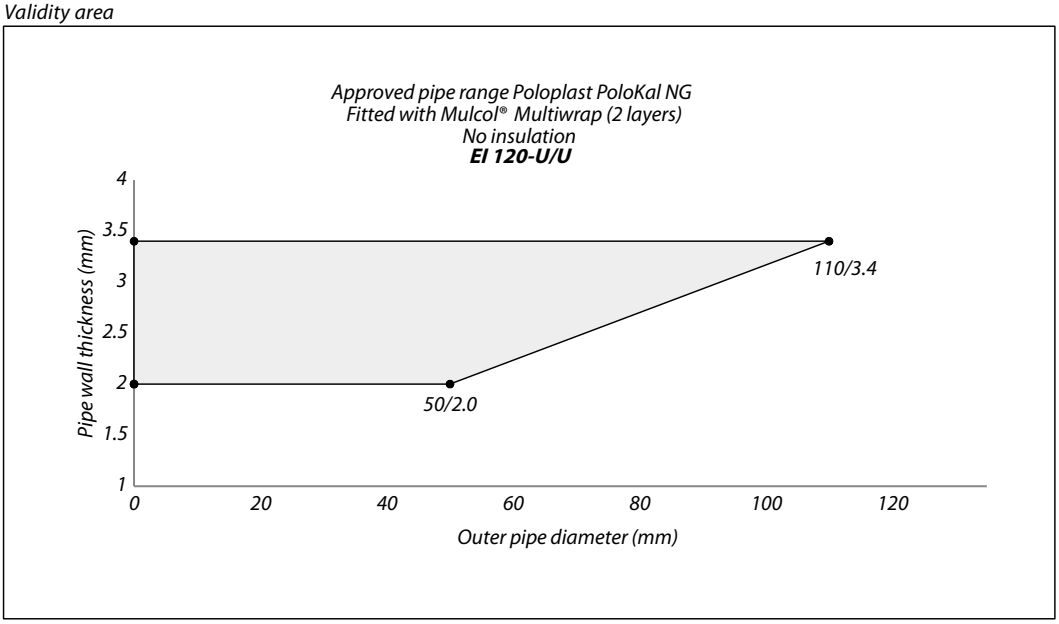
The systems have been tested in accordance with EN 1366-3 according to multiple design groups.

For plastic pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

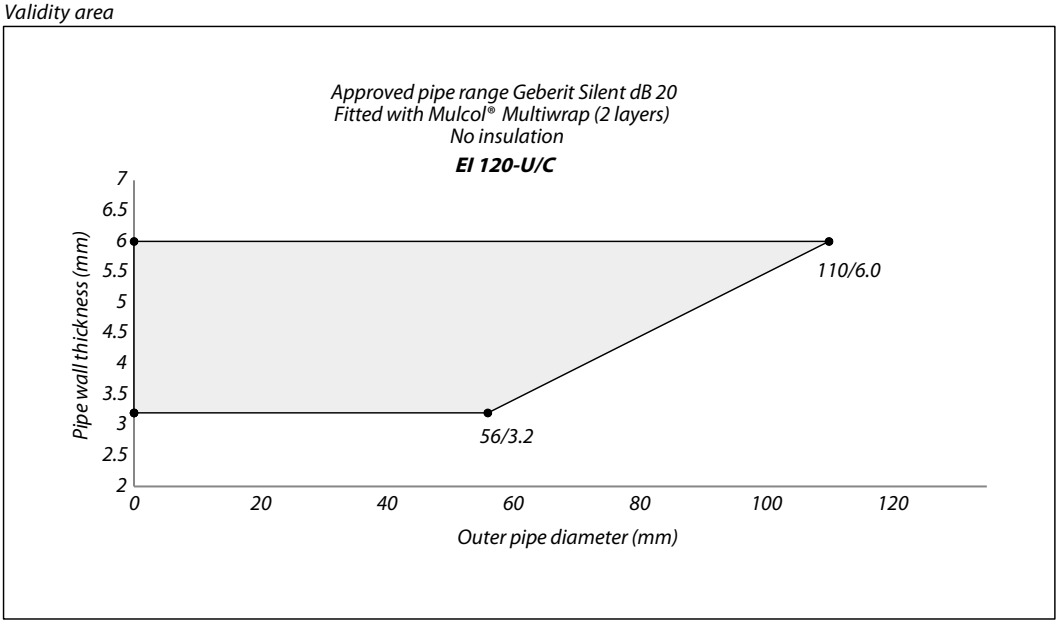
The Mulcol® Multiwrap may protrude a maximum of 5 mm from the surface of the penetration seal.

The minimum working distances between the elements apply according Table 5.1.

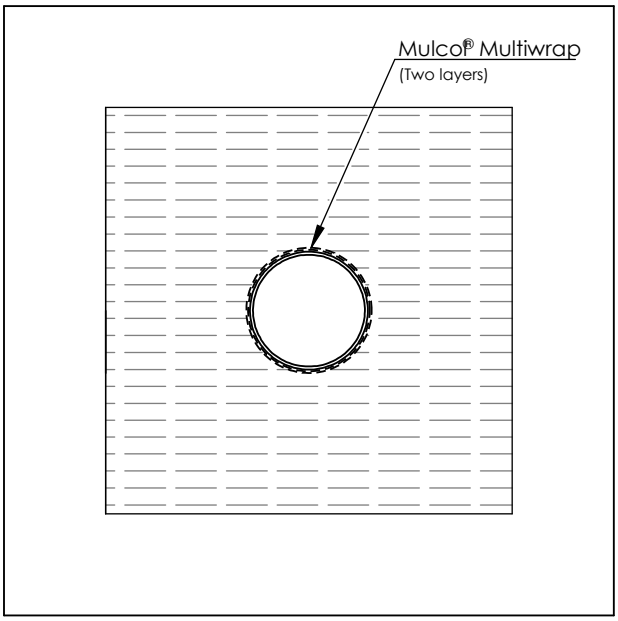
f5.5 *Validity area*

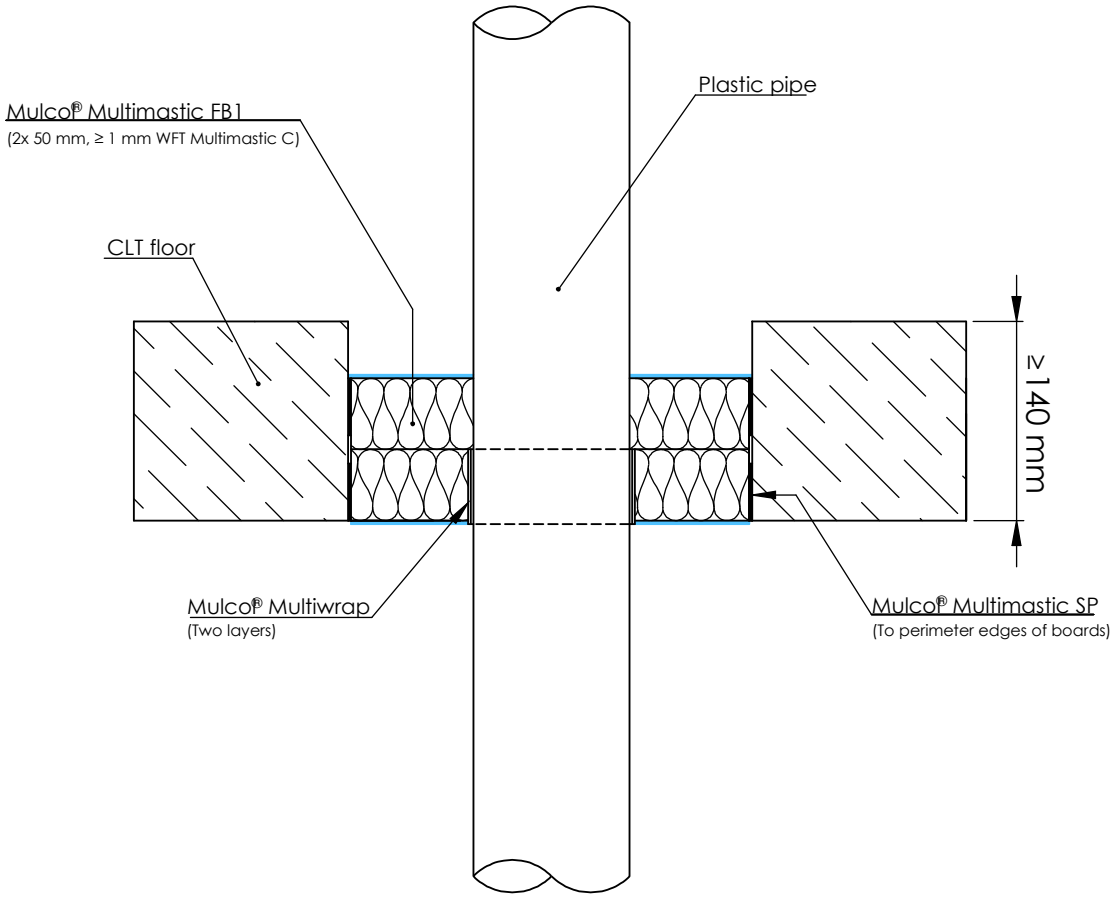


f5.6 *Validity area*



Bottom view



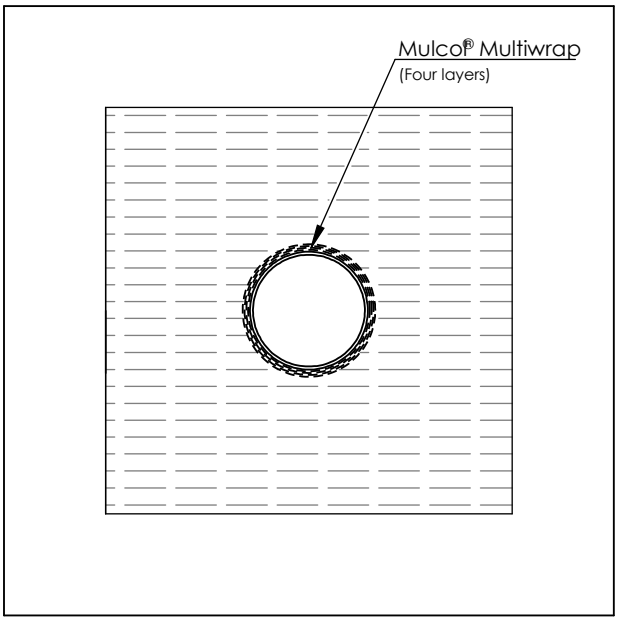


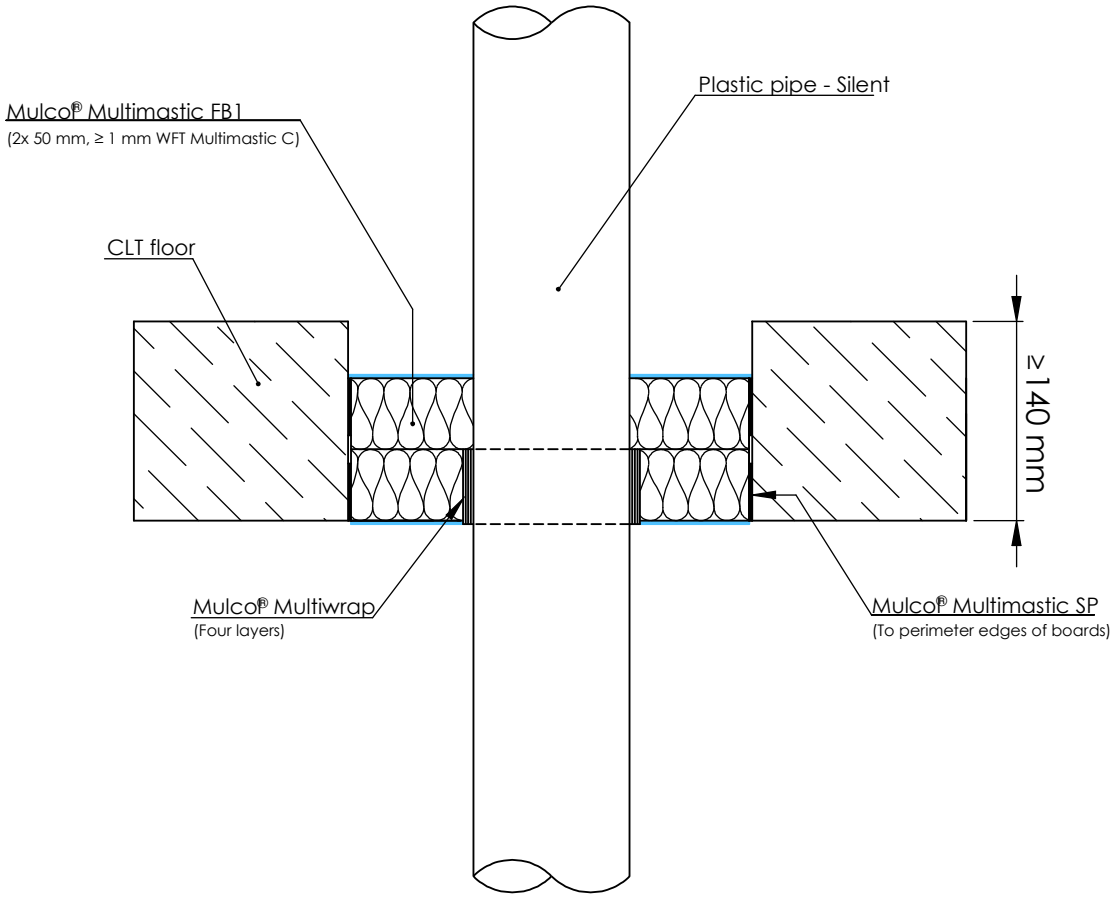
American projection	Scale :	Company : Mulcol International B.V.	FCLT-PP-MW2-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 23-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-PPS-MW4-MFB1.2.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 23-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

YA 2746-1E-RA-001 IEADEIE2B-HARML

5.5 Al. composite pipes – Mastic FB1 (2 x 50 mm, no cavity)

The Mulcol® Multimastic FB1 board system has a total thickness of 100 mm (2 x 50 mm, no cavity). For the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), a classification according to the following combinations of performance parameters and classes applies.

The envisaged fire resistance classification needed in practise must correspond to both the fire resistance of the penetrating element as the Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) system in Paragraph 5.2.5.

The drawings in this Chapter show the location of the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) at the lowest position in the floor.

5.5.1 Mulcol® Multimastic GR

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm)	Pipe material	System width x depth (mm)
Outer diameter	Wall thickness				
Drawings FCLT-MLA-MFB1-G1.18.10, FCLT-MLA-MFB1-G1.4.23 and FCLT-MLA-MFB1-G1.4.22					
≤ 32	3.0	EI 30–U/C E 90–U/C	N.a.	Henco PE-Xc/AL/PE-Xc	Mulcol® Multimastic GR (≥ 15 x ≥ 20)
≤ 32	3.0	EI 30–U/C E 90–U/C	Henco PE-Foam (6) LS 300/CS LI 300/CI		
≤ 75	6.0	EI 90–U/C E 90–U/C	AF/Armaflex (9 to 32) LS 400/CS		

The classifications are valid for insulation Armaflex with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

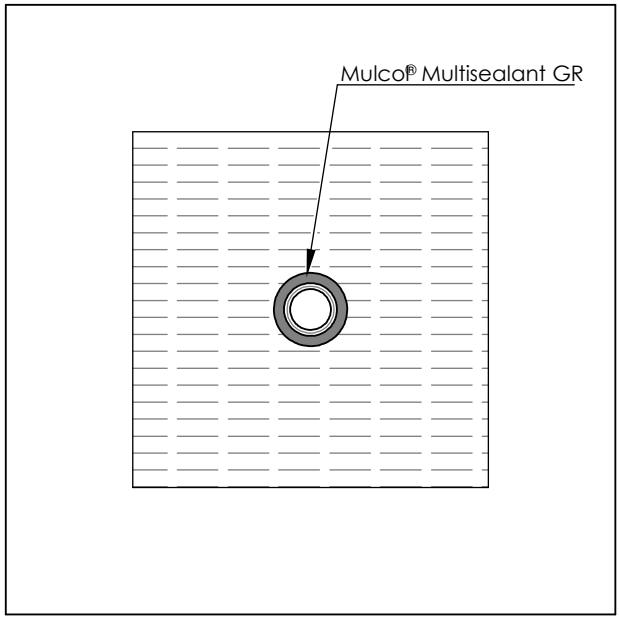
The classifications are valid for insulation Henco PE-Foam with a thickness as mentioned and is also valid for insulation other PE-foam with a reaction to fire class C_L-s1-d0 (or better) in accordance with EN 13501-1 (thickness ≤ 6 mm). The insulation shall be applied sustained or

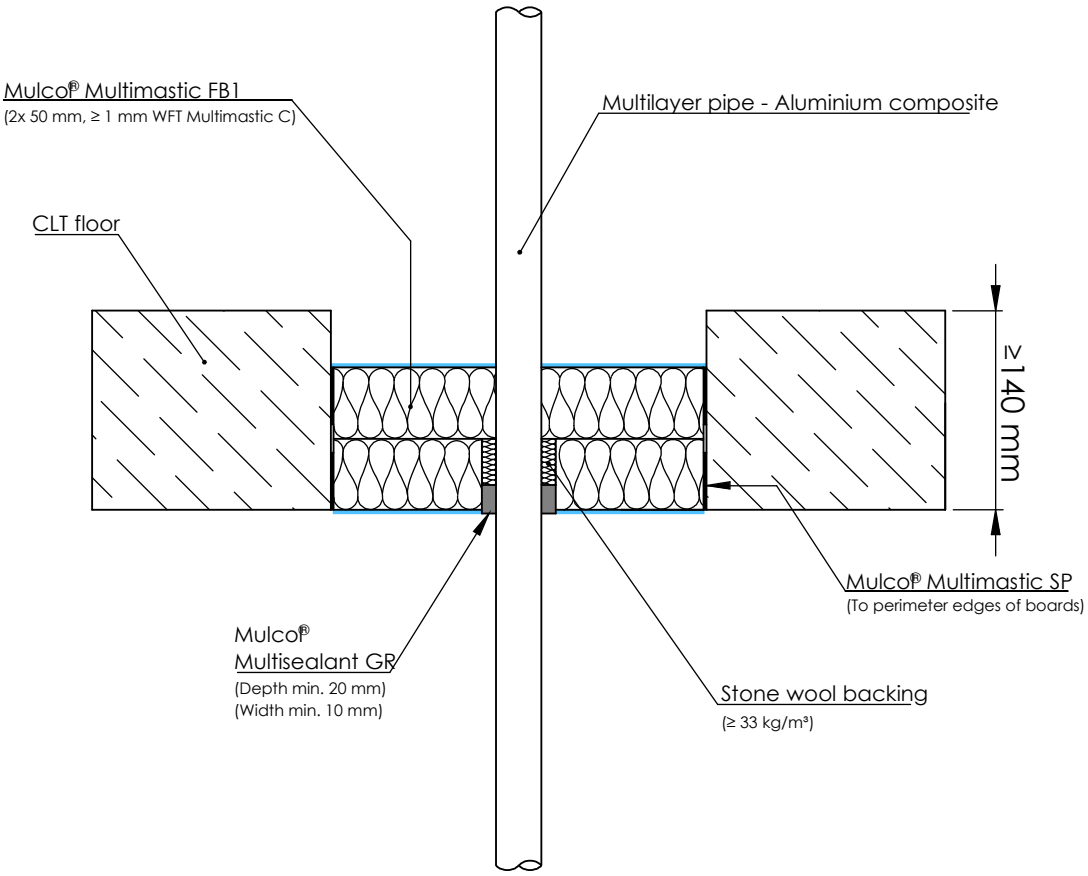
interrupted through the aperture with a minimum distance of 300 mm on both sides from the point where the pipe emerges out of the floor (LS or LI in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS or CI).

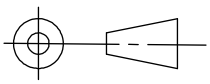
For aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

The minimum working distances between the elements apply according Table 5.1.

Bottom view



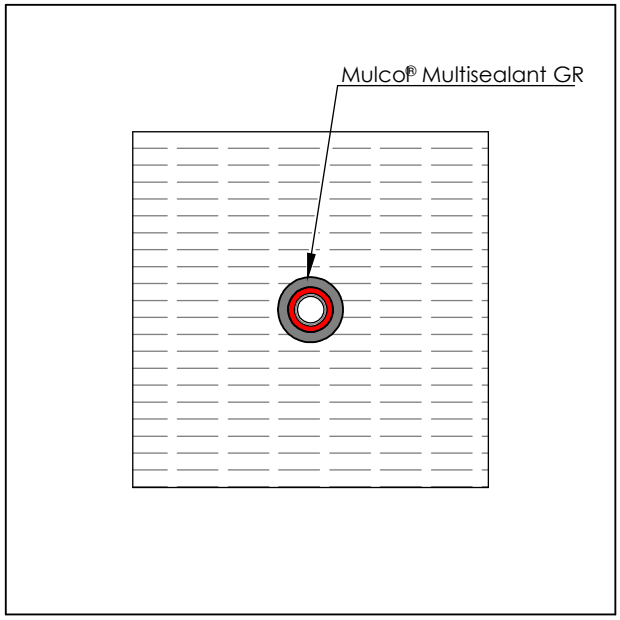


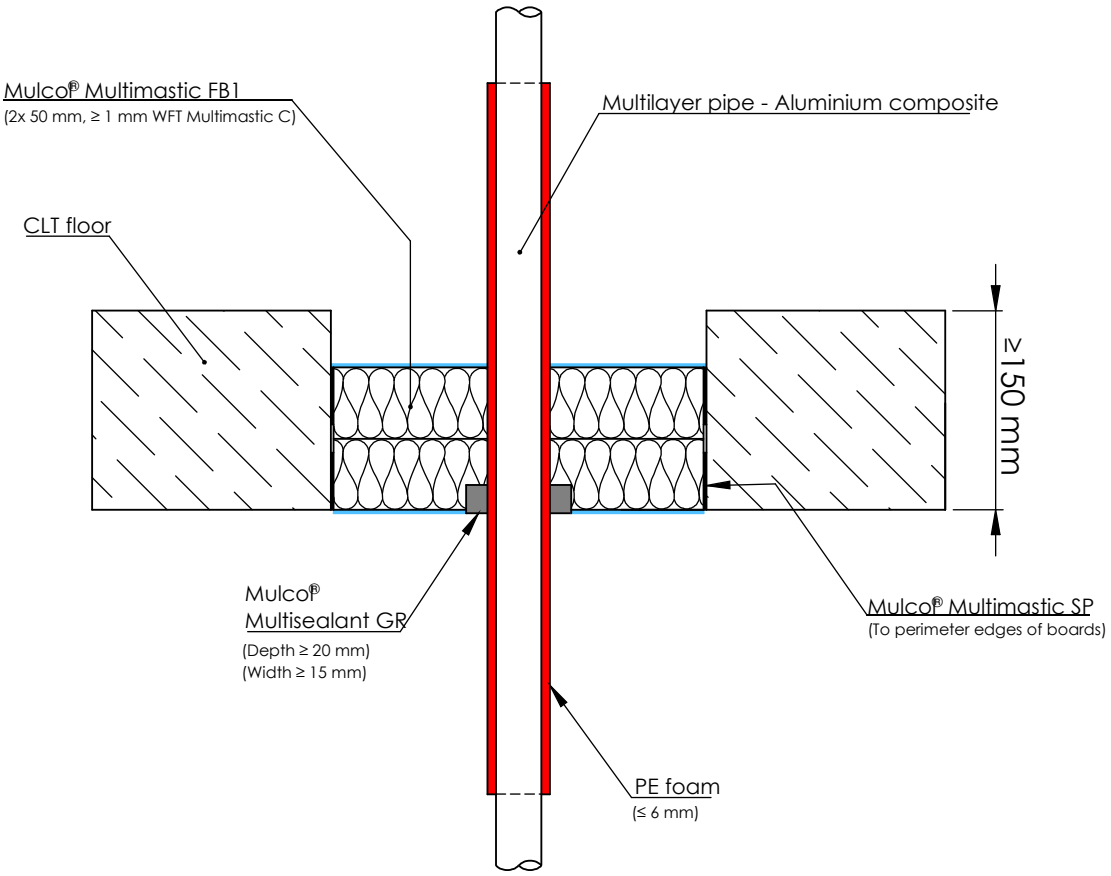
American projection 	Scale :	Company : Mulcol International B.V.	FCLT-MLA-MFB1-G1.18.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 24-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view



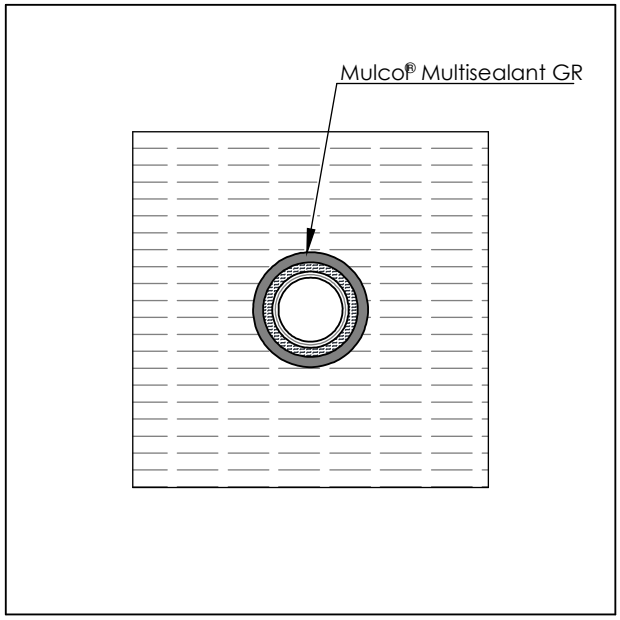


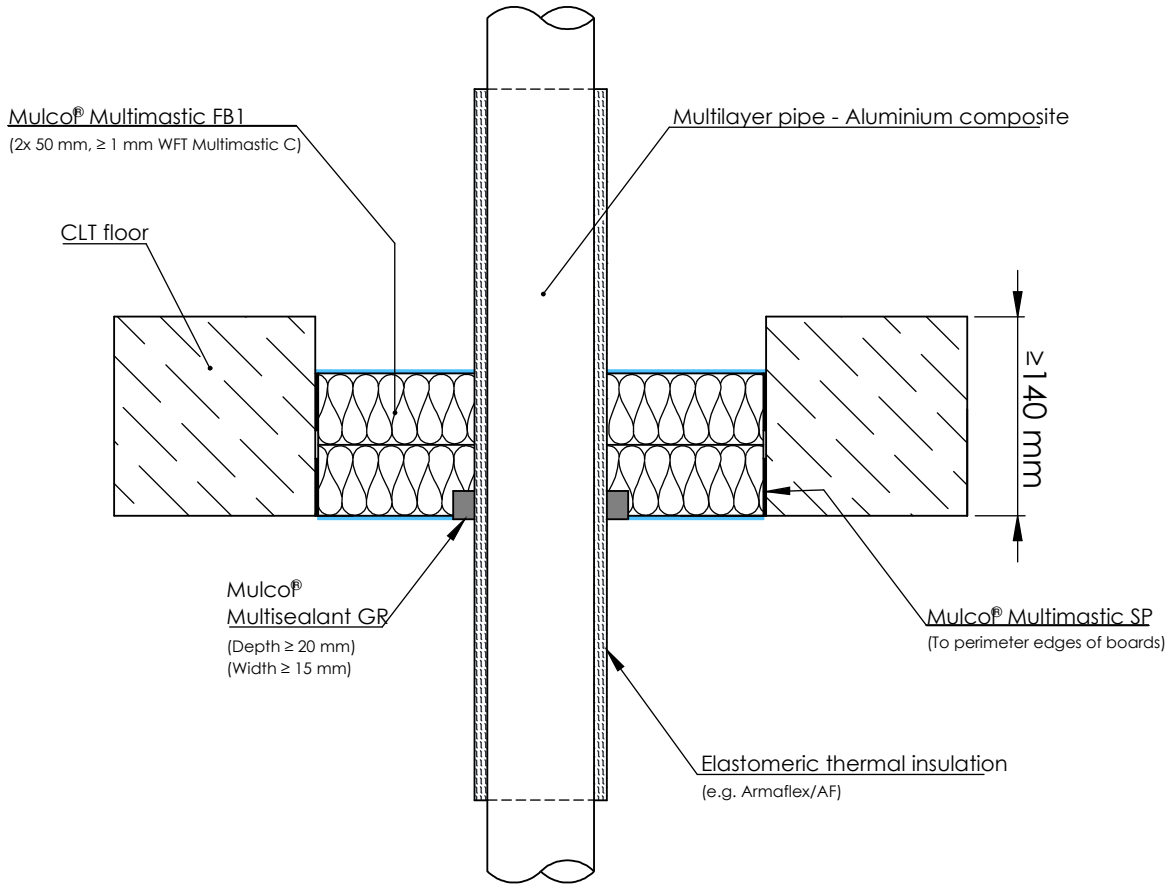
American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLA-MFB1-G1.4.23
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLA-MFB1-G1.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

5.5.2 Mulcol® Multidisc

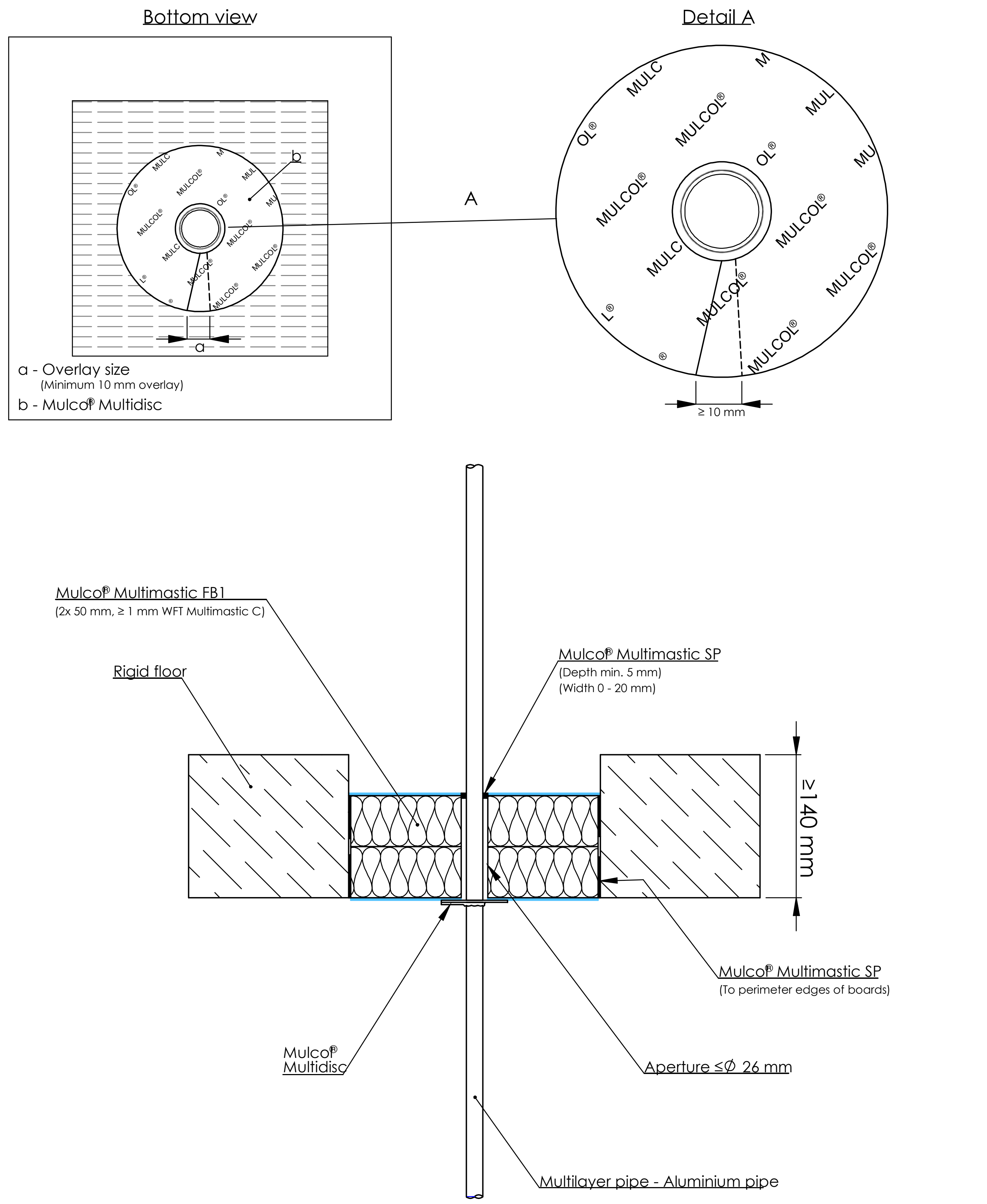
On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification				
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (mm)	System
Outer diameter	Wall thickness			
Drawing FCLT-MFB1-MLA-M2.0.10				
≤ 16	2.0	E 60–U/C	Henco PE-Xc/AL/PE-Xc	Mulcol® Multidisc

The holes for the penetrations seals fitted with the Mulcol® Multidisc shall be less than Ø26 mm. The Mulcol® Multidisc must be fitted below the floor.

For aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

The minimum working distances between the elements apply according Table 5.1.



American projection	Scale :	Company : Mulcol International B.V.	FCLT-MFB1-MLA-M2.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

Fire test pipe penetration seal
Mulcol® Multidisc
Installation in wooden CLT floor

5.6 Metal pipes – Multimastic FB1 (2 x 50 mm, no cavity)

The Mulcol® Multimastic FB1 board system has a total thickness of 100 mm (2 x 50 mm, no cavity). For the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity), a classification according to the following combinations of performance parameters and classes applies.

The envisaged fire resistance classification needed in practise must correspond to both the fire resistance of the penetrating element as the Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) system in Paragraph 5.2.5. The drawings in this Chapter show the location of the system Mulcol® Multimastic FB1 (2 x 50 mm, no cavity) at the lowest position in the floor.

5.6.1 Mulcol® Multisealant GR

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-MFB1-G1.4.22 and FCLT-ST-MFB1-G2.4.22						
≤ 22	≥ 1.0	EI 60–C/U E 120–C/U	AF/Armaflex (8.5)	Copper / (stainless-) steel / cast iron	Mulcol® Multisealant GR (≥ 10 x ≥ 20)	5.7
		EI 60–C/U E 90–C/U	AF/Armaflex (8.5 to 33.5)			
		EI 120–C/U	NH/Armaflex (9 to 25)			5.8
		EI 60–C/U E 120–C/U	Armaflex Ultima (9 to 25)			5.7
		EI 90–C/U E 120–C/U	Armaflex Ultima (25 to 32)			5.9
≤ 26.9	≥ 2.3	EI 120–C/U	AF/Armaflex (8.5 to 35)	(Stainless-) steel / cast iron		5.10
			NH/Armaflex (9 to 25)			5.11
		EI 60–C/U E 90–C/U	Armaflex Ultima (9 to 25)			5.12
		EI 90–C/U E 120–C/U	Armaflex Ultima (25)			5.13
		EI 60–C/U E 120–C/U	Kaiflex KK Plus (8.5)			5.14

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-MFB1-G1.4.22 and FCLT-ST-MFB1-G2.4.22						
≤ 54	≥ 1.5	EI 120–C/U* (CS)	AF/Armaflex (13.5)	Copper / (stainless-) steel / cast iron	Mulcol® Multisealant GR (≥ 10 x ≥ 20)	5.15
		EI 90–C/U E 120–C/U	AF/Armaflex (13.5 to 38)			5.16
		EI 120–C/U	NH/Armaflex (13)			5.17
		EI 90–C/U	NH/Armaflex (13 to 25)			5.18
		EI 60–C/U EI 90–C/U* (CS) E 120–C/U	Armaflex Ultima (13 to 32)			5.19 5.20
		EI 90–C/U	Armaflex Ultima (32)			5.16
≤ 114.3	≥ 3.6	EI 90–C/U E 120–C/U	AF/Armaflex (15 to 43)	(Stainless-) steel / cast iron		5.21
		EI 120–C/U* (CS)	AF/Armaflex (15)			5.22
		EI 120–C/U	NH/Armaflex (19 to 25)			5.23
		EI 90–C/U E 120–C/U	Armaflex Ultima (13)			5.24
		EI 60–C/U E 120–C/U	Armaflex Ultima (13 to 32)			5.25

* These specific classifications only apply with continued sustained insulation (CS in accordance with Table 1 of EN 1366-3).

The classifications are valid for insulation AF/Armaflex, NH/Armaflex or Armaflex Ultima with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

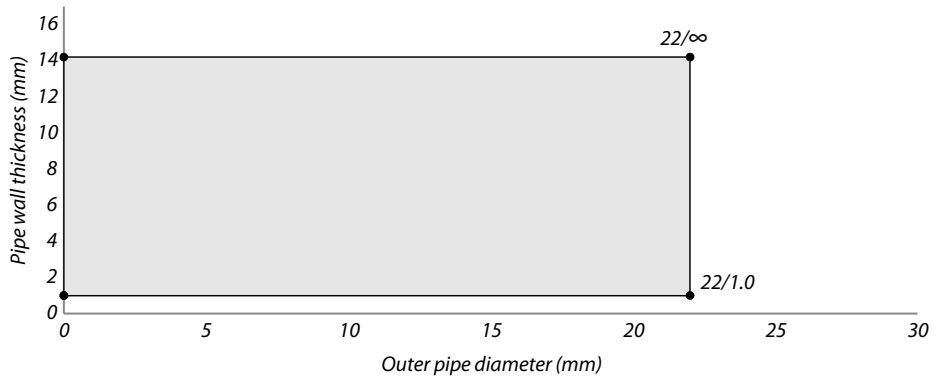
For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

When the insulation consist out of multiple parts or splices are present, the insulation is glued together with appropriate glue for the insulation type.

The minimum working distances between the elements apply according Table 5.1.

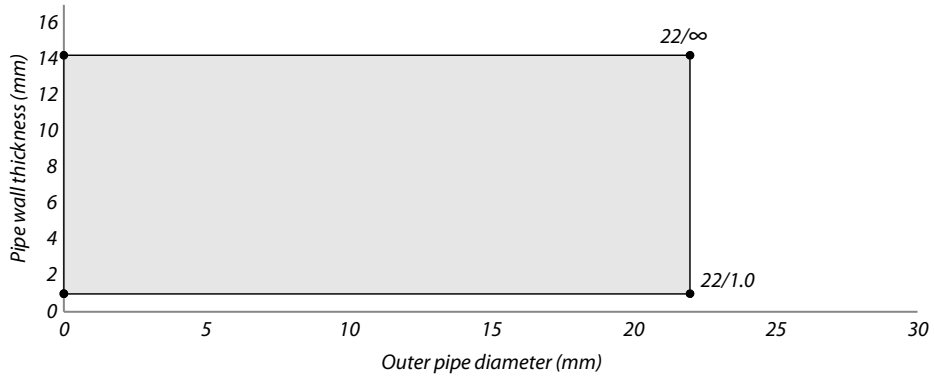
f5.7 *Validity area*

Approved pipe range copper (stainless-) steel / cast iron
Fitted with Mulcol® Multisealant GR
Insulation LS 400/CS: AF/Armaflex (8.5 to 33.5 mm) or Armaflex Ultima (9 to 25 mm)
EI 60-C/U

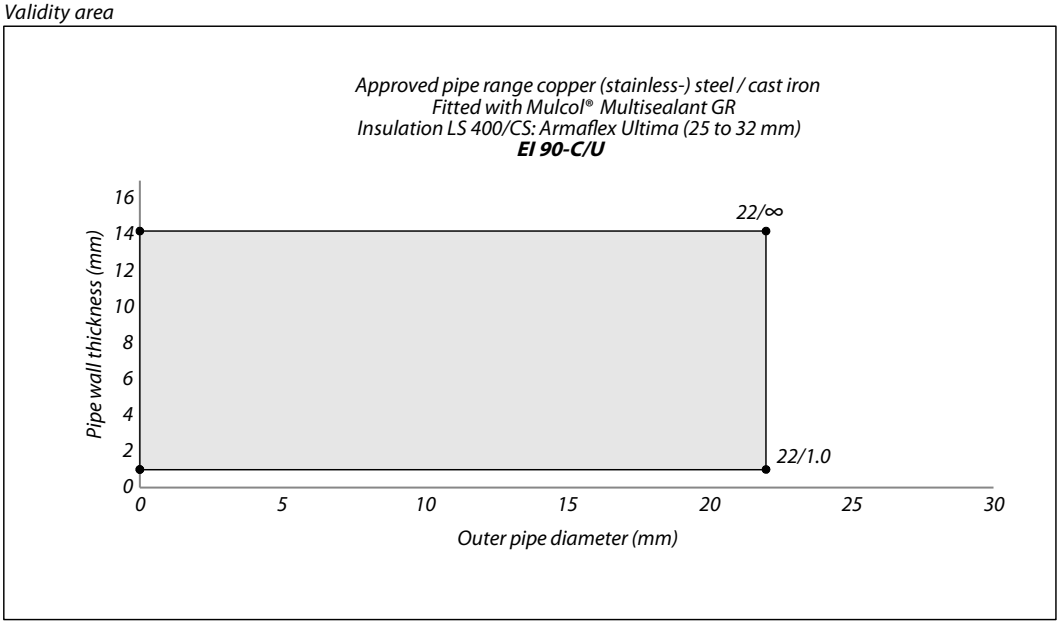


f5.8 *Validity area*

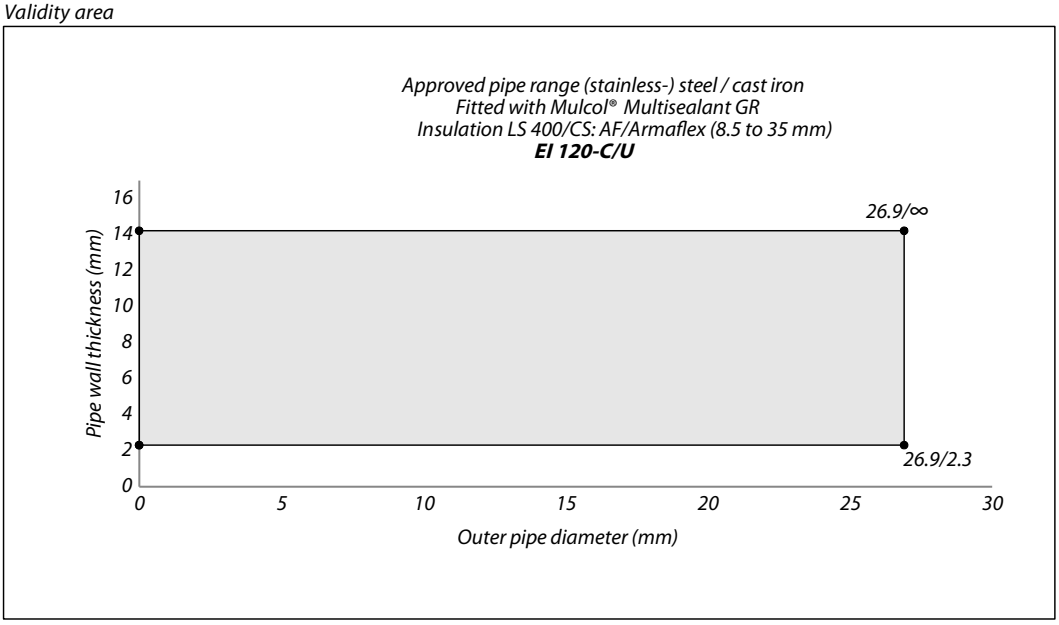
Approved pipe range copper (stainless-) steel / cast iron
Fitted with Mulcol® Multisealant GR
Insulation LS 400/CS: NH/Armaflex (9 to 25 mm)
EI 120-C/U



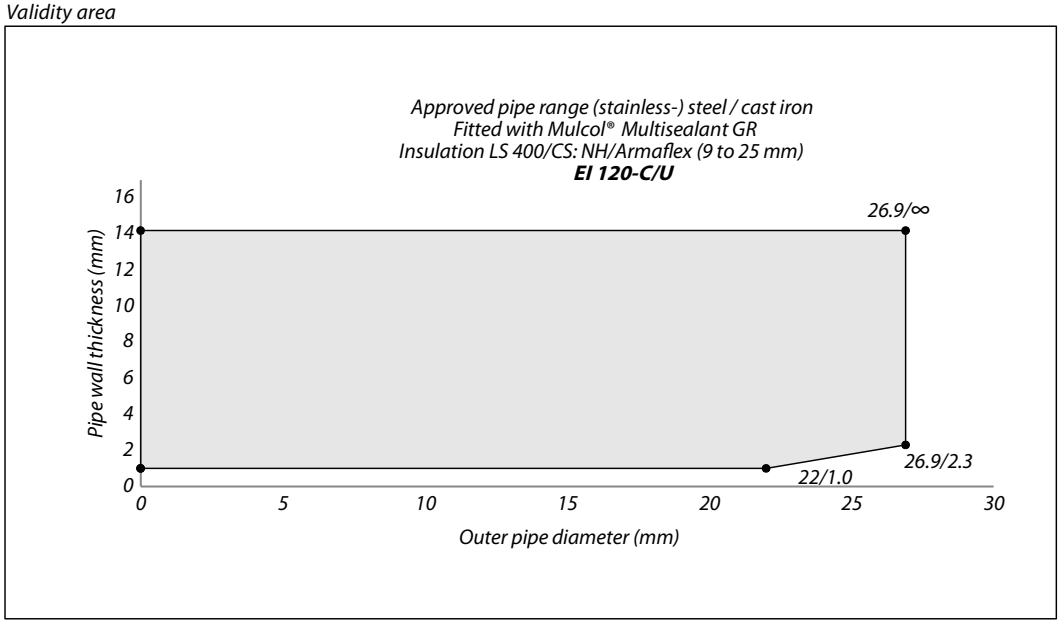
f5.9 *Validity area*



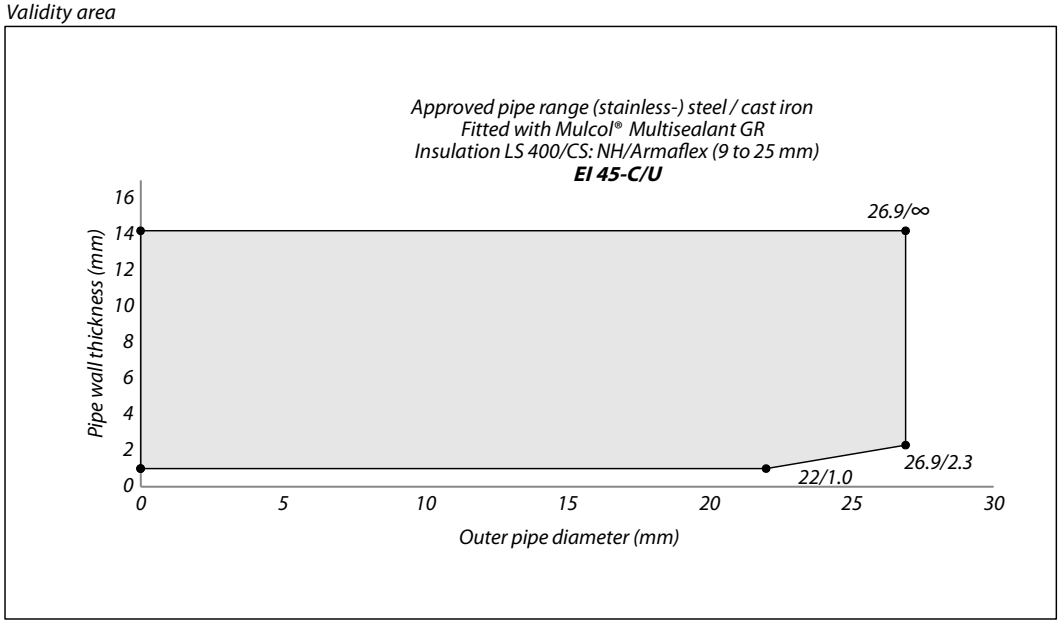
f5.10 *Validity area*



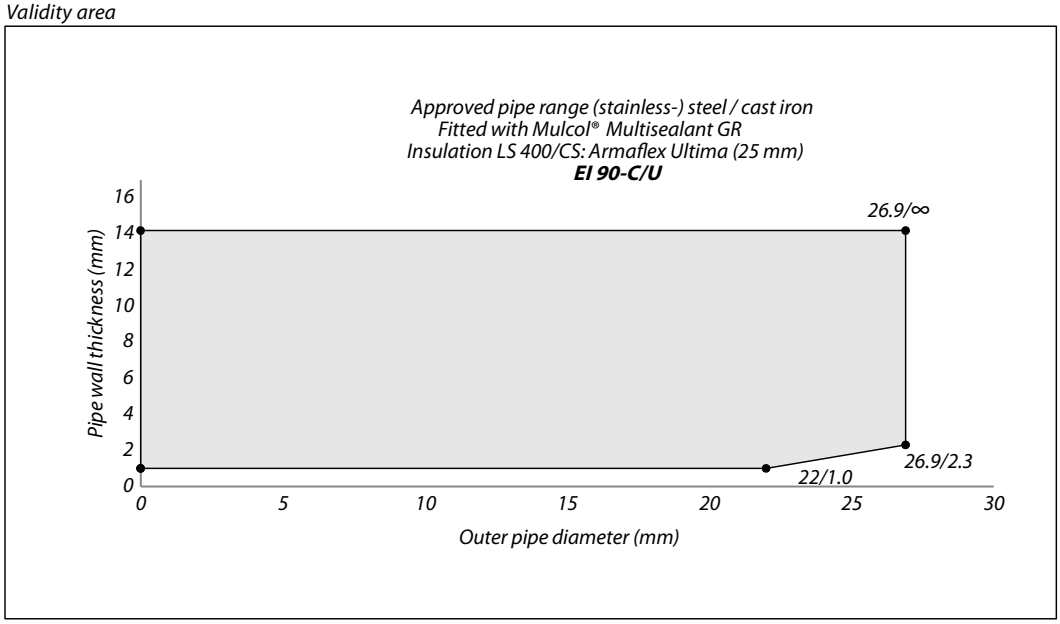
f5.11 Validity area



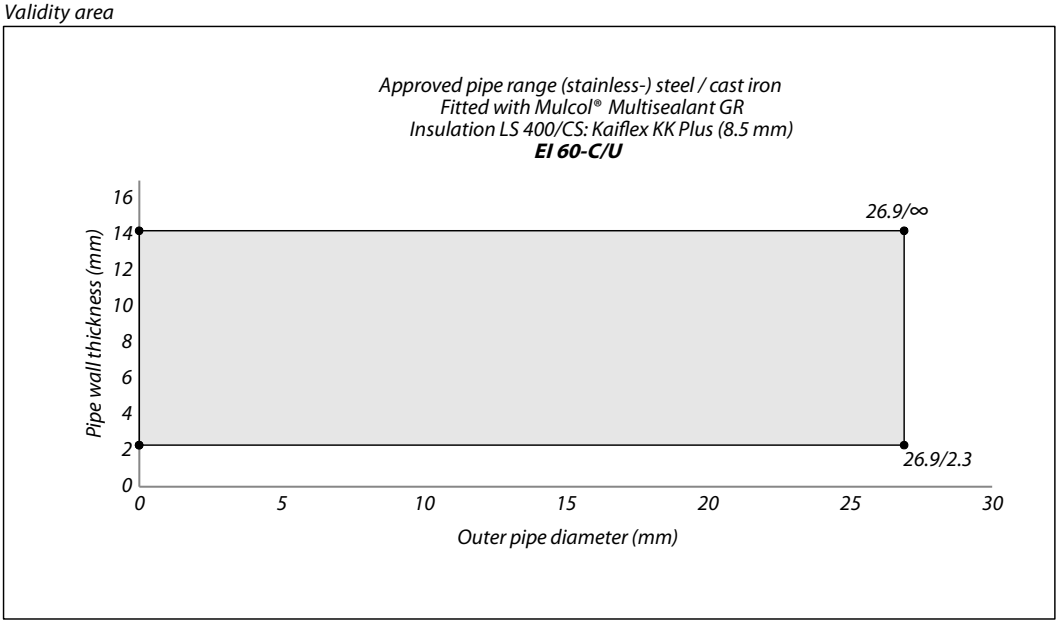
f5.12 Validity area



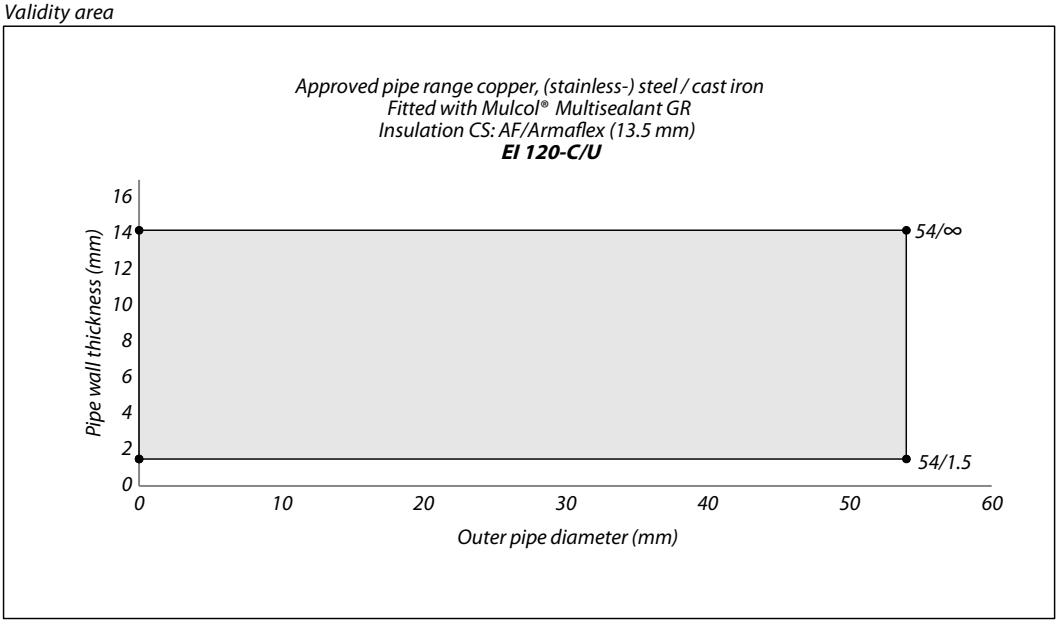
f5.13 Validity area



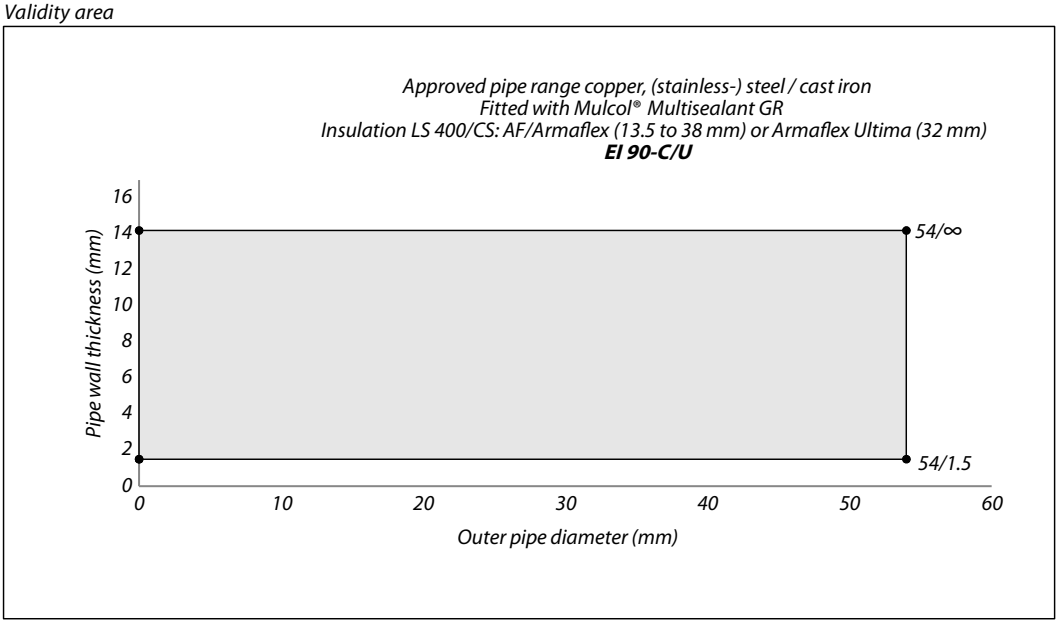
f5.14 Validity area



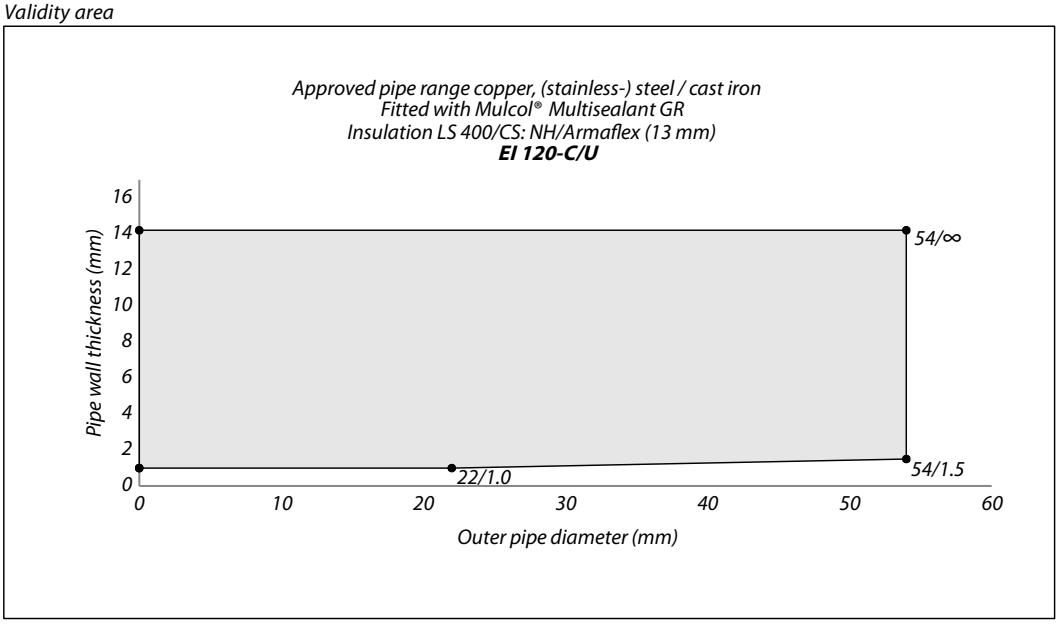
f5.15 Validity area



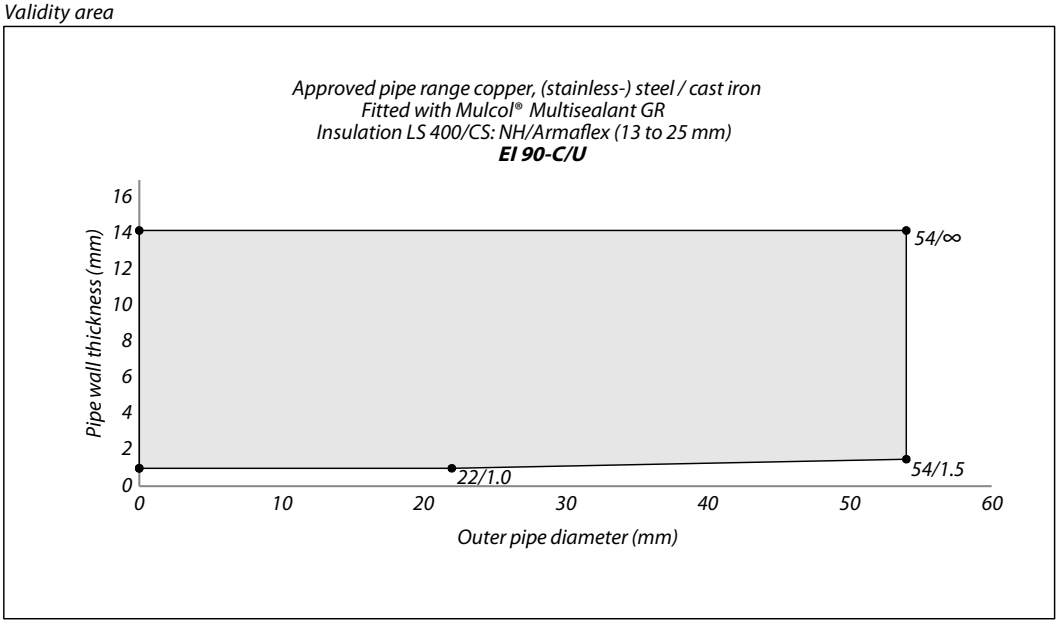
f5.16 Validity area



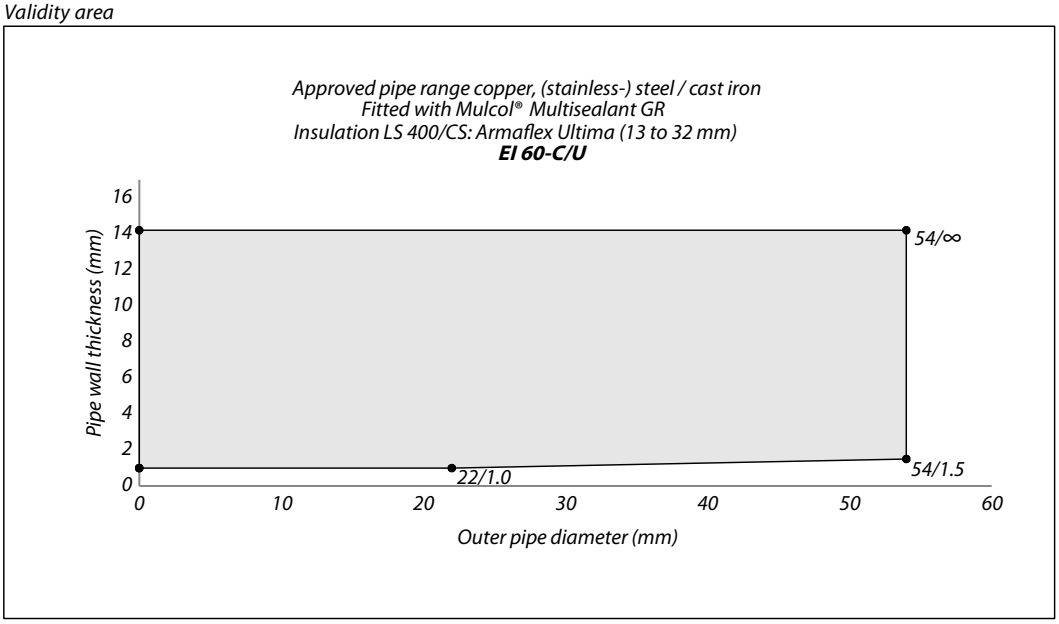
f5.17 Validity area



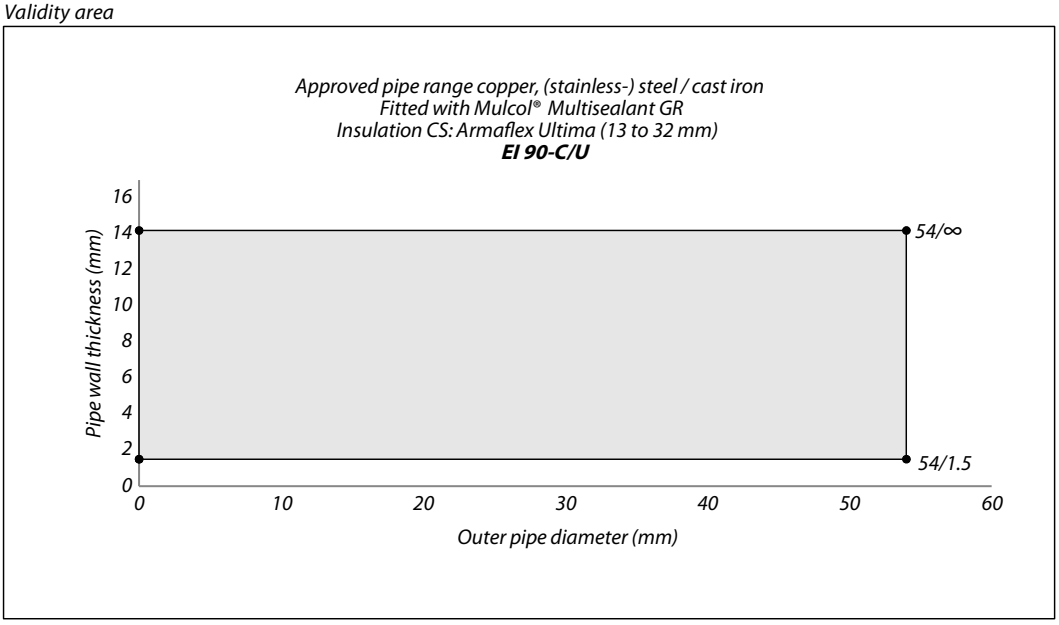
f5.18 Validity area



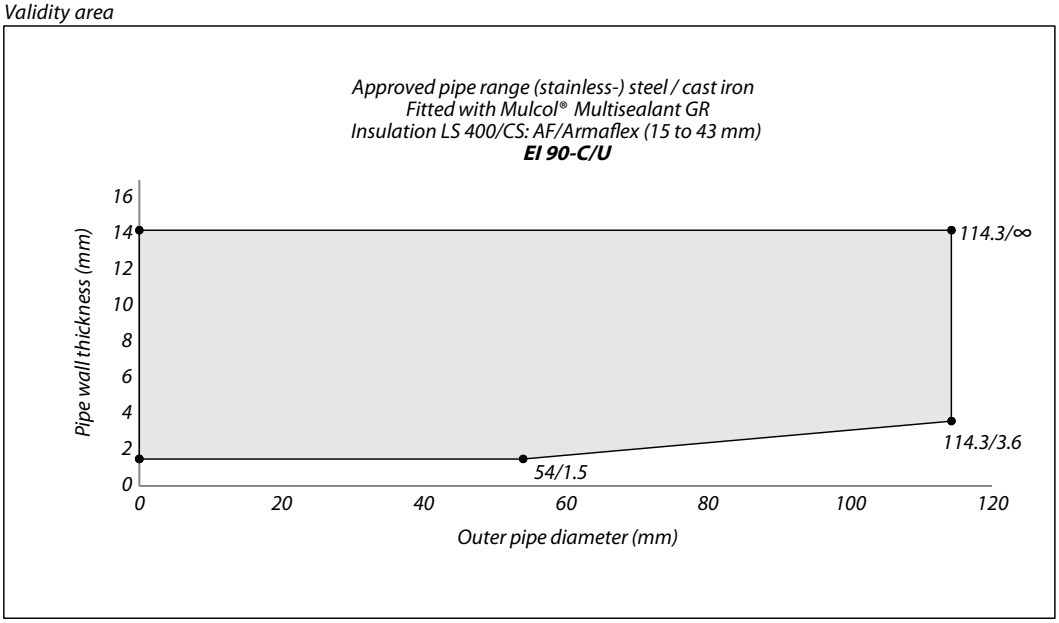
f5.19 *Validity area*



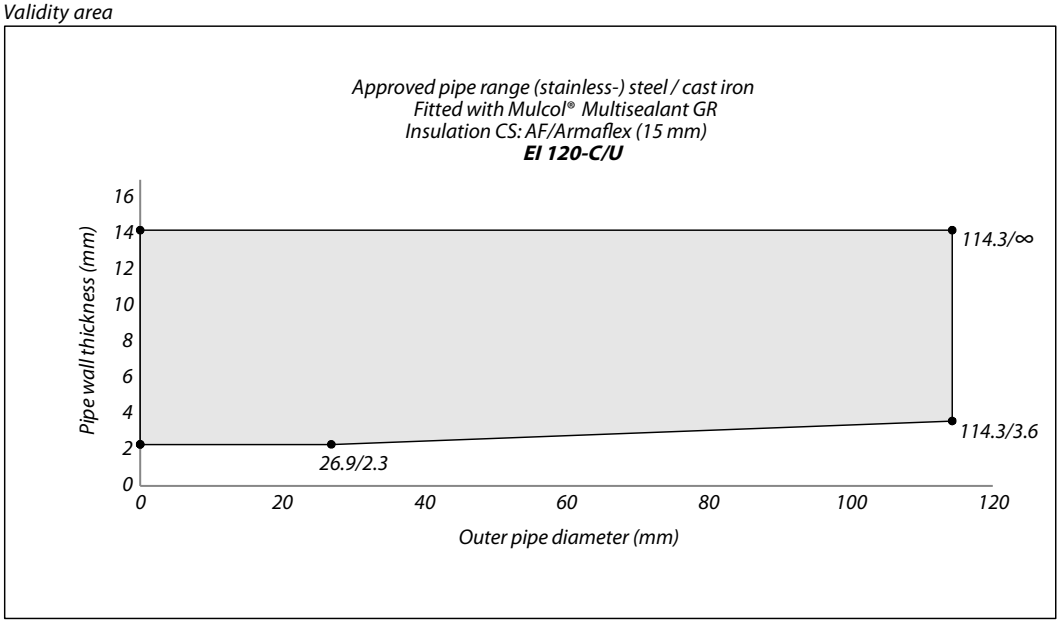
f5.20 *Validity area*



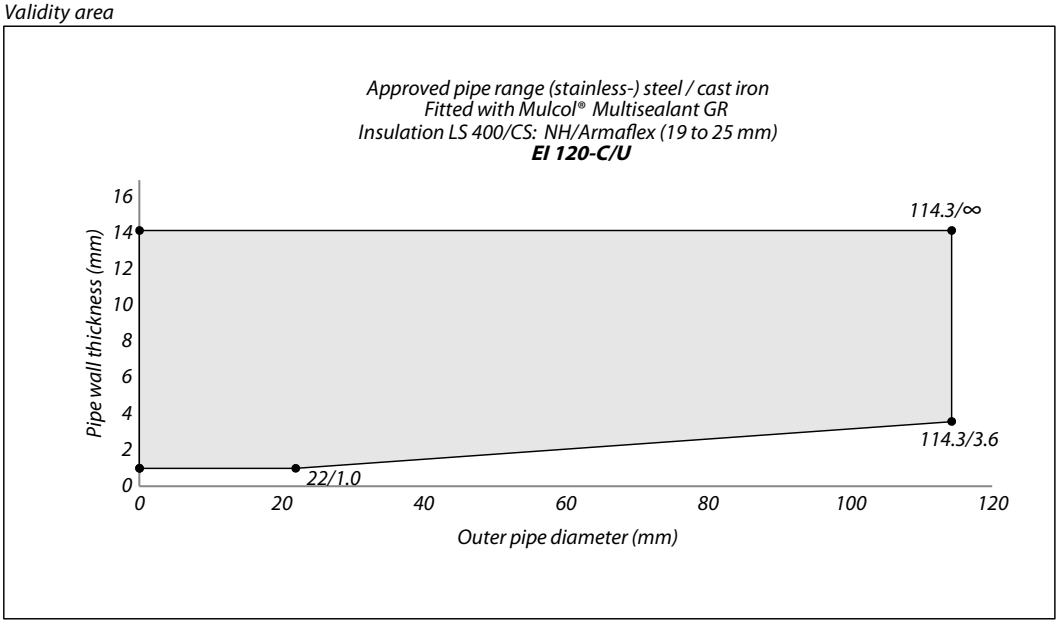
f5.21 *Validity area*



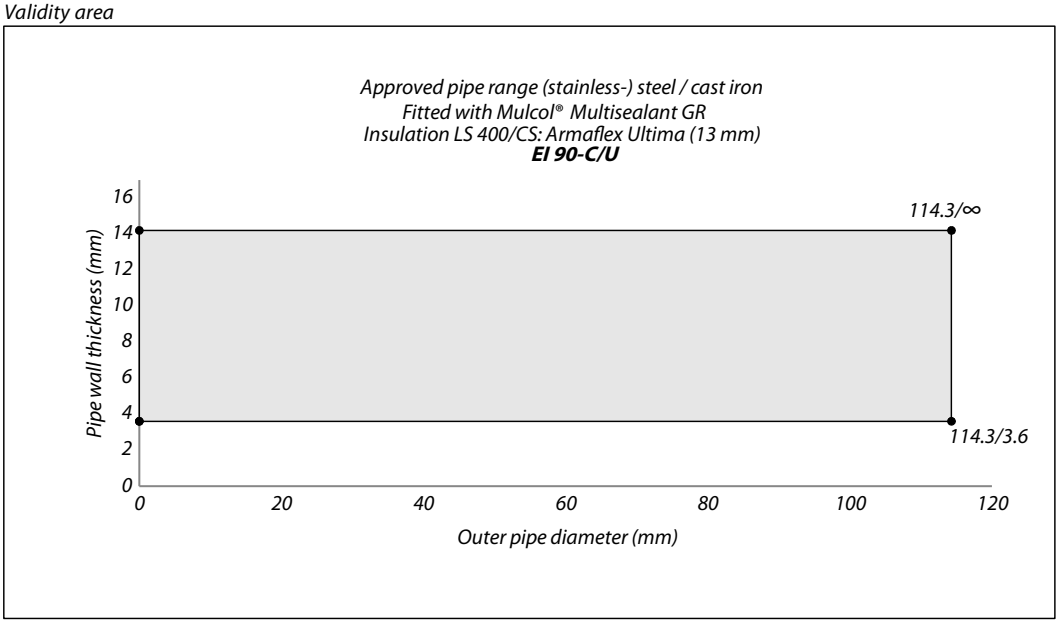
f5.22 *Validity area*



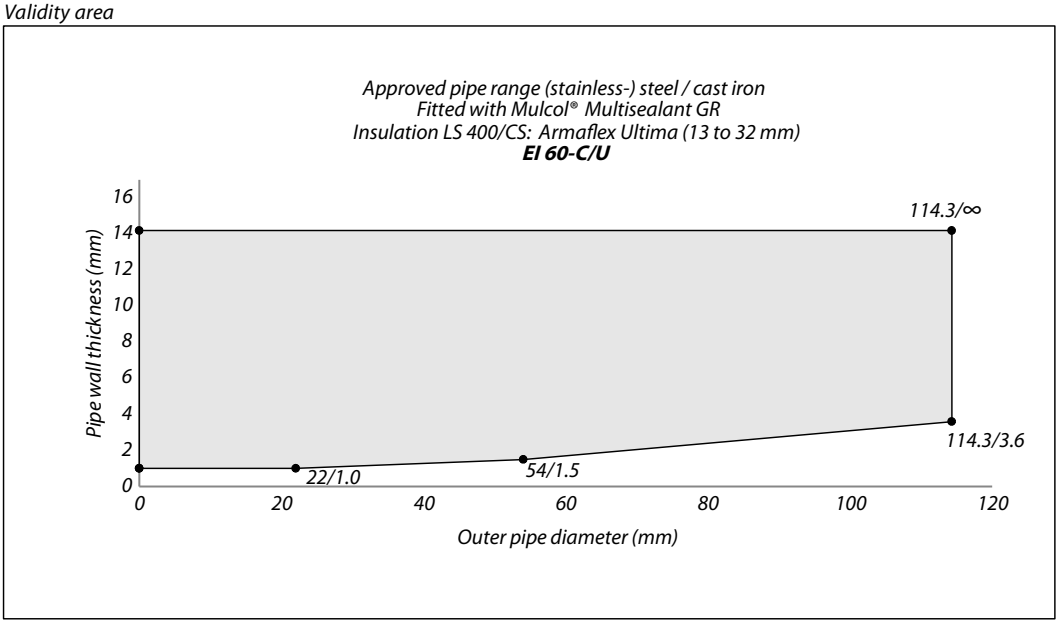
f5.23 Validity area



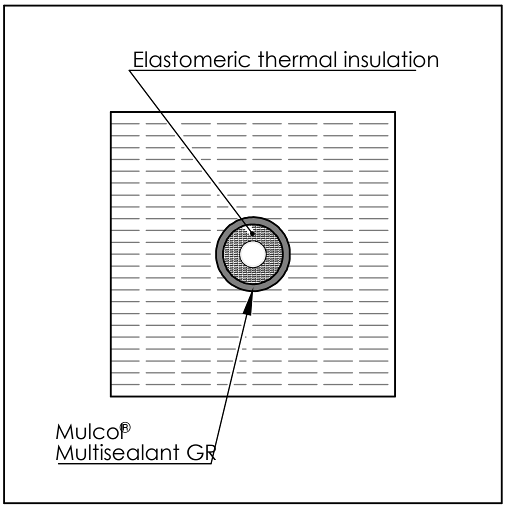
f5.24 Validity area

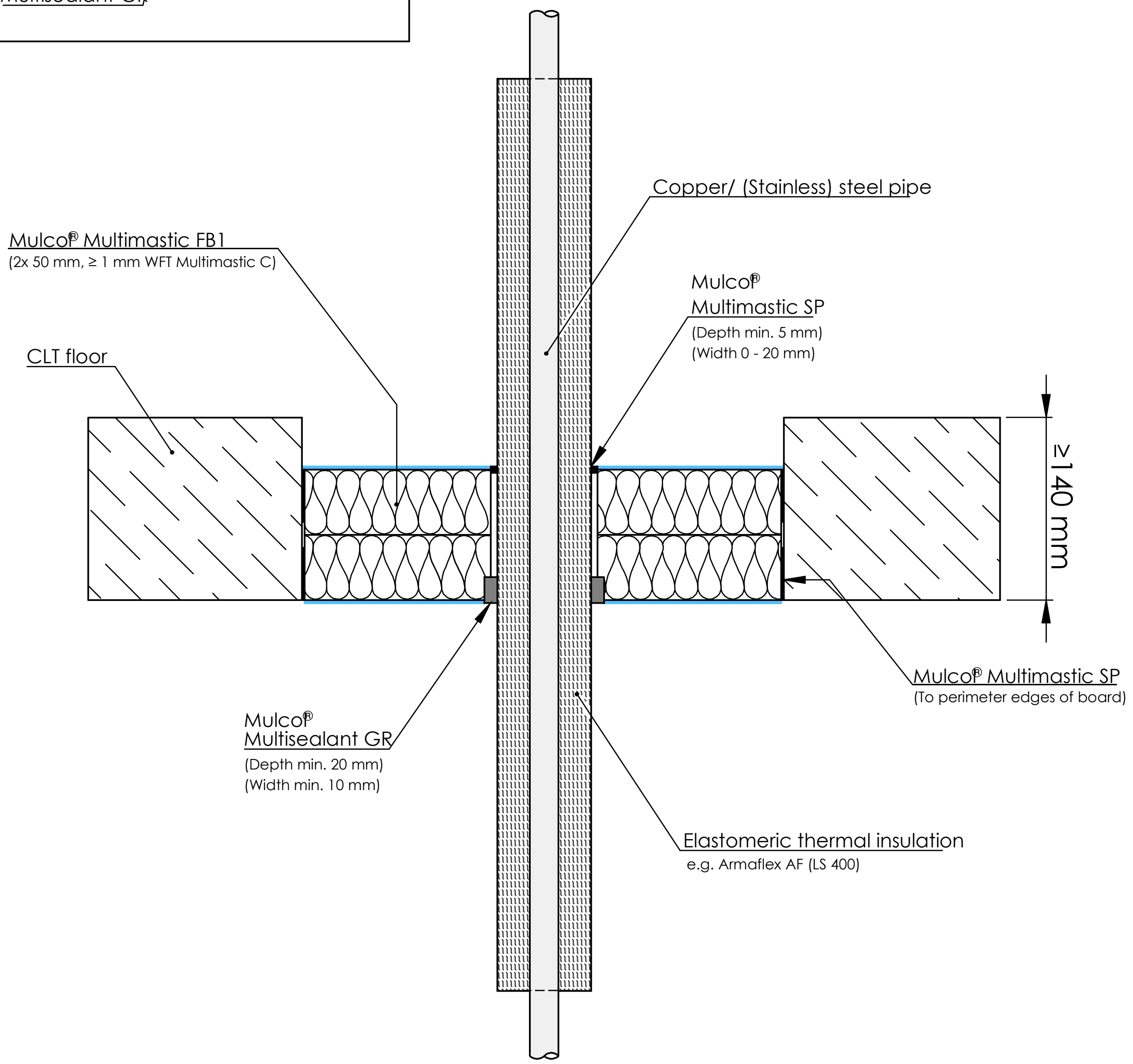


f5.25 *Validity area*



Bottom view

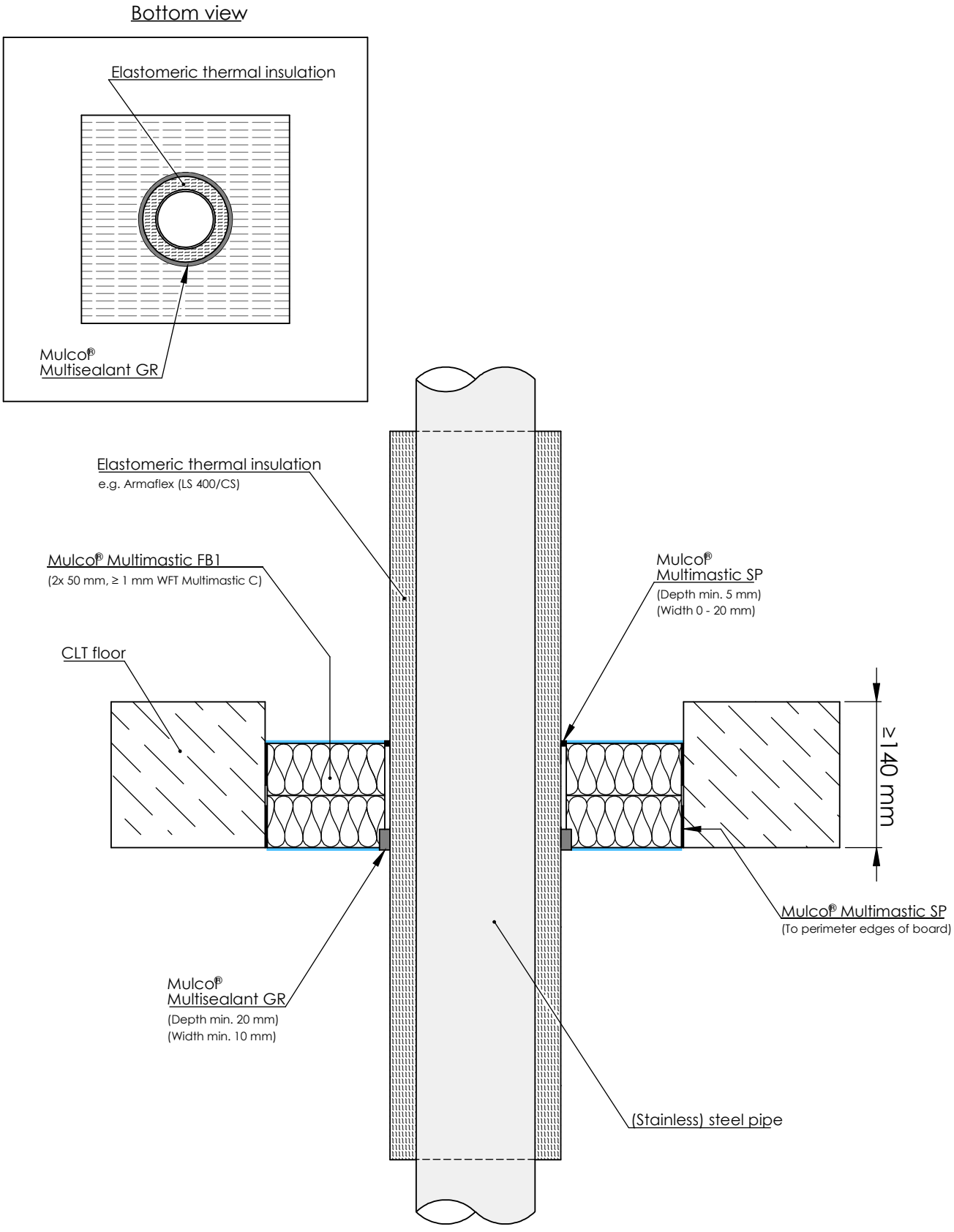




American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-MFB1-G1.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 15-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulco® Multisealant GR
Installation in wooden CLT floor



American projection	Scale :	Company : Mulcol International B.V.	FCLT-ST-MFB1-G2.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

5.6.2 Mulcol® Multimastic SP

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawings FCLT-CU-MFB1.2.20 and FCLT-ST-MFB1.2.20						
≤ 22	≥ 1.0	EI 120–C/U	Rockwool 810 (≥ 25) LS 400/CS	Copper / (stainless-) steel / cast iron	Mulcol® Multimastic SP (0-20 x ≥ 5)	5.26
≤ 54	≥ 1.5					5.27
≤ 114.3	≥ 3.6		Rockwool 810 (≥ 30) LS 400/CS	(Stainless-) steel / cast iron		5.28

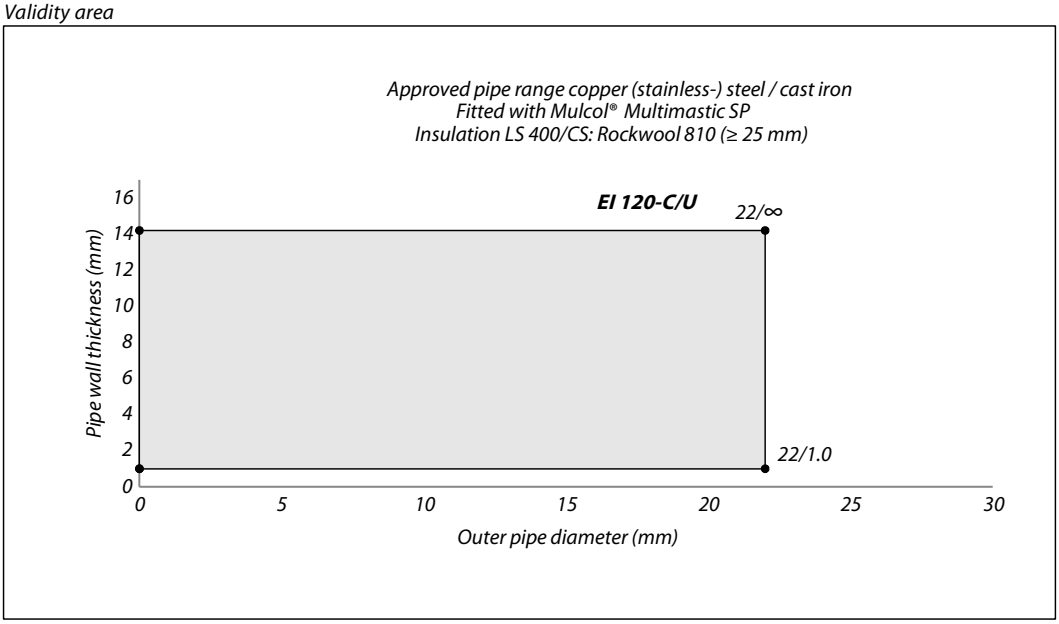
For drawings FCLT-CU-MFB1.2.22 and FCLT-ST-MFB1.2.20, the classifications are valid for insulation Rockwool 810 (including aluminium foil) with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

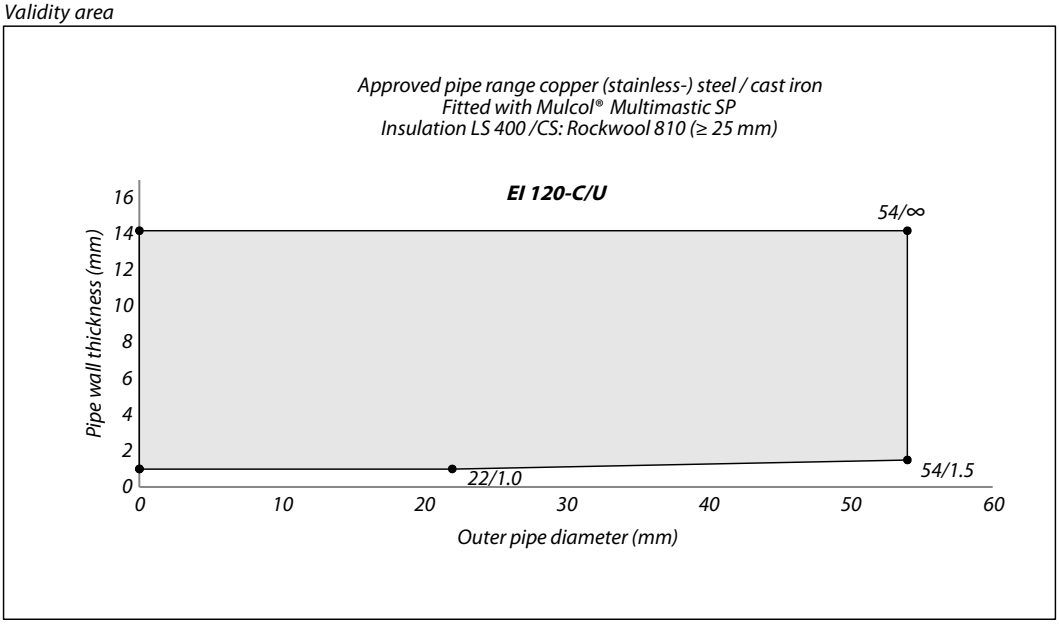
No coating Mulcol® Multimastic C is necessary on the insulation material Rockwool 810. Nevertheless if this coating is desired for optical reasons it is allowed to add Mulcol® Multimastic C onto the aluminium foil of the Rockwool 810.

The minimum working distances between the elements apply according Table 5.1.

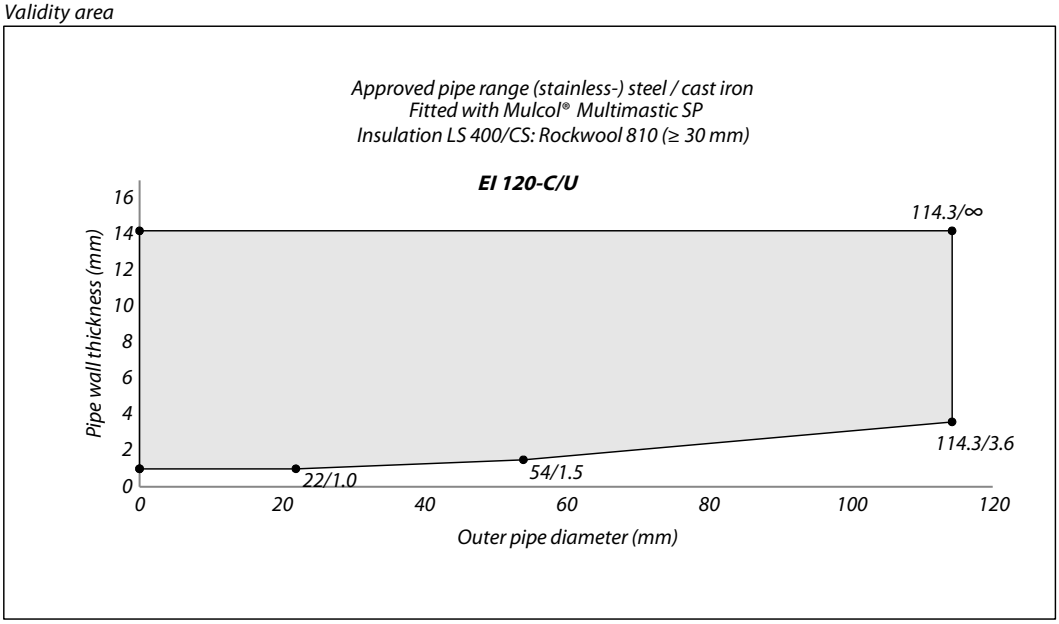
f5.26 *Validity area*



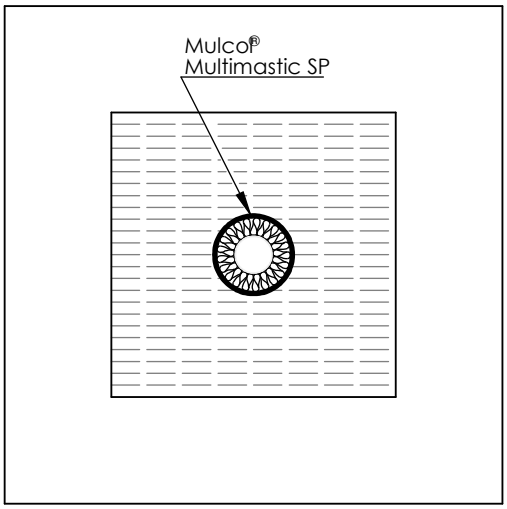
f5.27 *Validity area*

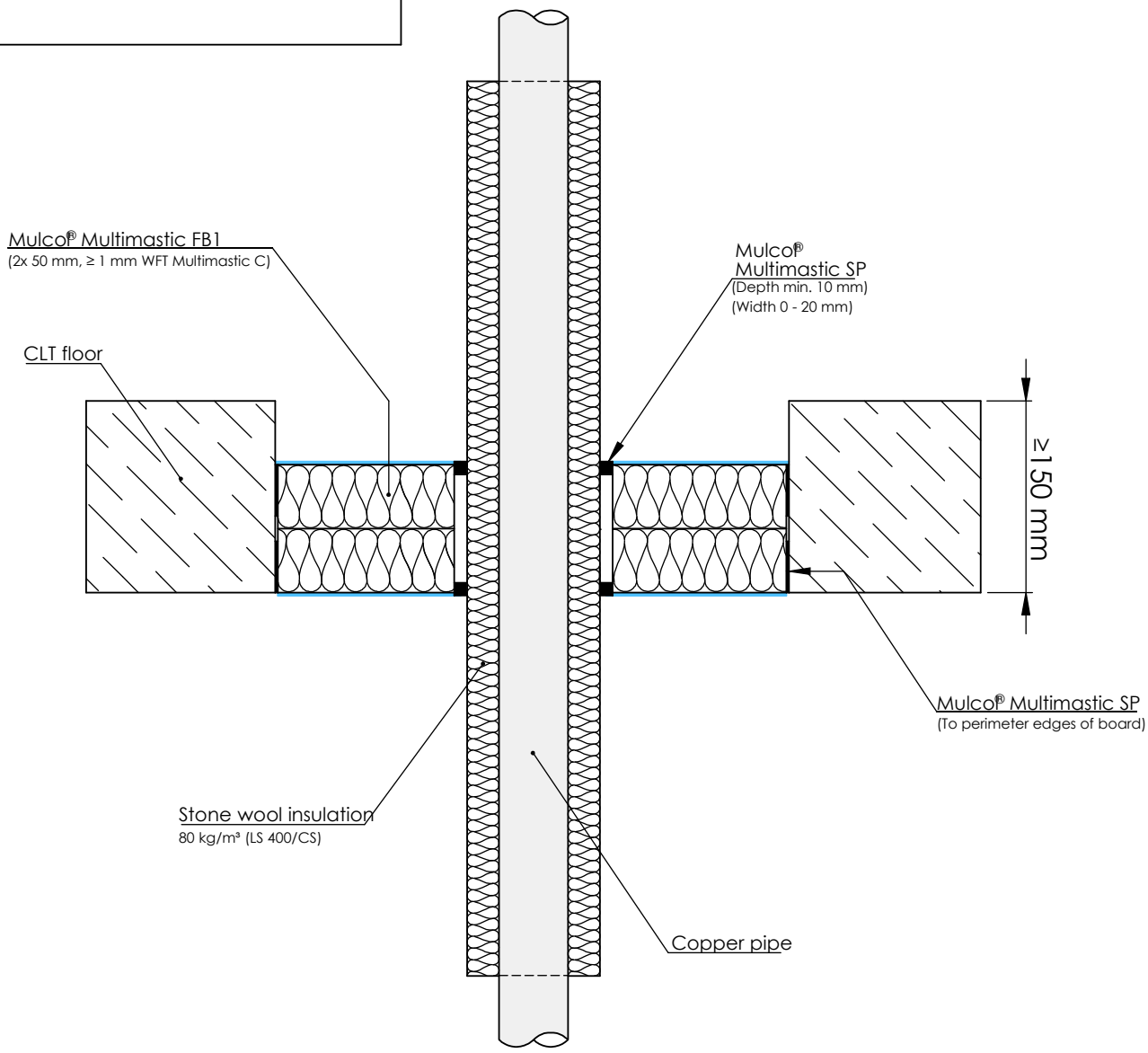


f5.28 Validity area



Bottom view



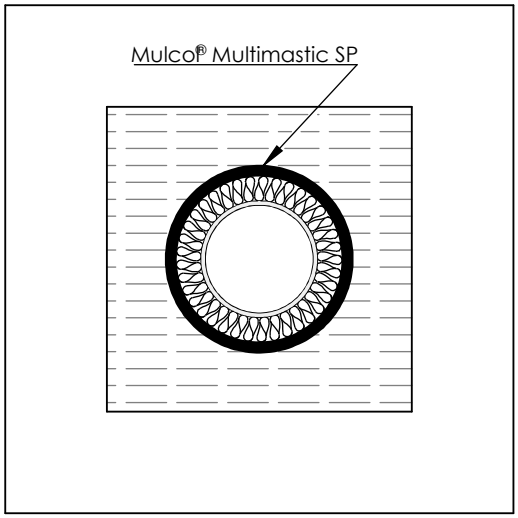


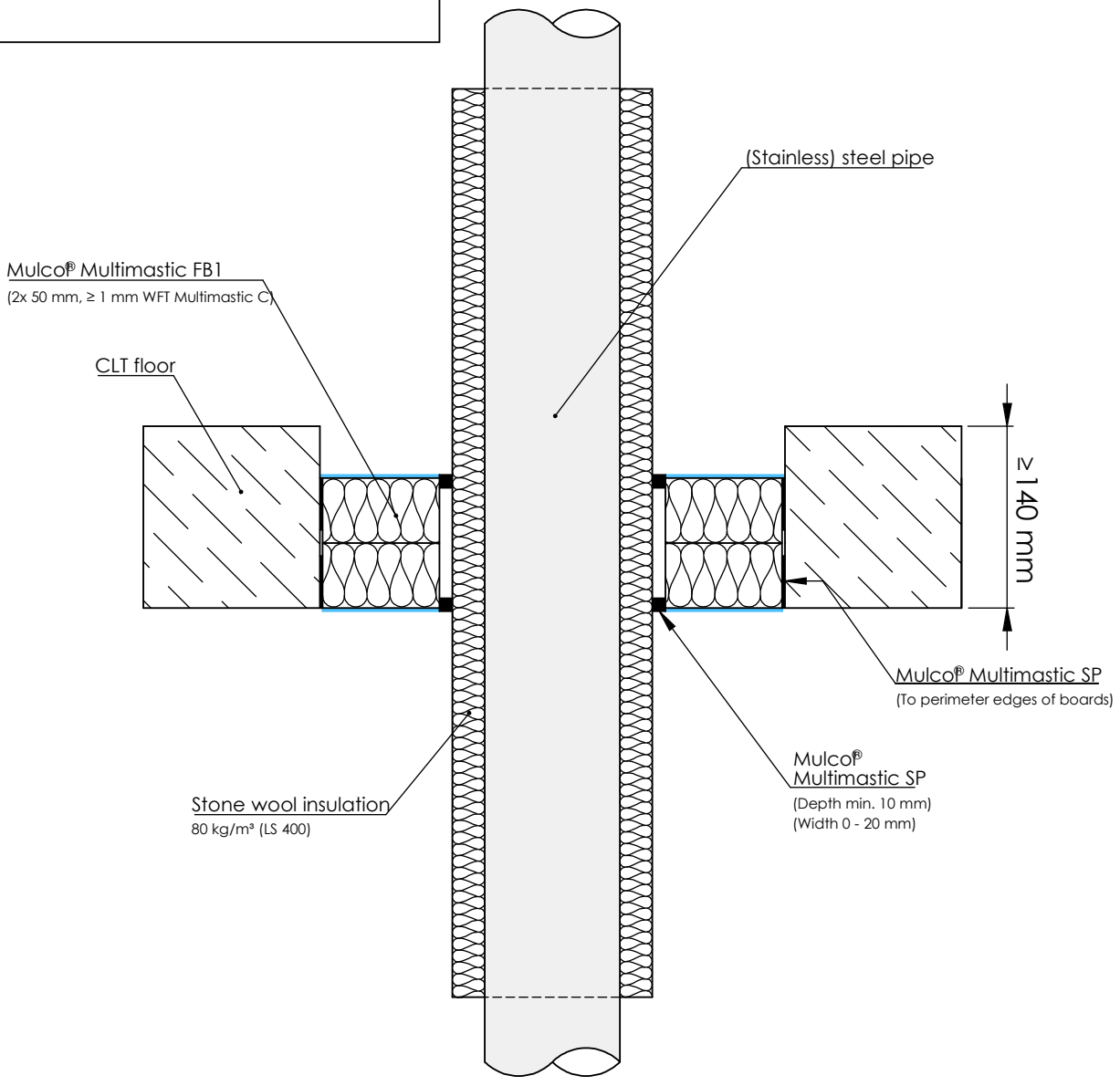
American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-MFB1.2.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-ST-MFB1.2.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 23-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

YA 2746-1E-RA-001 | EA0E1E2B | HARML

5.6.3 Mulcol® Multiwrap

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) LS 400/CS	Pipe material	System	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-MW2-MFB1.2.22 and FCLT-ST-MW2-MFB1.2.22						
≤ 12	≥ 1.0	EI 120–C/U	AF/Armaflex (11)	Copper, (stainless-) steel / cast iron	Mulcol® Multiwrap (2 layers)	5.29
		EI 90–C/U	AF/Armaflex (11 to 28.5)			5.30
≤ 54	≥ 1.5	EI 45–C/U E 90–C/U	AF/Armaflex (13.5 to 28.5)			5.31
		EI 90–C/U	AF/Armaflex (28.5)			5.32
≤ 168.3	≥ 4.5	EI 45–C/U E 120–C/U	AF/Armaflex (13 to 19)	(Stainless-) steel / cast iron		5.33

The classifications are valid for insulation AF/Armaflex with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

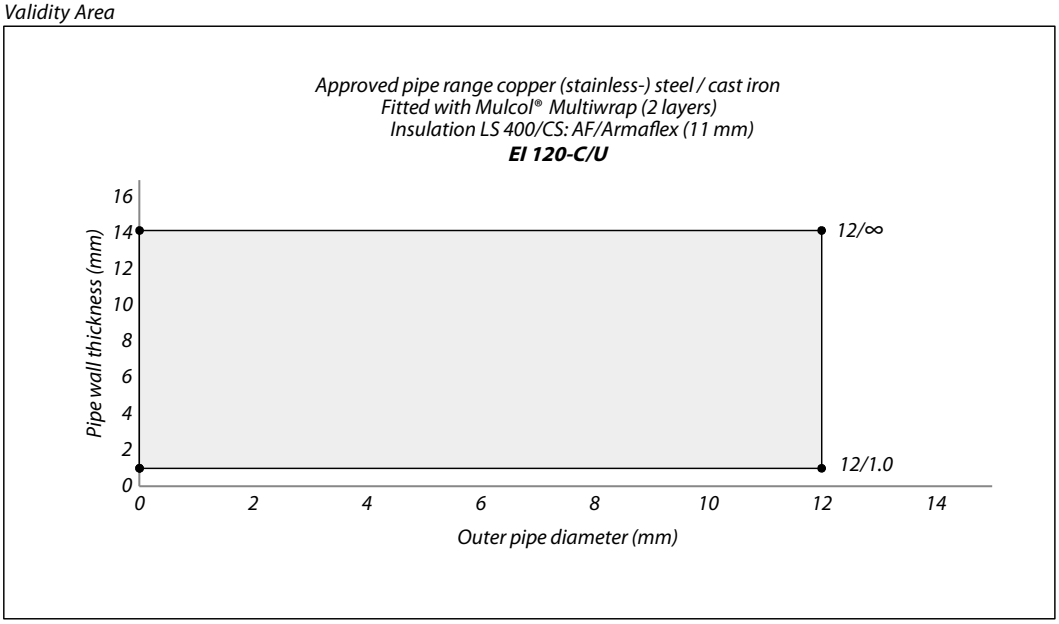
For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

The Mulcol® Multiwrap may protrude a maximum of 5 mm from the surface of the penetration seal.

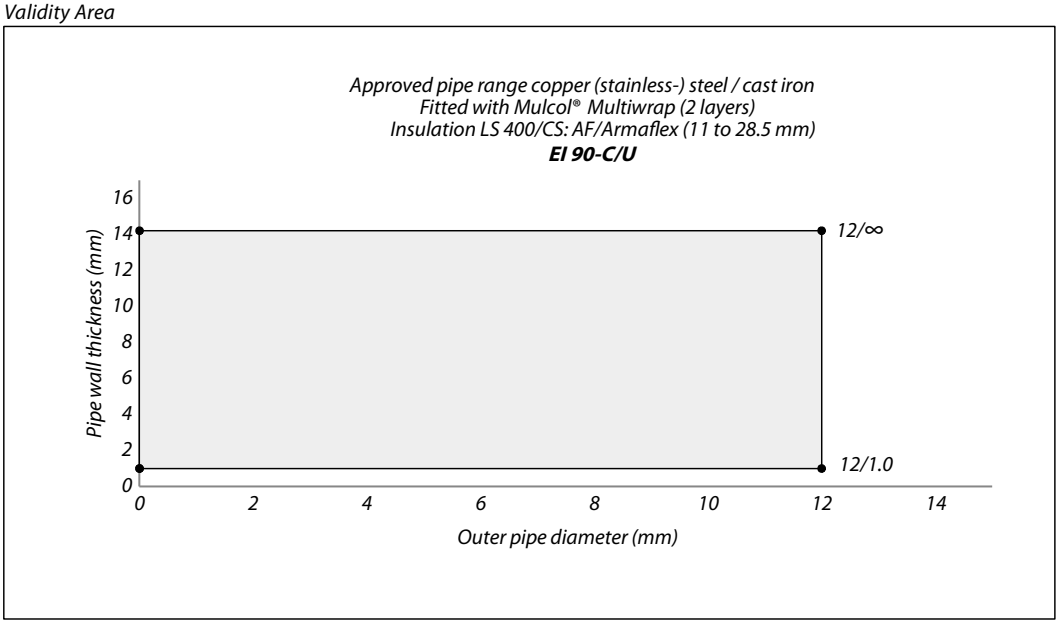
When the insulation consist out of multiple parts or splices are present, the insulation is glued together with appropriate glue for the insulation type.

The minimum working distances between the elements apply according Table 5.1.

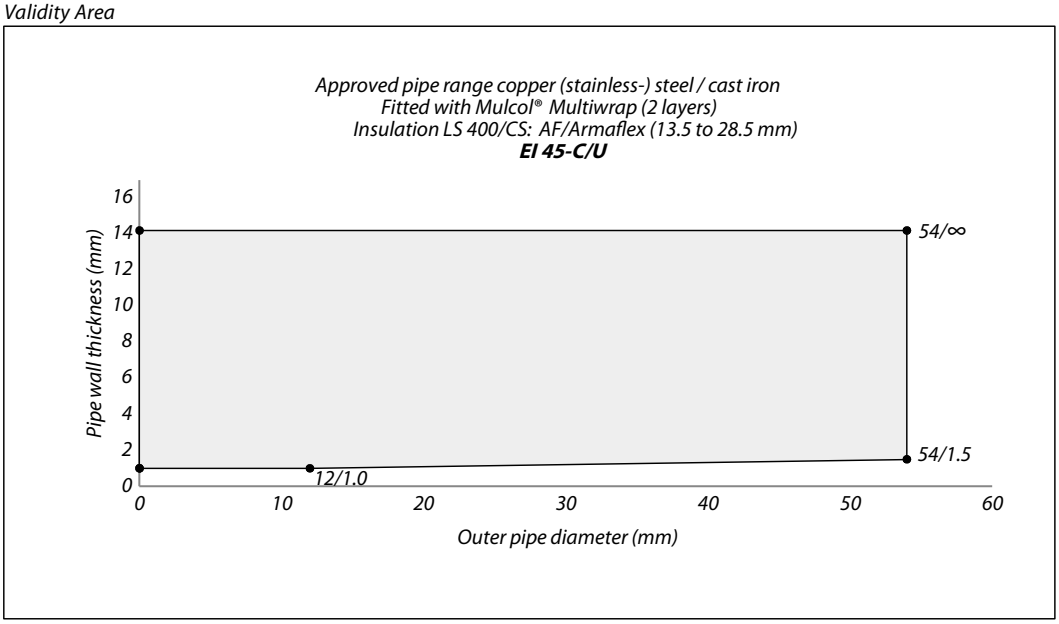
f5.29 Validity Area



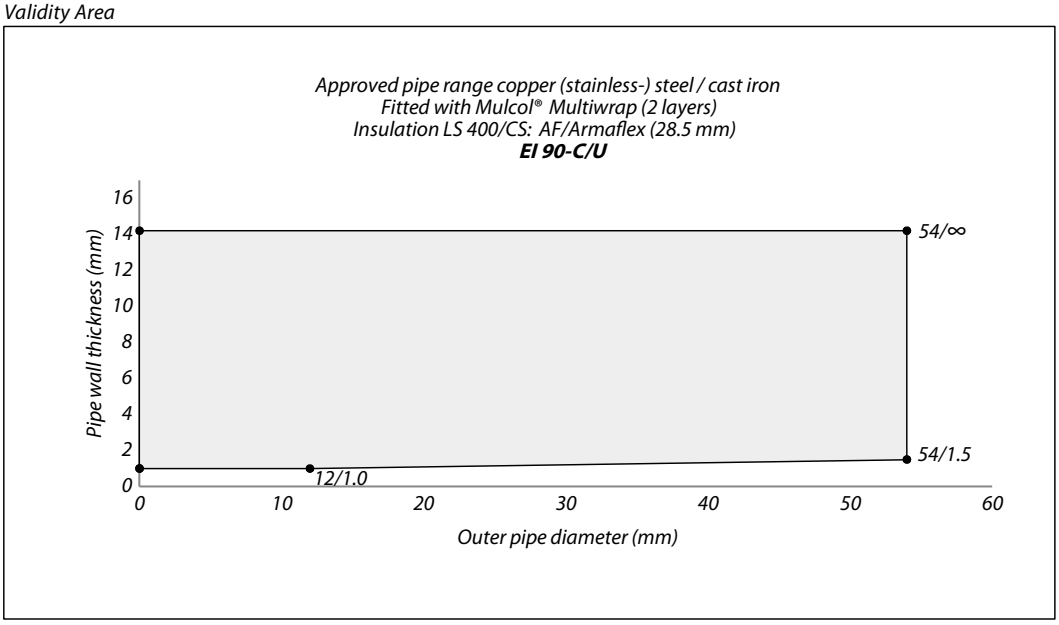
f5.30 Validity Area



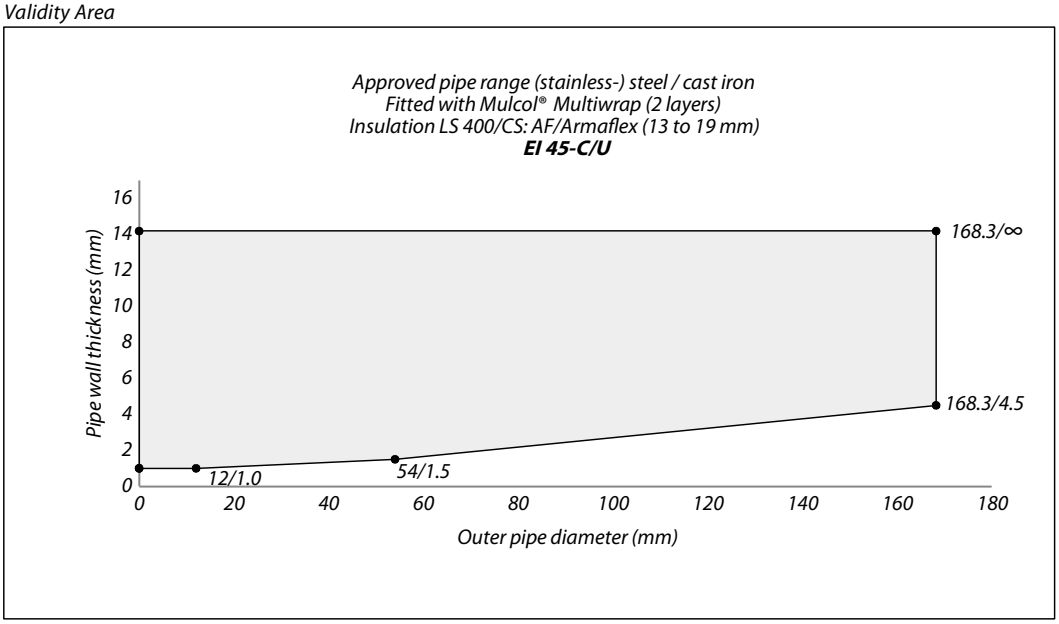
f5.31 Validity Area



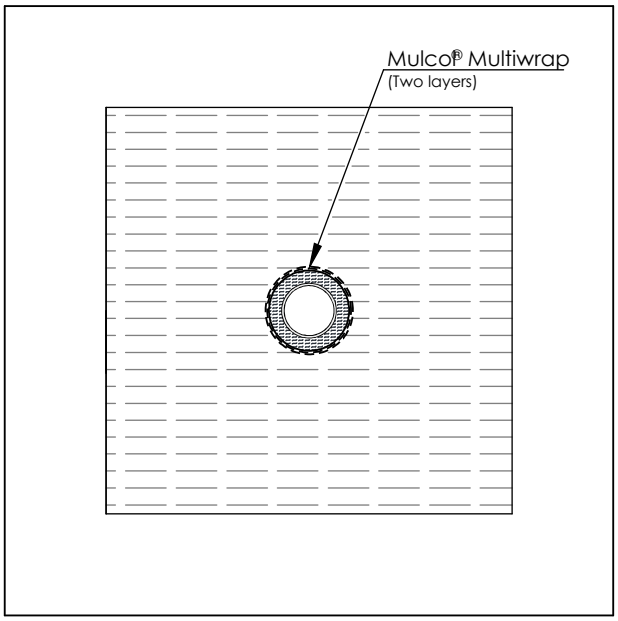
f5.32 Validity Area

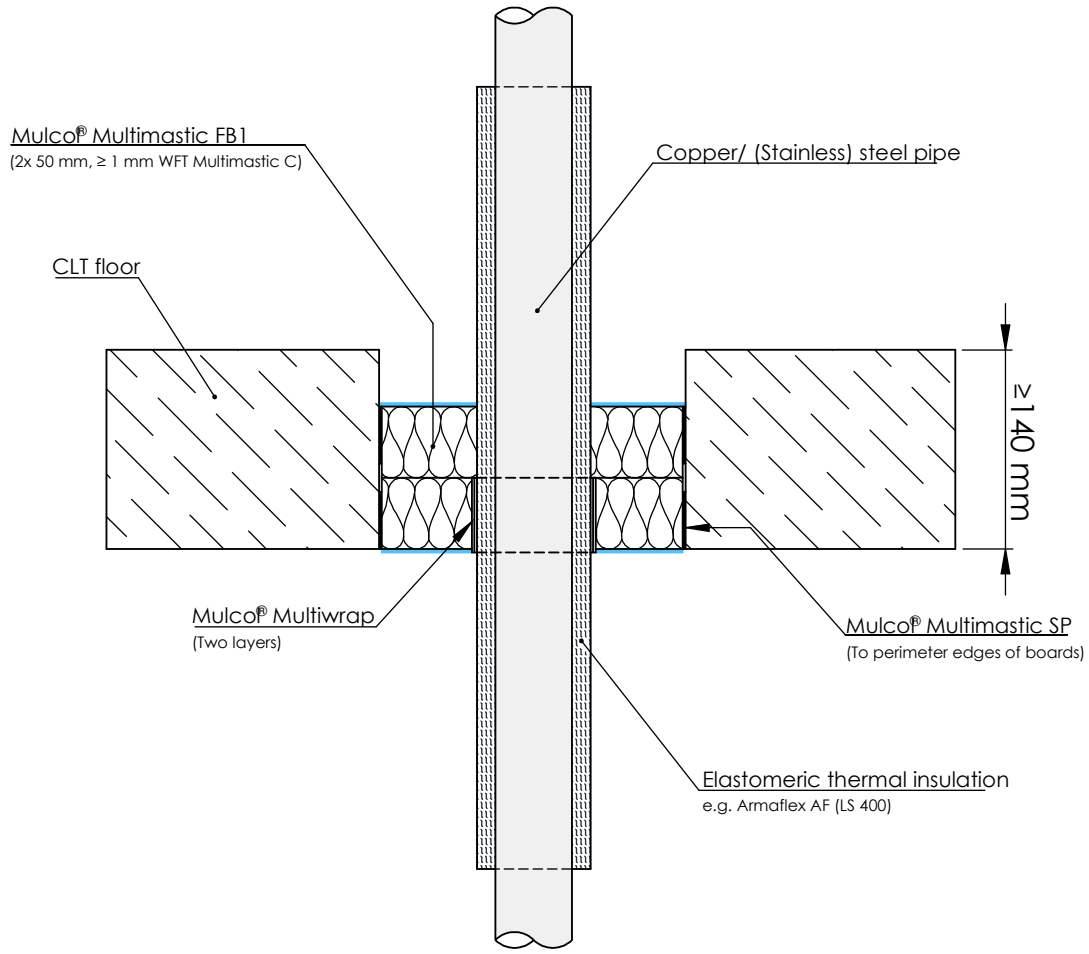


f5.33 Validity Area



Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-MW2-MFB1.2.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 23-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

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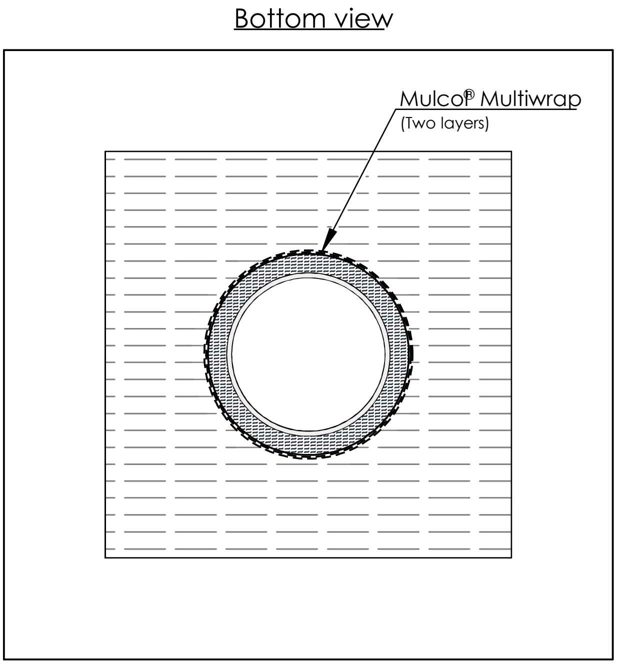
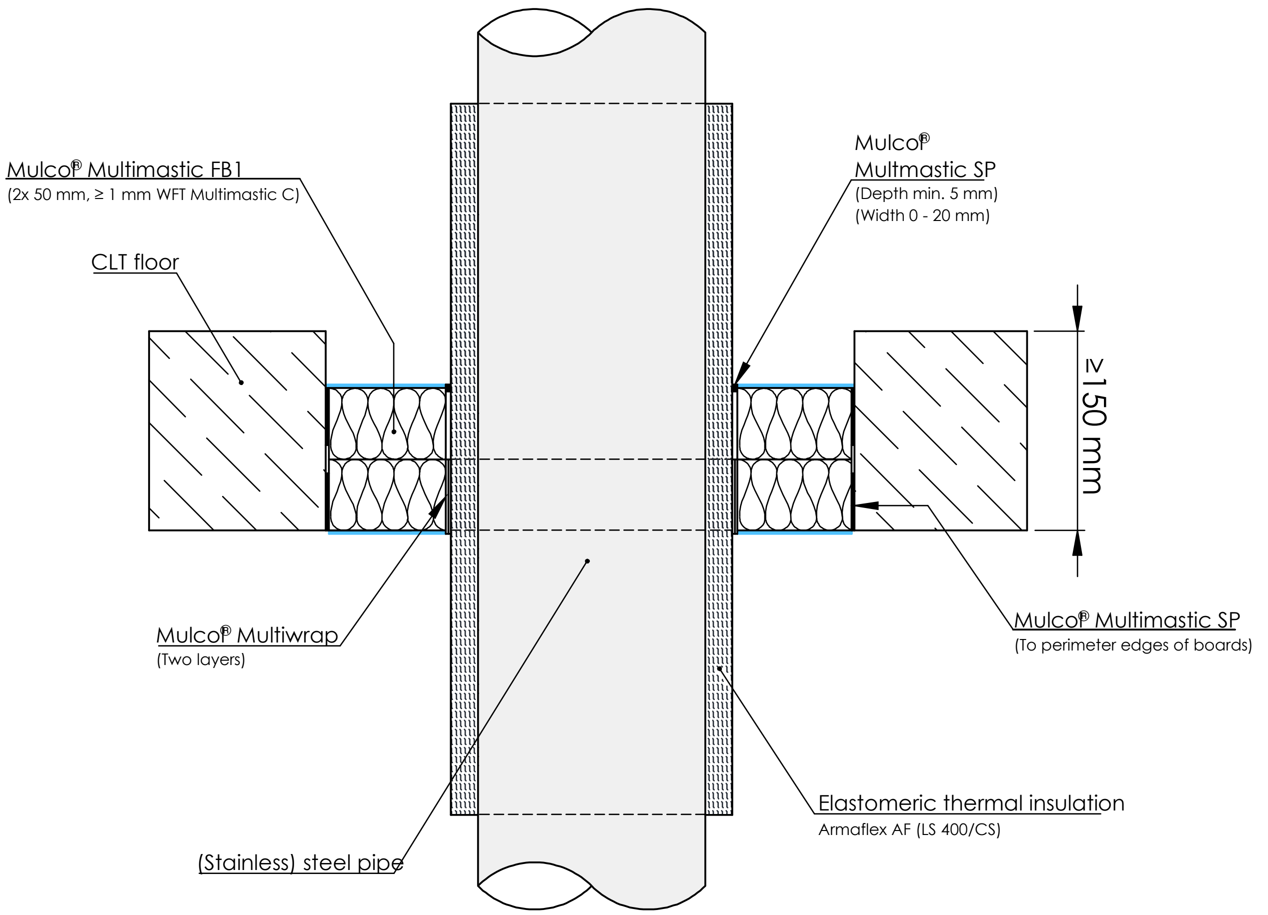




American projection	Scale :	Company : Mulcol International B.V.	FCLT-ST-MW2-MFB1.1.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 22-5-2023	Draftsman : K.J.	

MULCOL
FIRE PROTECTION

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

YA 2746-1E-RA-001 (EA0E1E2B) HARML

5.6.4 Mulcol® Multidisc

On the next pages, classifications, conditions and drawings of this system inside a mixed seal are given.

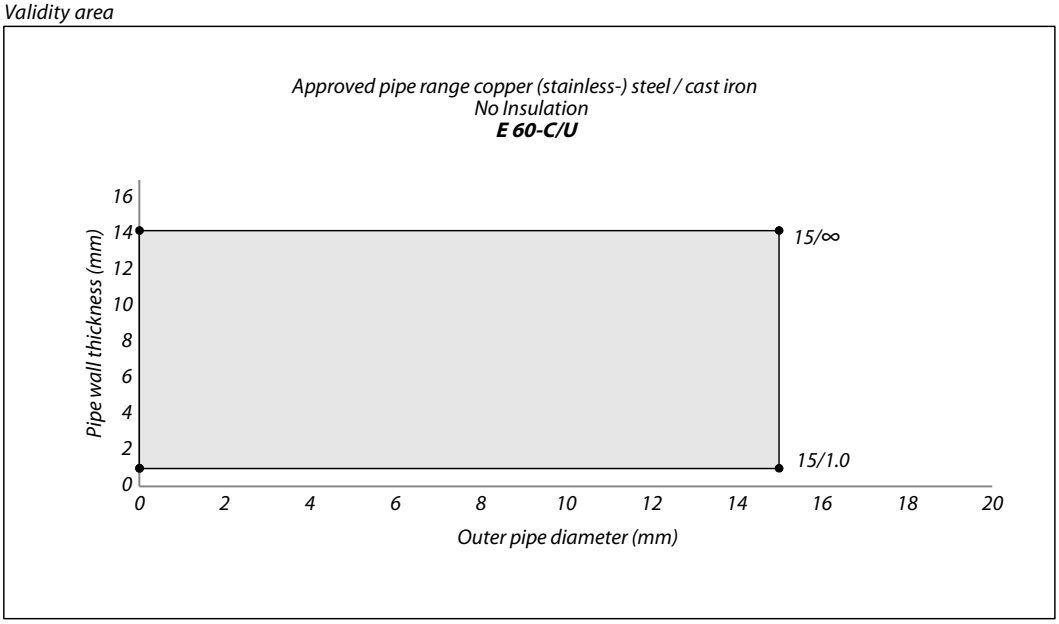
Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm)	Pipe material	System	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-MFB1-M2.0.10						
≤ 15	≥ 1.0	E 60–C/U	No insulation	Copper / (stainless-) steel / cast iron	Mulcol® Multidisc	5.34

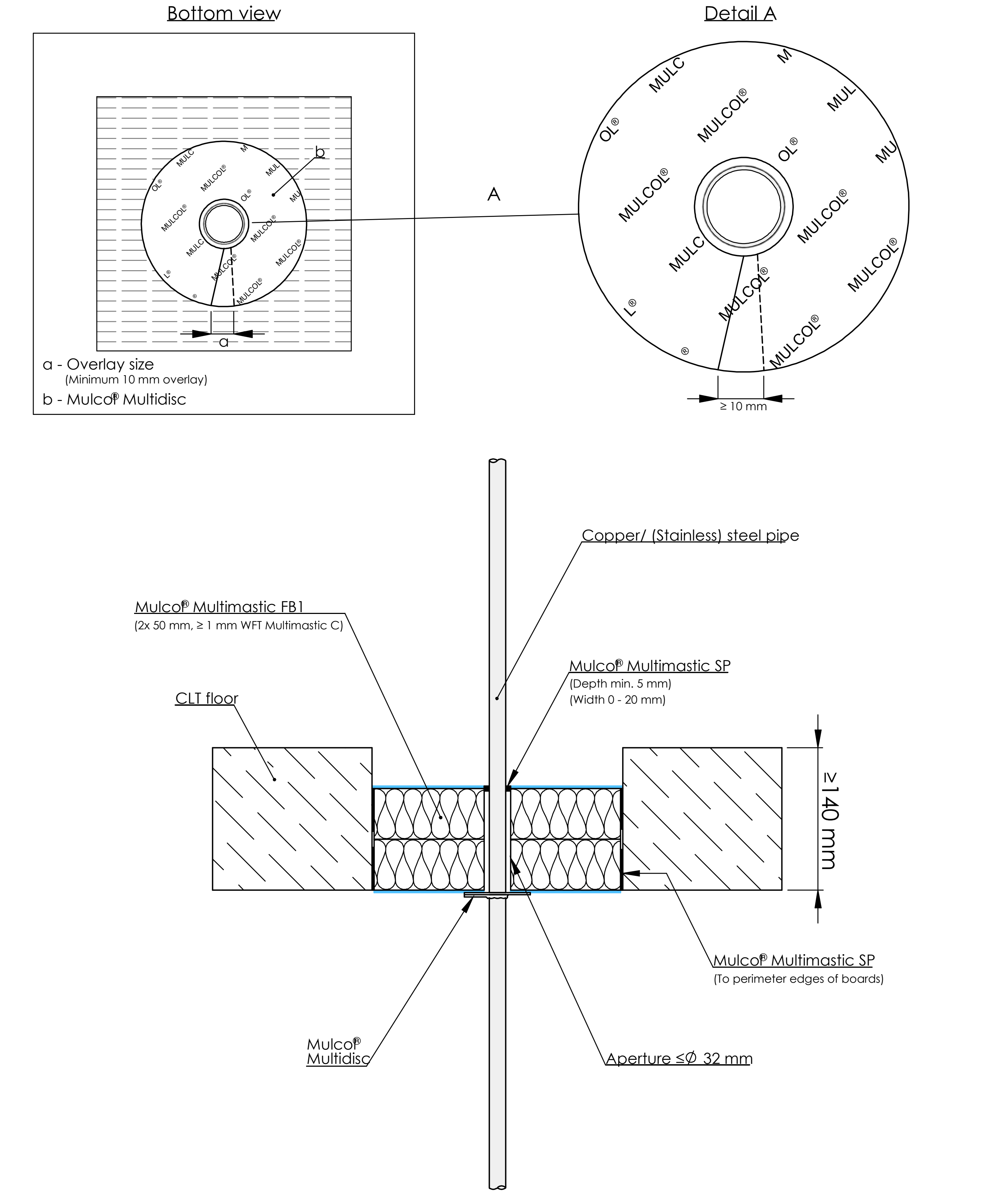
The holes for the penetrations seals fitted with the Mulcol® Multidisc shall be less than Ø26 mm. The Mulcol® Multidisc must be fitted below the floor.

For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

The minimum working distances between the elements apply according Table 5.1.

f5.34 Validity area





American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-MFB1-M2.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 25-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multidisc
Installation in wooden CLT floor

5.7 Sheathed cables – directly through the CLT floor

5.7.1 Mulcol® Multisealant GR

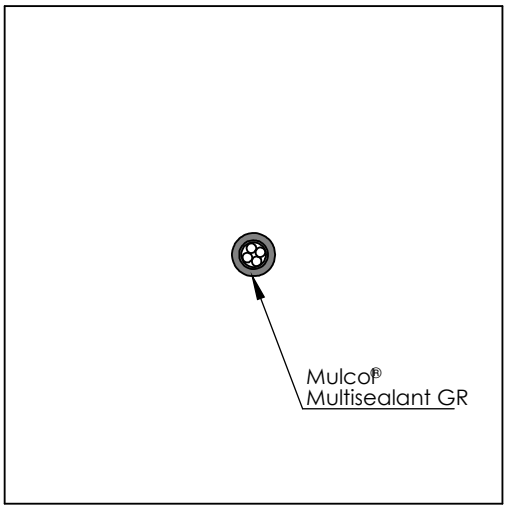
The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

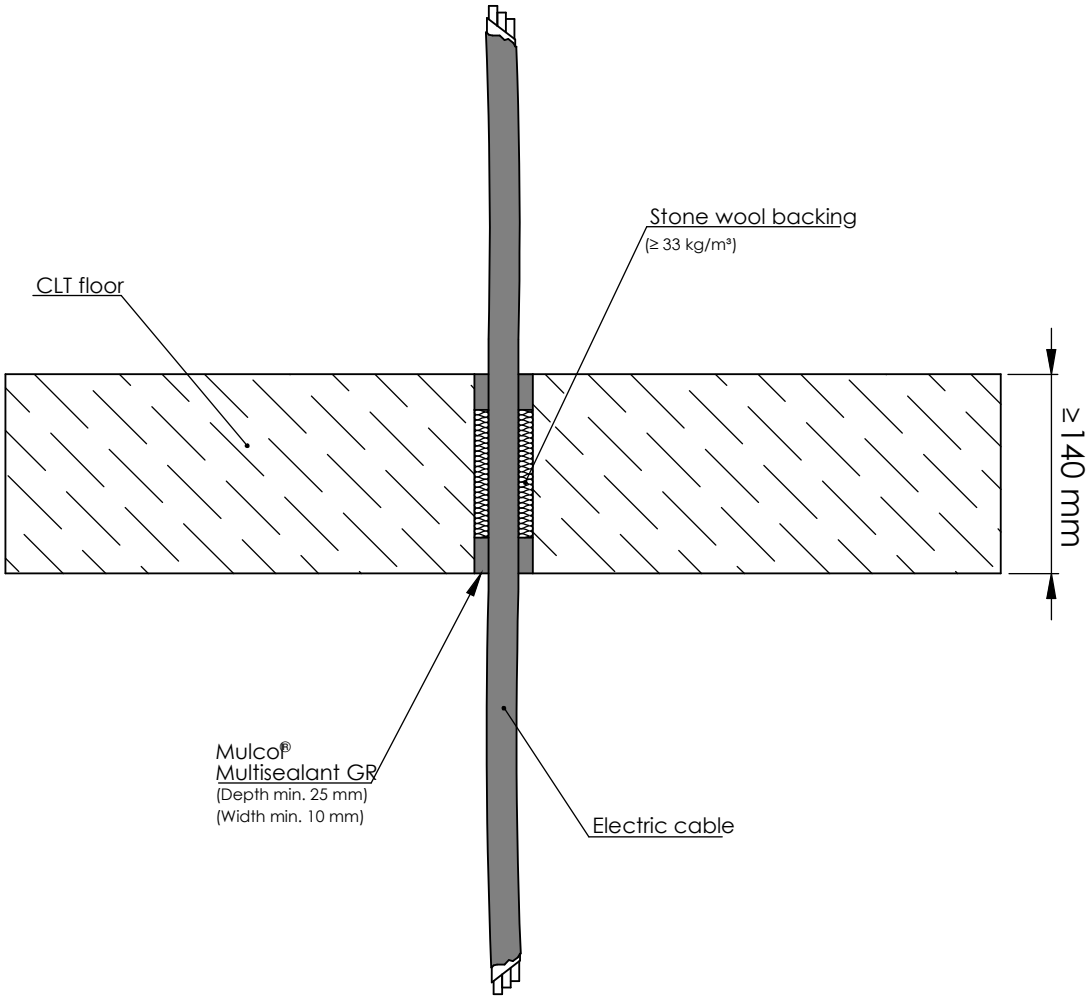
A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification		
Cable groups	**Performance class**	**System** width x depth (mm)
Drawing FCLT-EC-G2.19.10		
Single sheathed cable up to Ø21 mm (including optical fibres and coaxial cable)	**EI 120–U/C**	**Mulcol® Multisealant GR** (≥ 10 x ≥ 25) (backing 90 mm)
Drawing FCLT-ECB-G2.19.10		
Telecommunication cables up to Ø21 mm (bundle ≤ Ø100 mm)	**EI 120–U/C**	**Mulcol® Multisealant GR** (≥ 10 x ≥ 25) (backing 90 mm)

It is mandatory to apply Mulcol® Multisealant GR in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

Bottom view



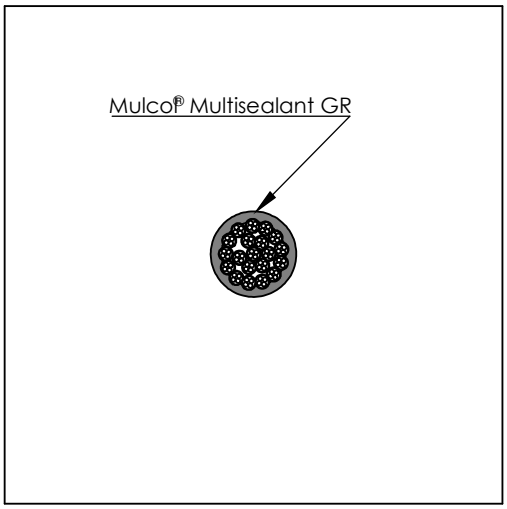


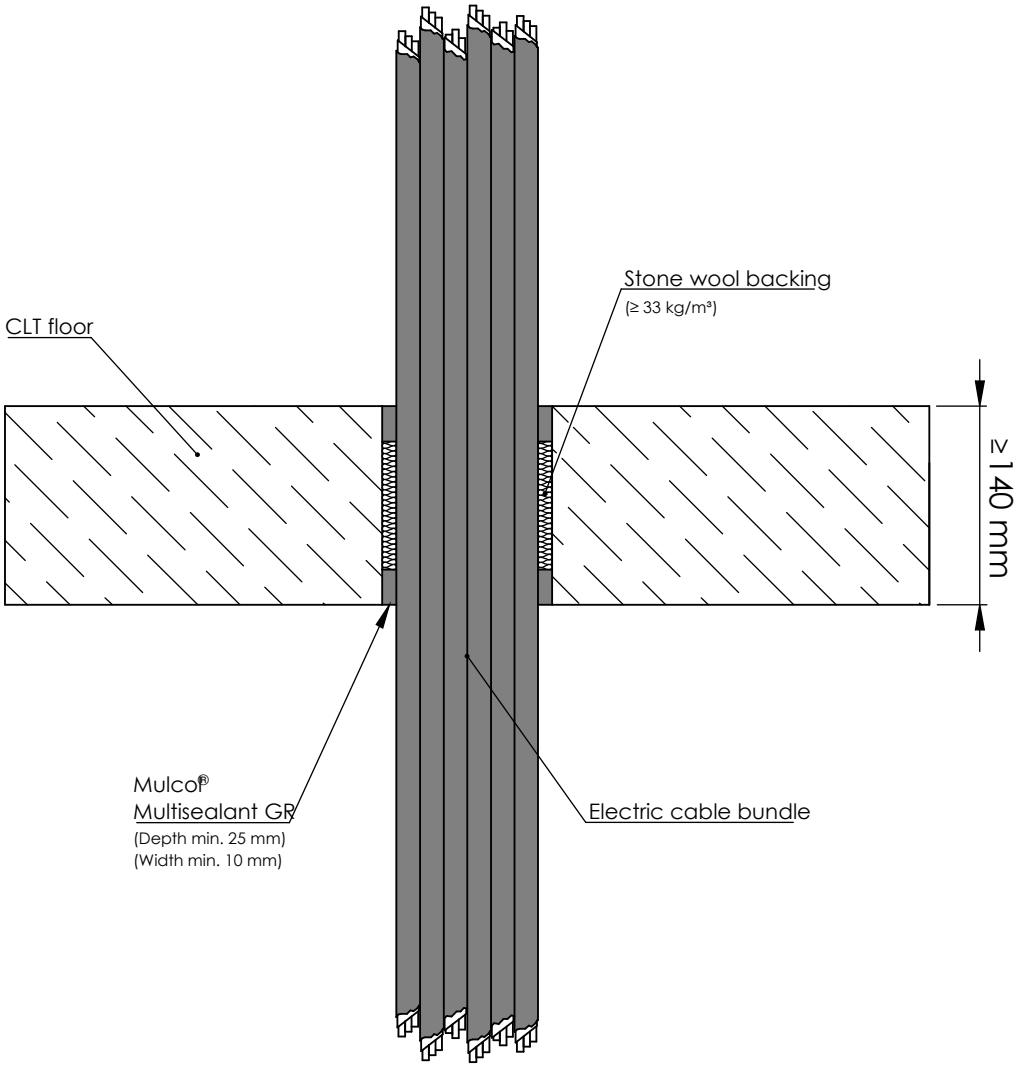
American projection	Scale :	Company : Mulcol International B.V.	FCLT-EC-G2.19.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 25-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test cable penetration seal
Mulcol® Multisealant GR
Installation in wooden CLT floor

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-ECB-G2.19.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 25-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

5.7.2 Mulcol® Multidisc

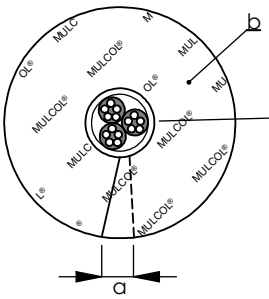
The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification			
Number of cables	**Genetic type**	**Performance class**	**System**
Drawing FCLT-EC25-M2.0.10			
≤ 3	**YMVK 5 x 2.5 mm²**	**EI 120–U/C**	**Mulcol® Multidisc**

The holes for the penetrations seal shall be ≤ Ø26 mm. It is mandatory to apply one Mulcol® Multidisc below the floor. A backing of Rockwool (density 33 kg/m³) is mandatory.

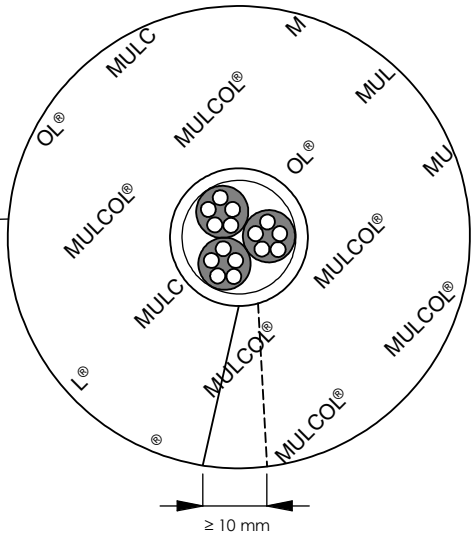
Bottom view

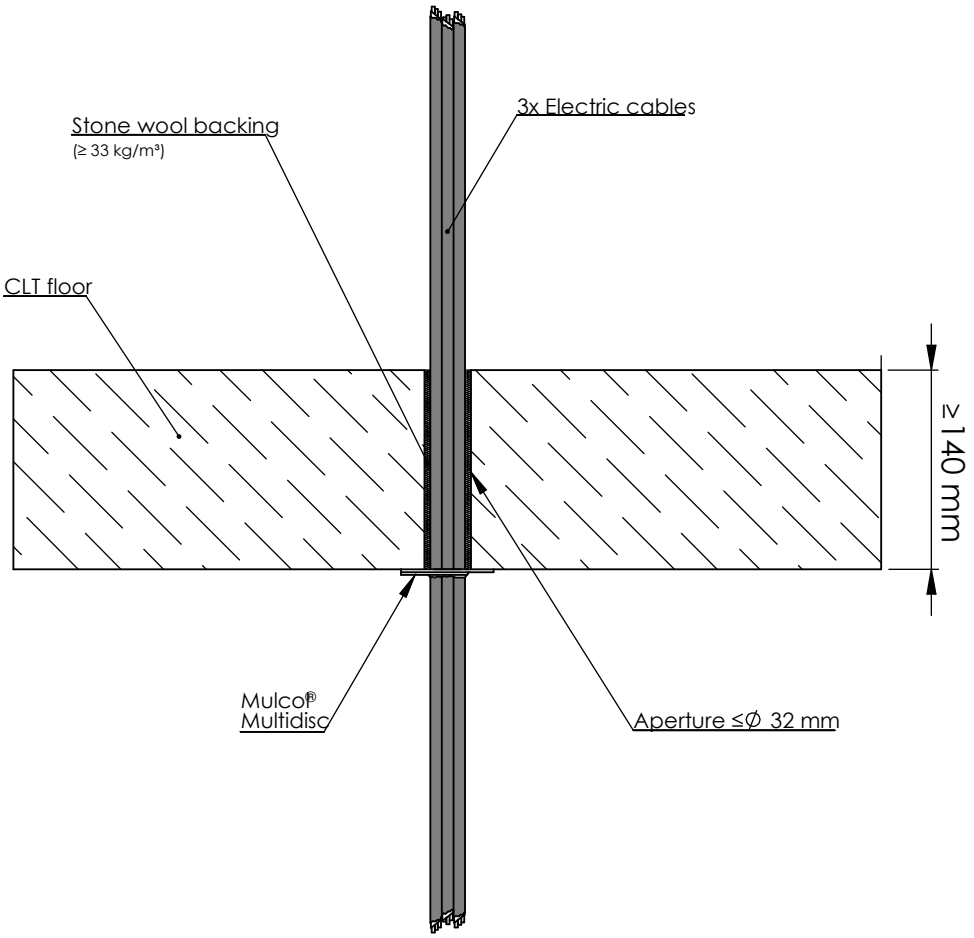


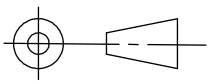
a - Overlay size
(Minimum 10 mm overlay)
b - Mulcol® Multidisc

A

Detail A





American projection 	Scale :	Company : Mulcol International B.V.	FCLT-ECB-M1.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 1-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test cable penetration seal
Mulcol® Multidisc
Installation in wooden CLT floor

5.8 Conduits – directly through the CLT floor

5.8.1 Mulcol® Multicollar Slim

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification			
Conduit dimensions (mm) **Outer diameter**	**Performance class with pipe end configuration**	**Conduit material (mm)**	**System**
Drawing FCLT-MC30-ECH-11.0.30			
≤ 63	**EI 90–U/U E 120–U/U**	**Ribbed PE-flexible-sleeve conduit Ø63 mm**	**Mulcol® Multicollar Slim** **Mulcol® Multimastic SP** **(≥ 10 x ≥ 20) (backing 100 mm)**

It is mandatory to apply Mulcol® Multimastic SP in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

The ribbed-PE-flexible sleeve protrudes at least 200 mm out of the floor at both sides of the floor. When the sleeve protrudes < 500 mm, no pipe support is needed. When the sleeve protrudes ≥ 500 mm, a pipe support is mandatory.

Multiple cables are allowed in any number or combination up to a filling degree of 100%. The actual type and number of cables inside the ribbed-PE-flexible sleeve may derive from the drawings in any combination cables mentioned in the Tables below. Also empty conduits are allowed.

Fire resistance classification Cable groups drawing FCLT-MC30-ECH-11.0.30	
Sheathed cables up to Ø60 mm (including optical fibres and coaxial cables up to Ø28 mm)	**EI 90 E 120**
Telecommunication cables up to Ø21 mm (bundle ≤ Ø60 mm)	

On the next page, classifications, conditions and drawings of this system inside a floor are given.

Fire resistance classification			
Conduit dimensions (mm) **Outer diameter**	**Performance class with pipe end configuration**	**Conduit material (mm)**	**System**
Drawing FCLT-MC30-EPB-11.0.40			
≤ 19 mm	**EI 90–U/U** **E 120–U/U**	**PVC conduit bundle Ø80 mm**	**Mulcol® Multicollar Slim** **Mulcol® Multimastic SP** **(≥ 10 x ≥ 20)** **(backing 100 mm)**

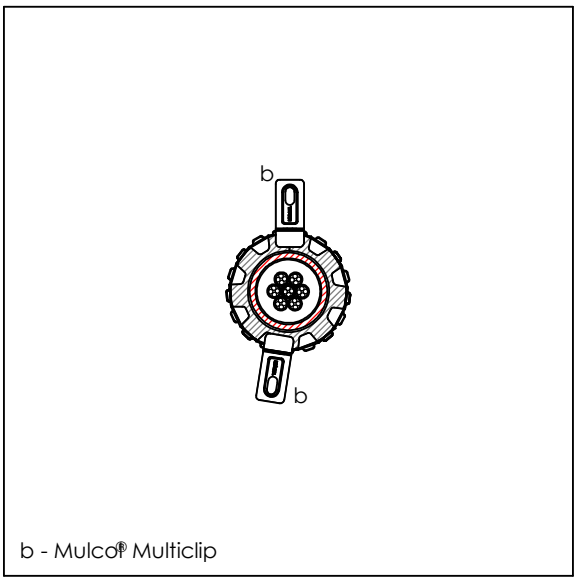
It is mandatory to apply Mulcol® Multimastic SP in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

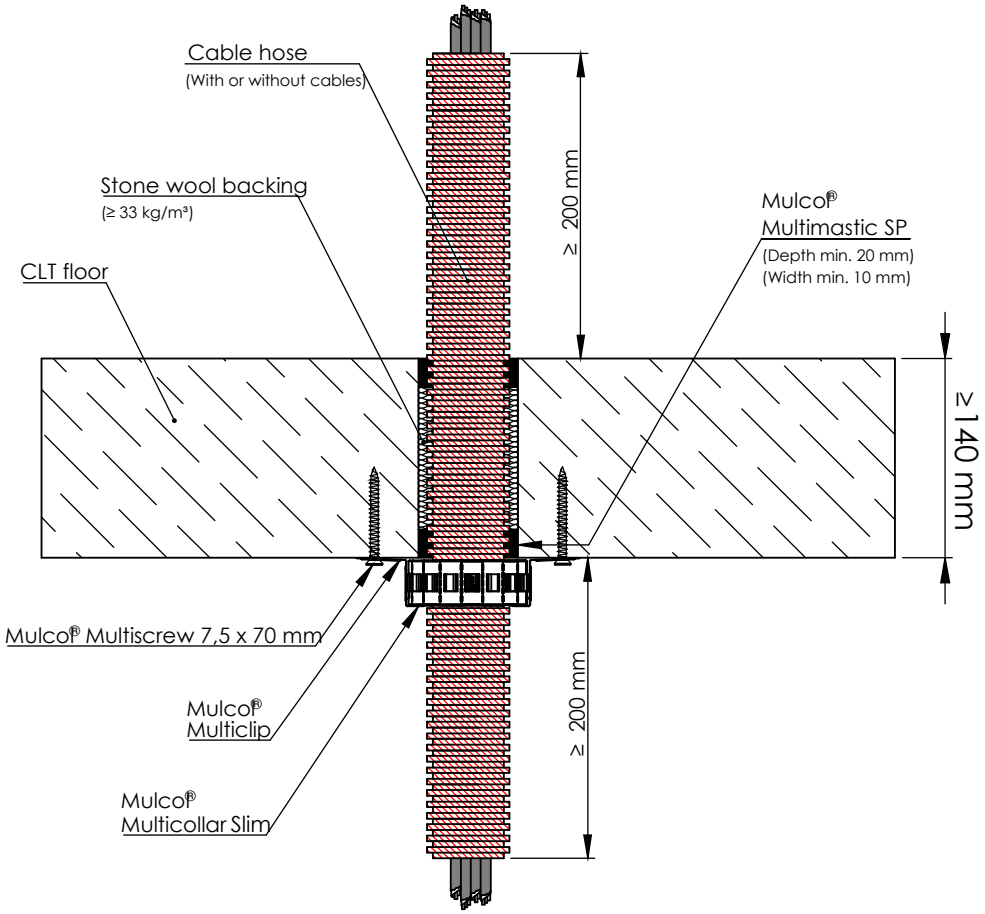
The PVC conduits protrudes at least 500 mm out of the floor at both sides of the floor. A pipe support is mandatory (maximum distance 450 mm to first pipe support).

Multiple cables are allowed in any number or combination up to a filling degree of 100%. The actual type and number of cables inside the PVC conduits may derive from the drawings in any combination cables mentioned in the Tables below. Also empty conduits are allowed.

Fire resistance classification Cable groups drawing FCLT-MC30-EPB-11.0.40	
Sheathed cables up to Ø10.2 mm (including optical fibres and coaxial cables)	**EI 90** **E 120**
Unsheathed cables up to Ø5 mm	

Bottom view

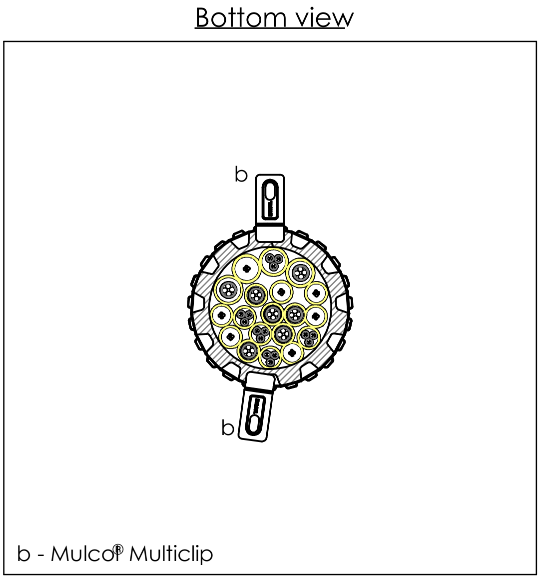


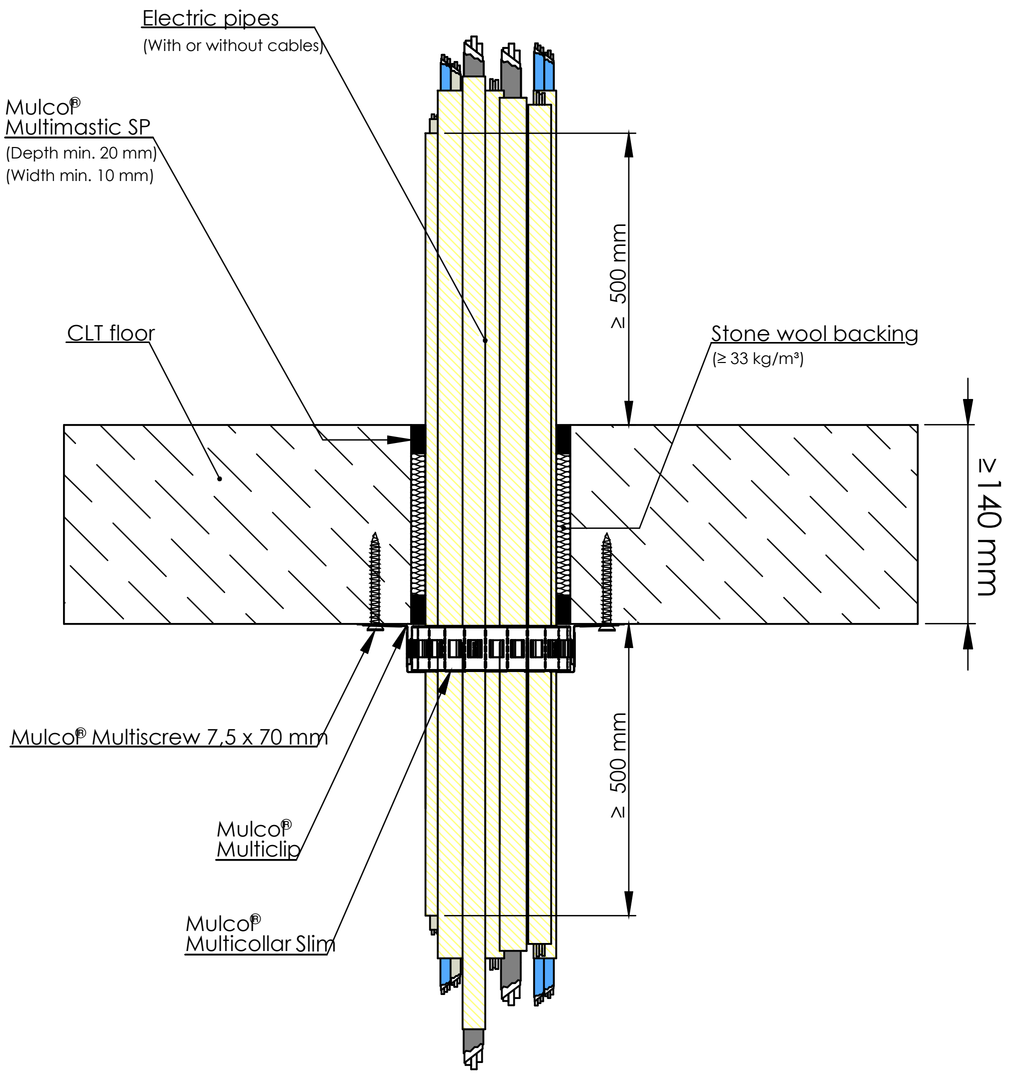


American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-ECH-11.0.30
	Unit of measure : mm	Department : Research & Development	A4
	Date : 25-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-EPB-11.0.40
	Unit of measure : mm	Department : Research & Development	
	Date : 6-7-2023	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

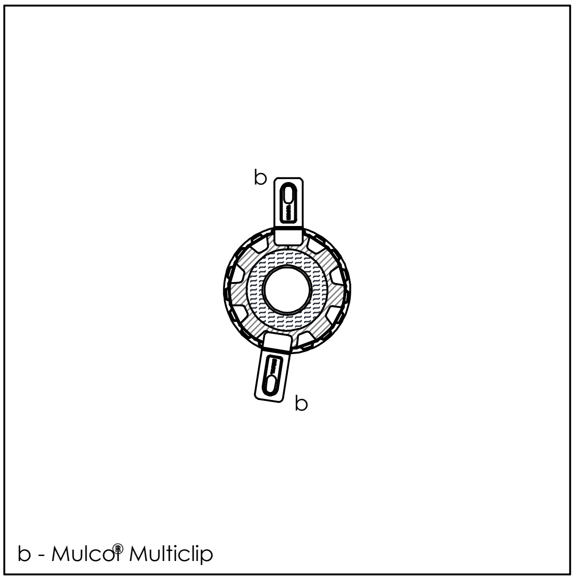
Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Conduit diameter (mm)	Pipe material	Thickness insulation (mm)	System
Outer diameter	Wall thickness					
Drawing FCLT-MC30-CU-MSP1.1.22, FCLT-MC30-MLA-MSP1.1.22 and FCLT-MC30-ST-MSP1.1.22						
≤ 35	≥ 1.5	EI 60–C/U E 120–C/U	PVC-conduit Ø75 x 1.8 mm	Copper / (stainless-) steel / cast iron	AF/ Armaflex 13 mm CS	Mulcol® Multicollar Slim
≤ 32	≥ 3.0	EI 120–C/U		Wavin PE-Xc/AL/PE-HD		Mulcol® Multimastic SP (≥ 10 x ≥ 10) (backing 130 mm)
≤ 32	≥ 2.0	EI 120–C/U	PVC-conduit Ø125 x 3.2 mm	(stainless-) steel / cast iron	PUR-PE 30 mm CS	

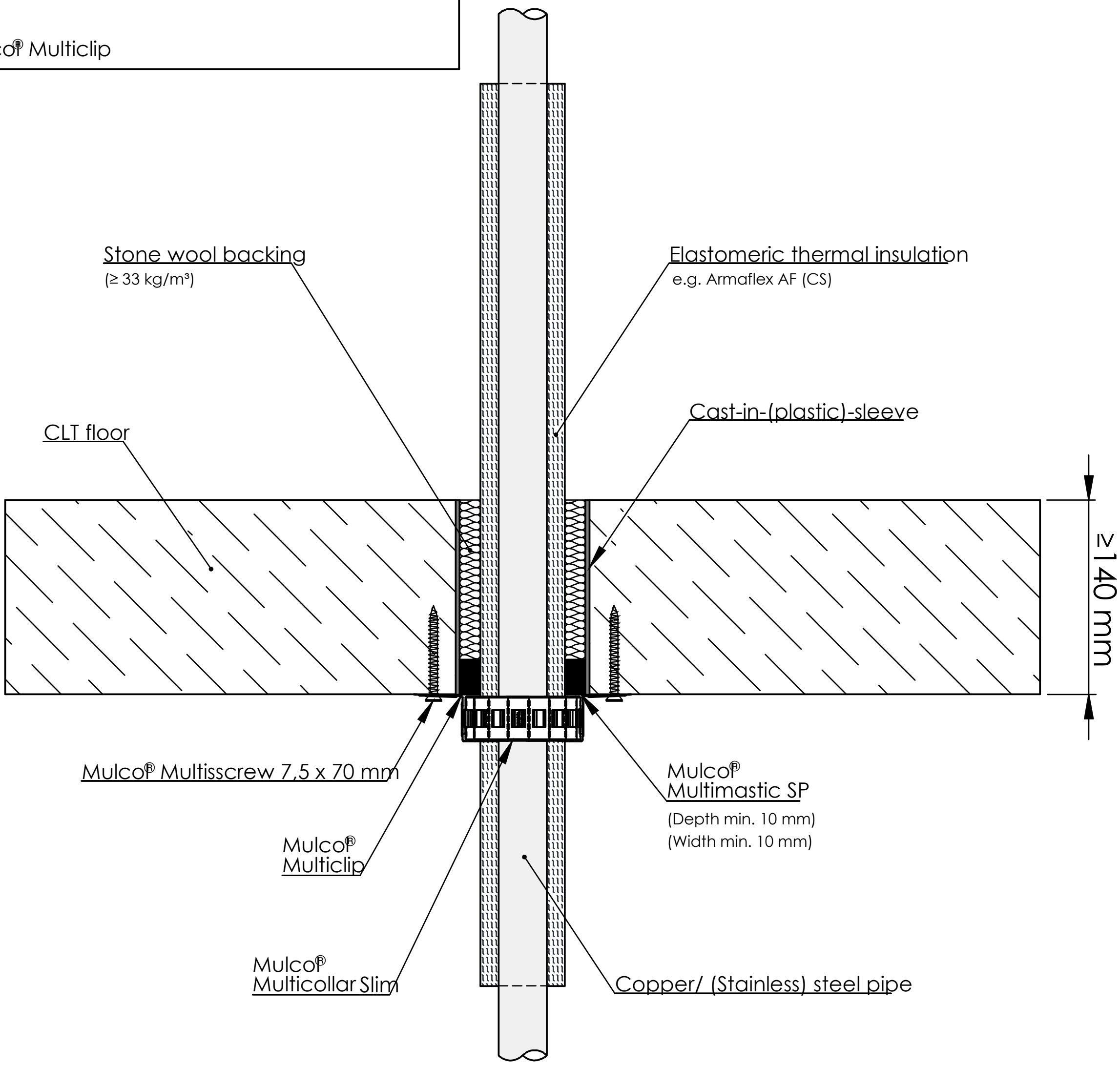
The fire resistance classification is valid for PVC-conduit. The conduit shall be applied sustained through the aperture. The Mulcol® Multicollar Slim shall be fixed to the CLT floor with screws (MRS-U 7.5 x 70 mm).

It is mandatory to apply Mulcol® Multimastic SP in the annular gap (depth ≥ 10 mm) on the unexposed side of the floor, with a stone wool backing (≥ 33 kg/m^3, depth ≥ 130 mm).

For steel, cast iron and aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

Bottom view



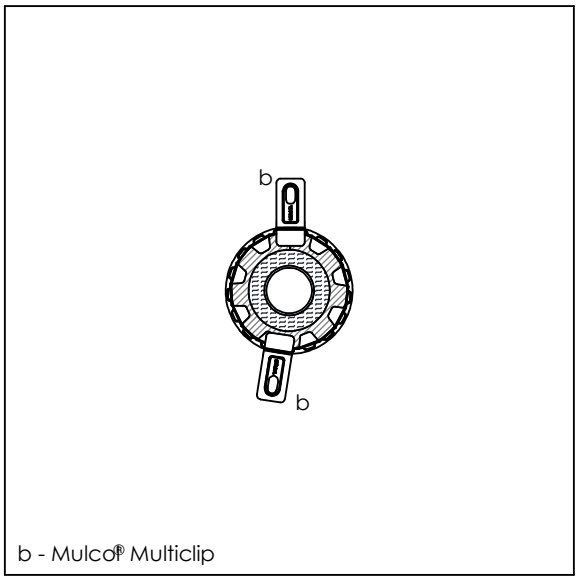


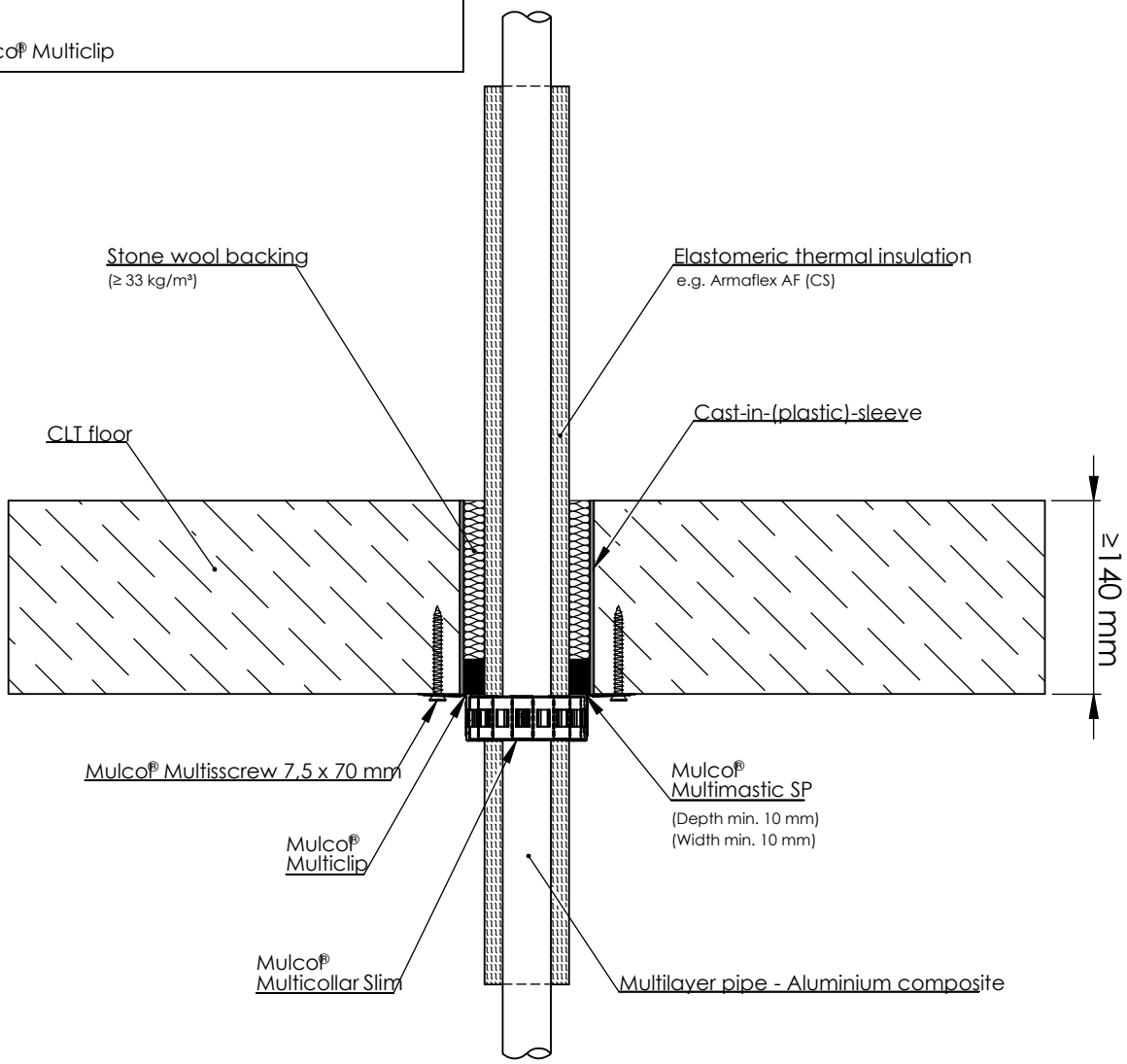
American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-CU-MSP1.1.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 12-7-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

Bottom view



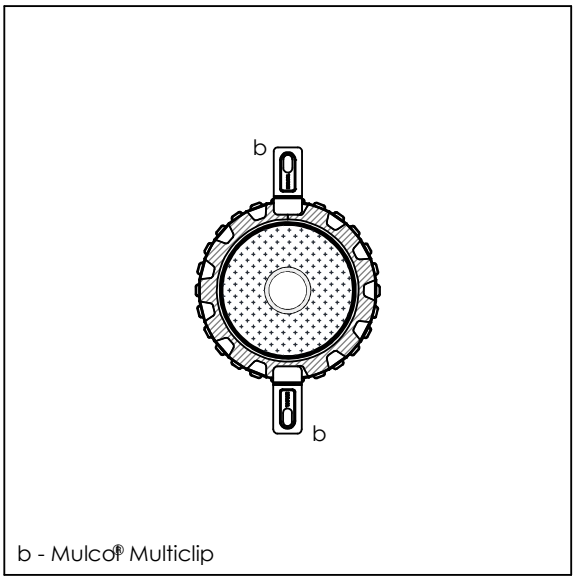


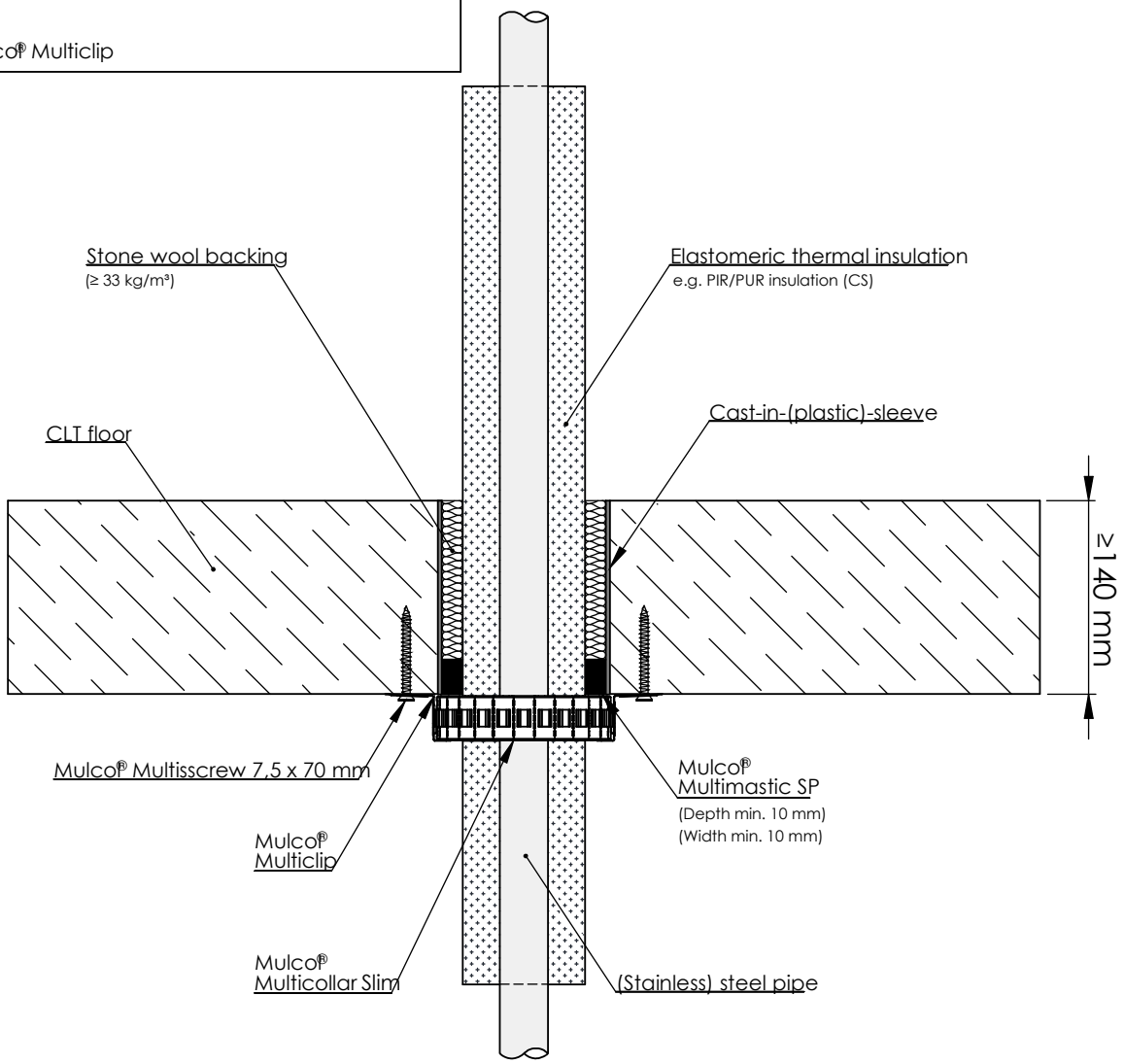
American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-MLA-MSP1.1.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 12-7-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-ST-MSP1.1.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 12-7-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

5.8.2 Mulcol® Multisealant GR

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

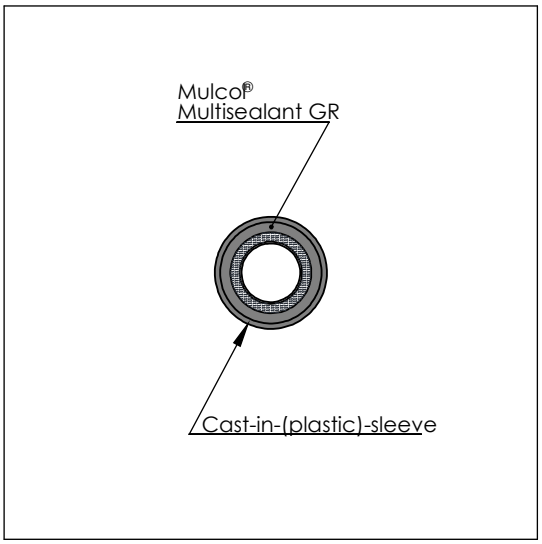
Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Conduit diameter (mm)	Pipe material	Thickness insulation (mm)	System
Outer diameter	Wall thickness					
Drawing FCLT-CU-G1.19.22 and FCLT-ST-G1.19.20						
≤ 22	≥ 1.1	EI 90–C/U E 120–C/U	PVC-conduit Ø75 x 1.8 mm	Copper / (stainless-) steel / cast iron	AF/ Armaflex 13 mm CS	Mulcol® Multisealant GR (≥ 10 x ≥ 25) (backing 115 mm)
≤ 32	≥ 2.0	EI 120–C/U	PVC-conduit Ø125 x 3.2 mm	(stainless-) steel / cast iron	Rockwool 810 30 mm CS	

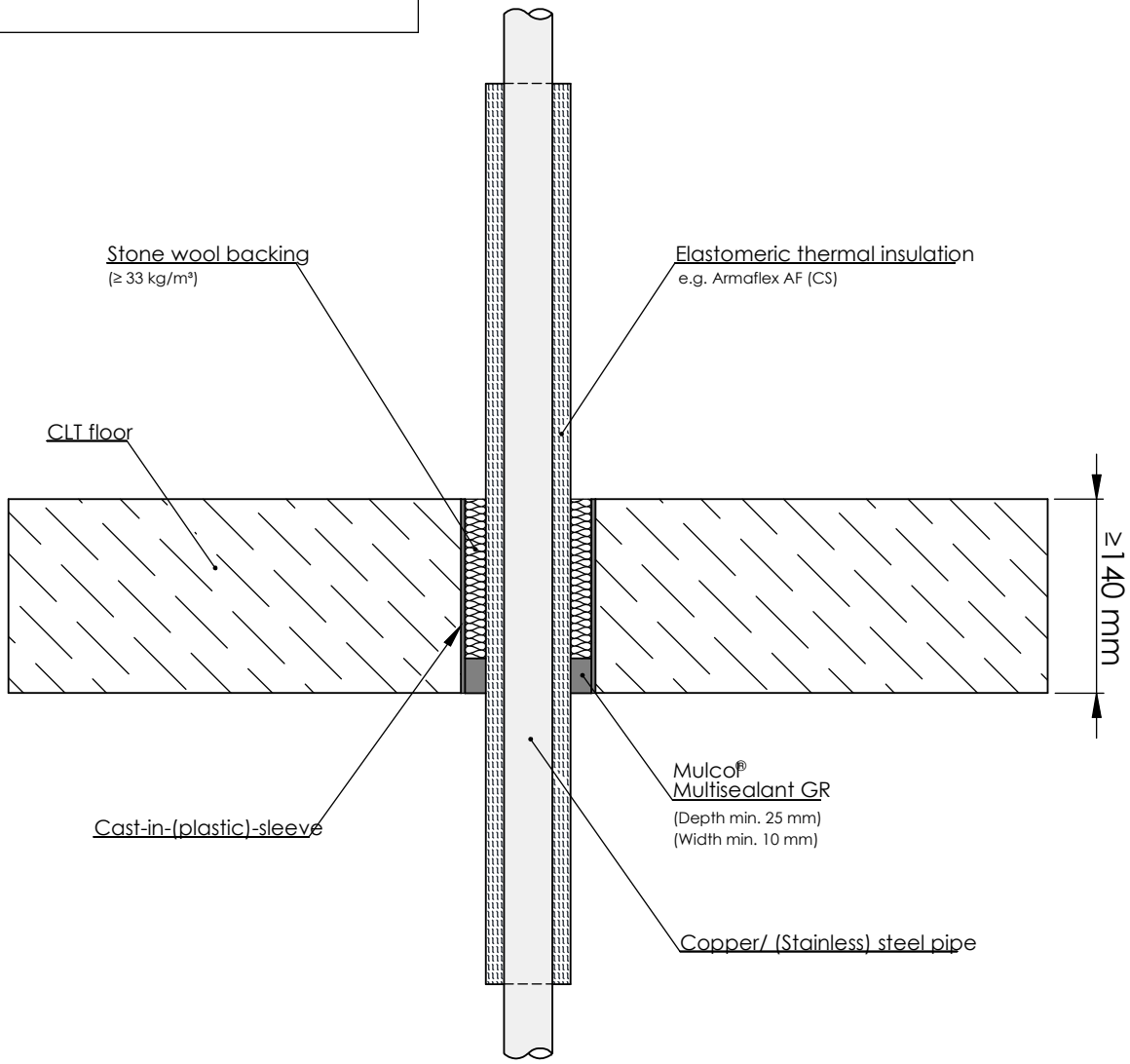
The fire resistance classification is valid for PVC-conduit. The conduit shall be applied sustained through the aperture.

It is mandatory to apply Mulcol® Multisealant GR in the annular gap (depth ≥ 25 mm) on the unexposed side of the floor, with a stone wool backing (≥ 33 kg/m^3, depth ≥ 115 mm).

For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

Bottom view



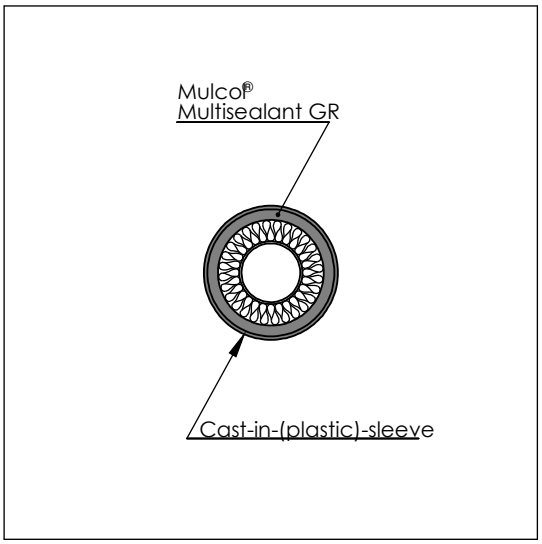


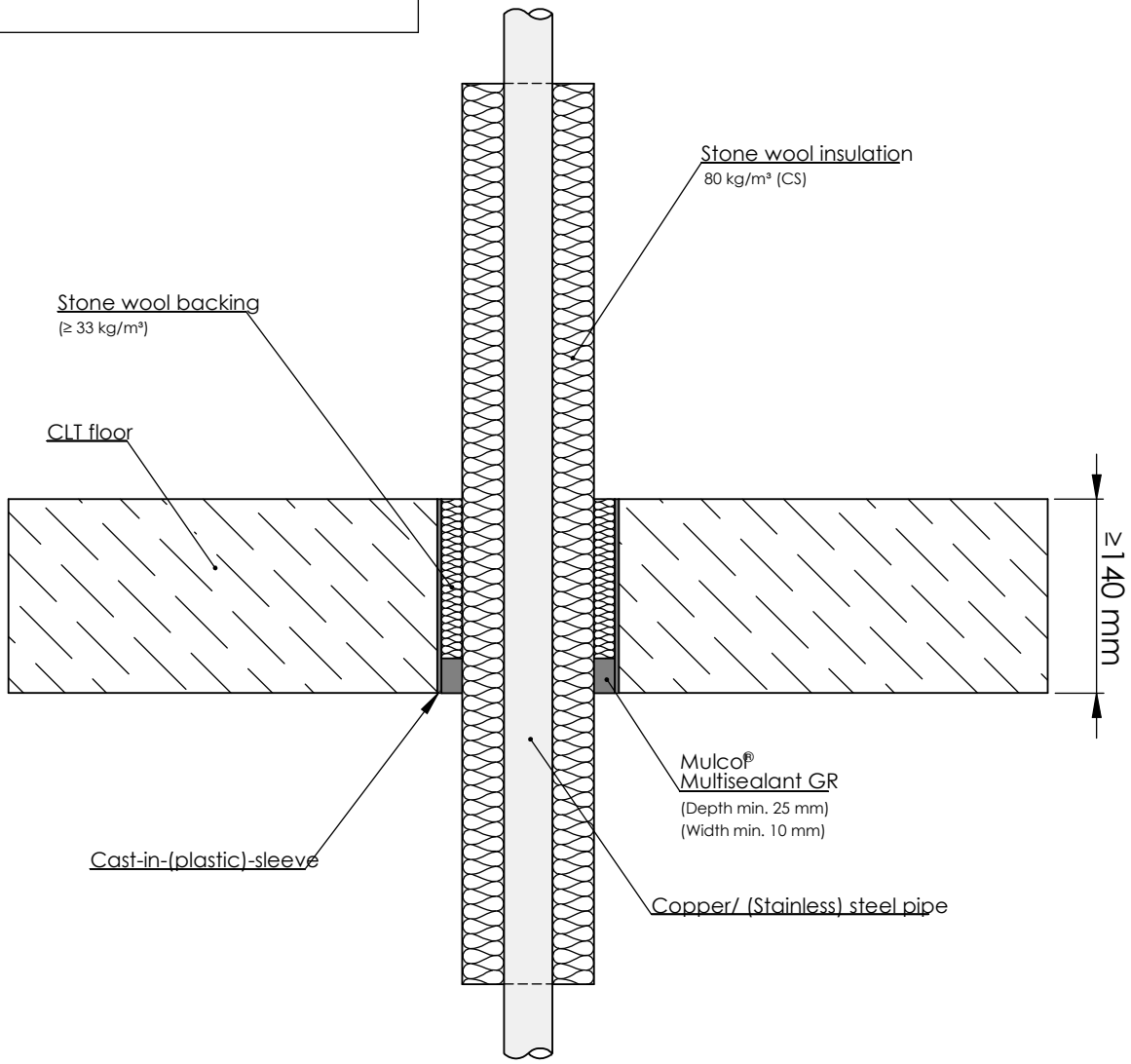
American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-G1.19.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 10-7-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-ST-G1.19.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 11-7-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

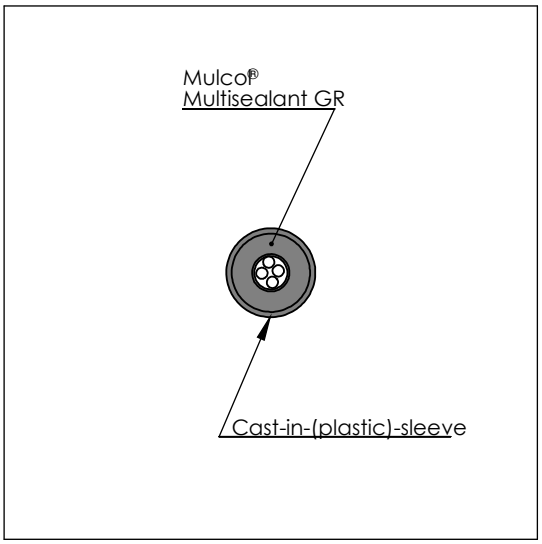
Fire resistance classification				
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System width x depth (mm)
Outer diameter	Wall thickness			
Drawing FCLT-EC21-G1.19.10				
≤ 50	≥ 2.0	EI 120–C/U	PVC-U	Mulcol® Multisealant GR (≥ 10 x ≥ 25) (backing 115 mm)

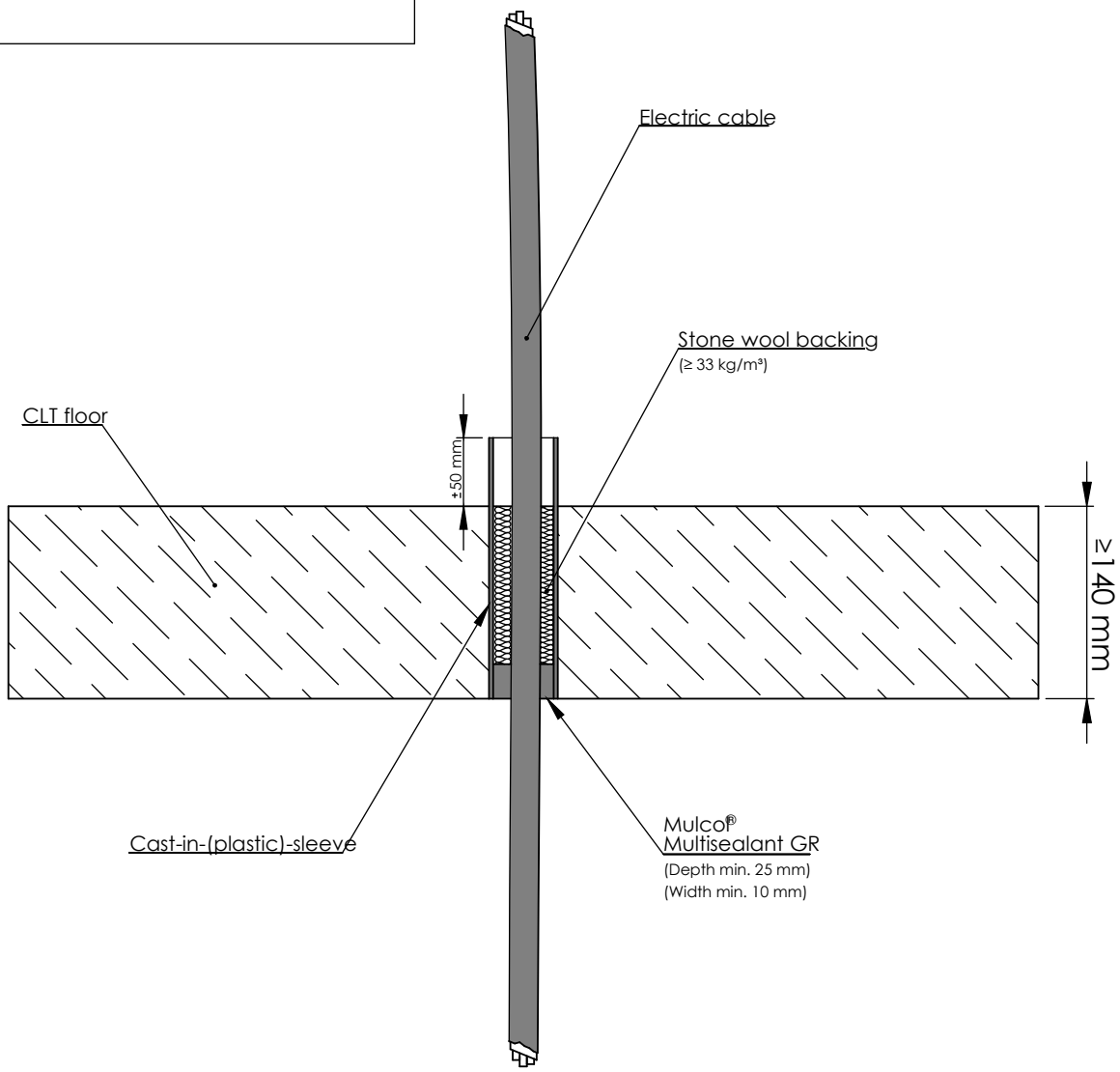
The fire resistance classification is valid for PVC-conduit. The conduit shall be applied sustained through the aperture, protruding approximately 50 mm above the floor.

Fire resistance classification Drawing FCLT-EC21-G1.19.10	
Cable groups	Performance class
Sheathed cables up to Ø21 mm (including optical fibres and coaxial cables)	EI 120

It is mandatory to apply Mulcol® Multisealant GR in the annular gap (depth ≥ 25 mm) on the unexposed side of the floor, with a stone wool backing (≥ 33 kg/m^3, depth ≥ 115 mm).

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-EC21-G1.19.10
	Unit of measure : mm	Department : Research & Development	
	Date : 10-7-2023	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

Fire test cable penetration seal
Mulcol® Multisealant GR
Installation in wooden CLT floor

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

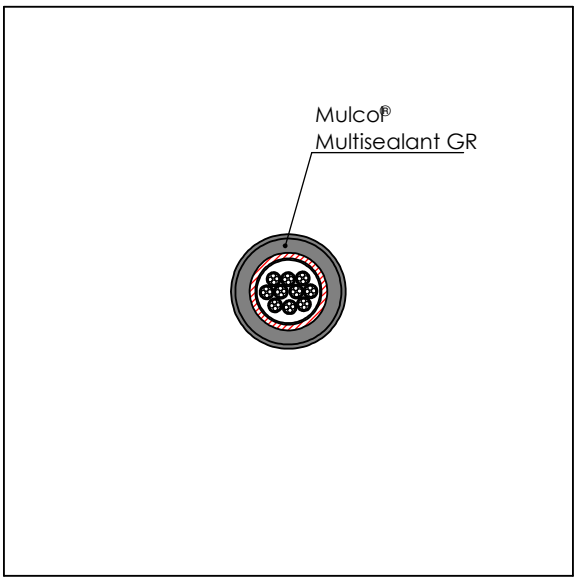
Fire resistance classification				
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System width x depth (mm)
Outer diameter	Wall thickness			
Drawing FCLT-ECH-G1.19.30				
≤ 90	≥ 1.8	E 120–C/U	PVC-U	Mulcol® Multisealant GR (≥ 10 x ≥ 25) (backing 115 mm)

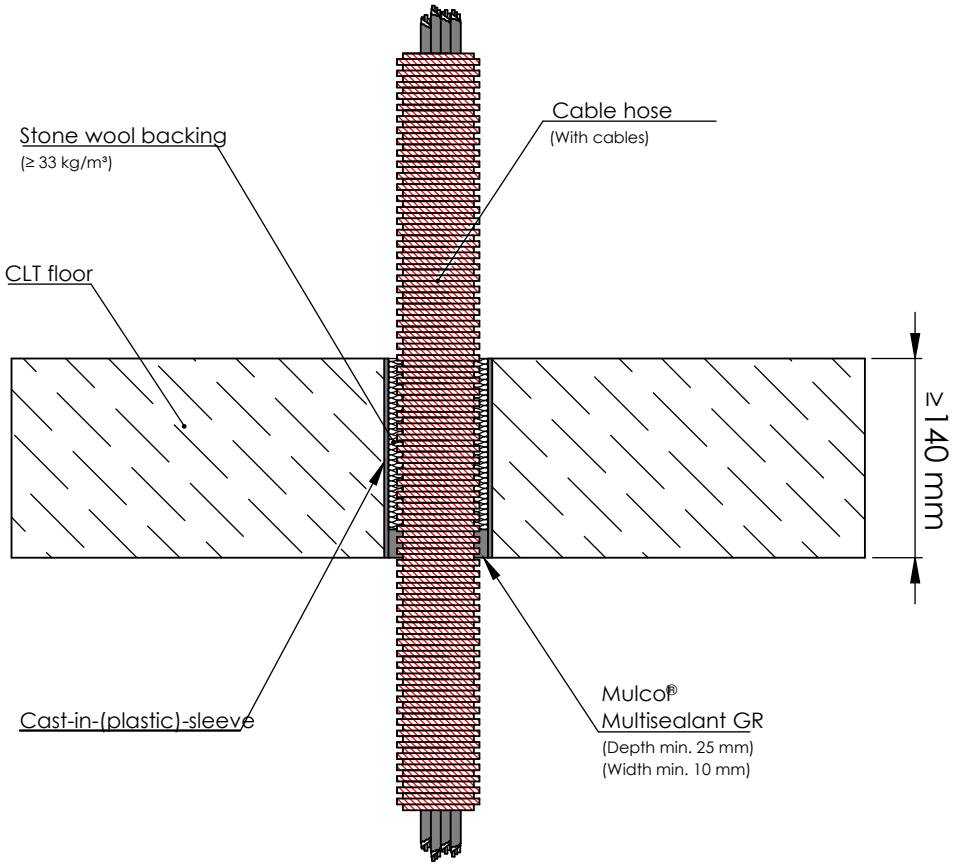
The fire resistance classification is valid for PVC-conduit. The conduit shall be applied sustained through the aperture.

Fire resistance classification Drawing FCLT-ECH-G1.19.30	
Cable groups	**Performance class**
Flex cable hose Ø63 mm with CAI cables (bundle of 10 cables)	**E 120**

It is mandatory to apply Mulcol® Multisealant GR in the annular gap (depth ≥ 25 mm) on the unexposed side of the floor, with a stone wool backing (≥ 33 kg/m^3, depth ≥ 115 mm).

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-ECH-G1.19.30
	Unit of measure : mm	Department : Research & Development	A4
	Date : 25-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

YA 2746-1E-RA-001 | EA0E1E2B | HARML

5.9 Plastic pipes – directly through the CLT floor

5.9.1 Mulcol® Multicollar Slim

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

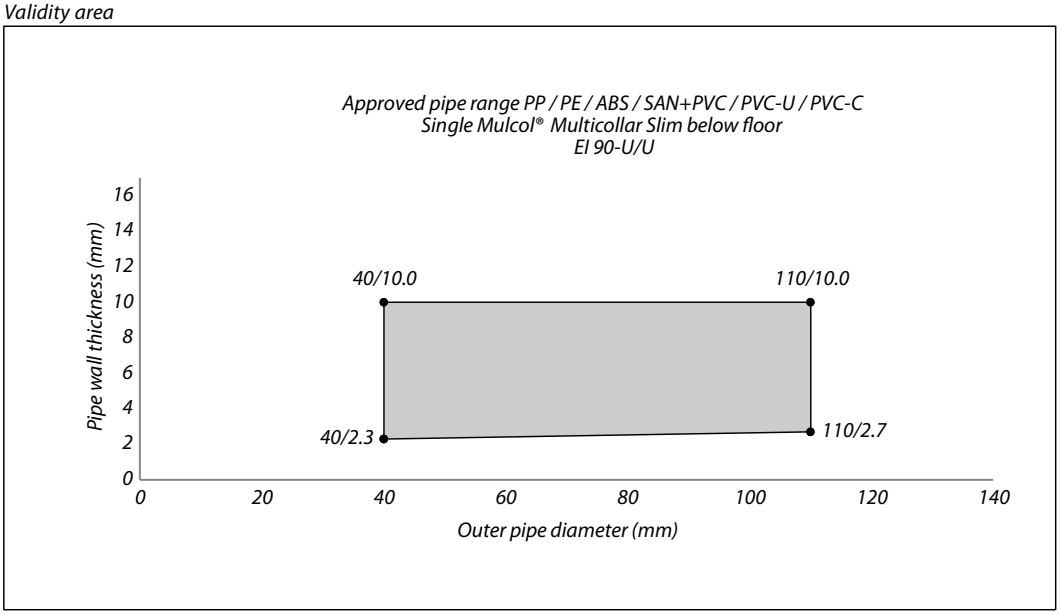
Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System	See figure
Outer diameter	Wall thickness				
Drawing FCLT-MC30-PP-11.0.10 and FCLT-MC30-PPS-11.0.10					
≥ 40	2.3 to 10.0	EI 90–U/U	PP / PE / ABS / SAN+PVC / PVC-U / PVC-C	Mulcol® Multicollar Slim	5.35
≤ 110	2.7 to 10.0				
≤ 125	3.9	EI 120–U/C	PE-HD / PE / ABS / SAN+PVC		N.a.
≤ 110	6.0	EI 120–U/U	Raupiano Plus	Mulcol® Multimastic SP (≥ 10 x ≥ 20) (backing 100 mm)	N.a.
≤ 160	4.0	EI 60–U/C			
≤ 110	2.7	EI 120–U/U	Geberit Silent dB20		N.a.
≤ 40	2.3	EI 120–U/U	PP		N.a.
≤ 125	3.1	EI 120–U/C			
≤ 110	3.2 to 8.1	EI 120–U/U	PVC-U / PVC-C		5.36

For plastic pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

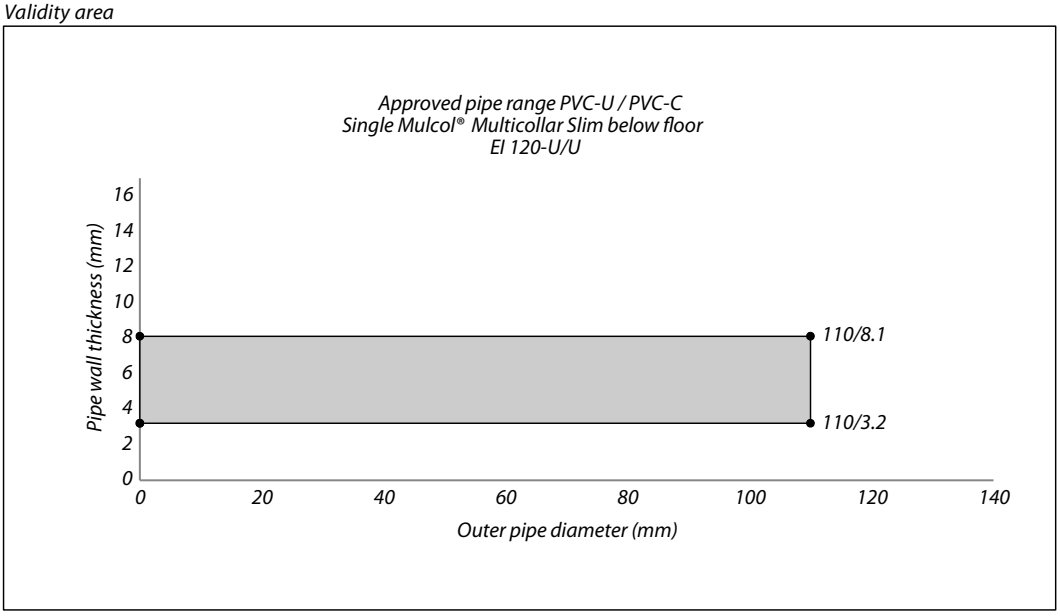
It is mandatory to apply Mulcol® Multimastic SP in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

It is mandatory to apply one Mulcol® Multicollar Slim below the floor.

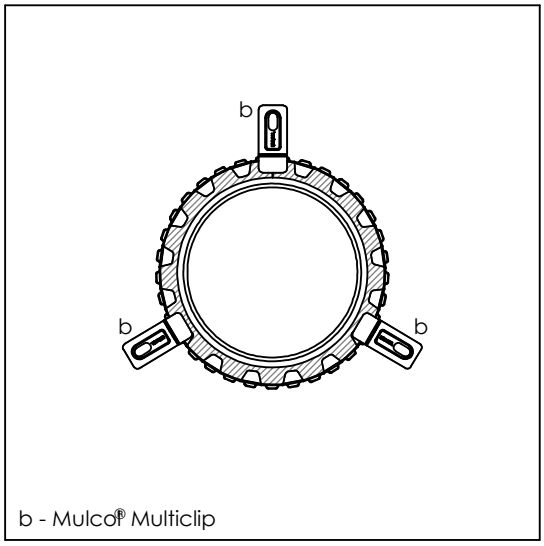
f5.35 Validity area



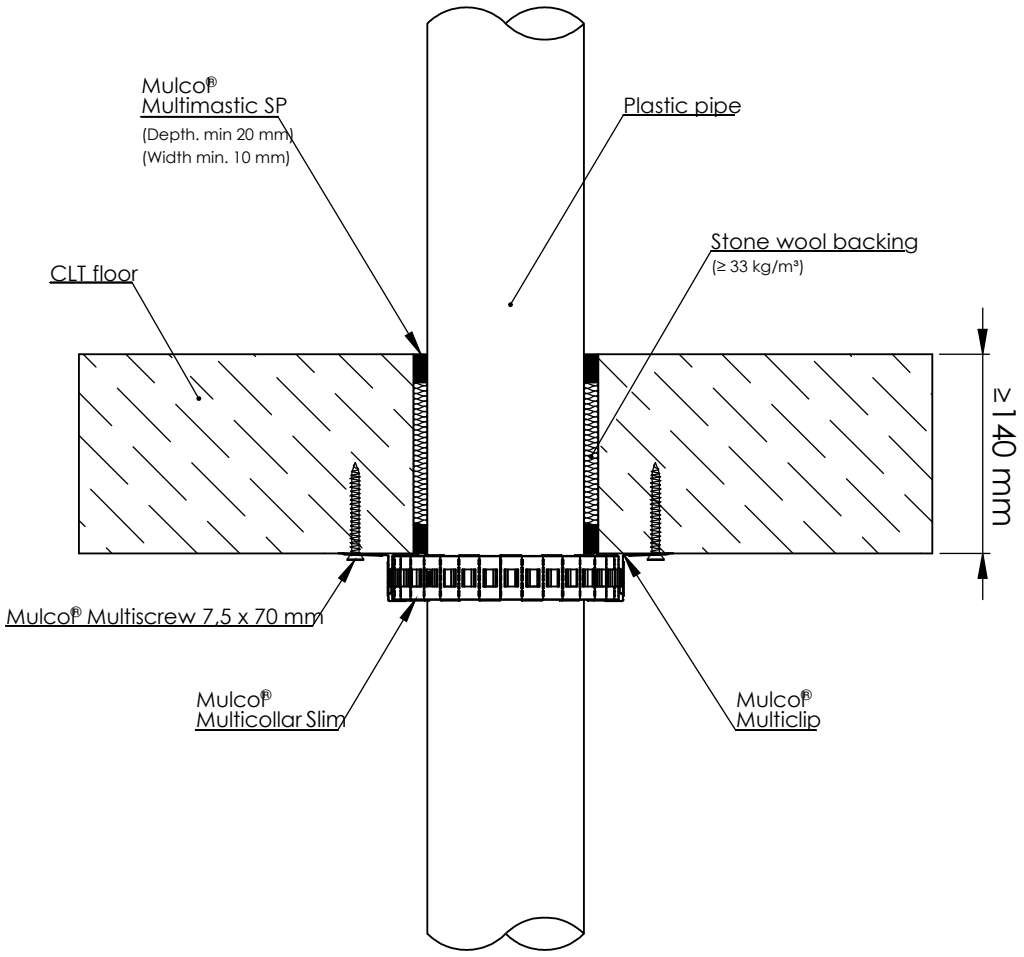
f5.36 Validity area



Bottom view



b - Mulcol® Multiclip

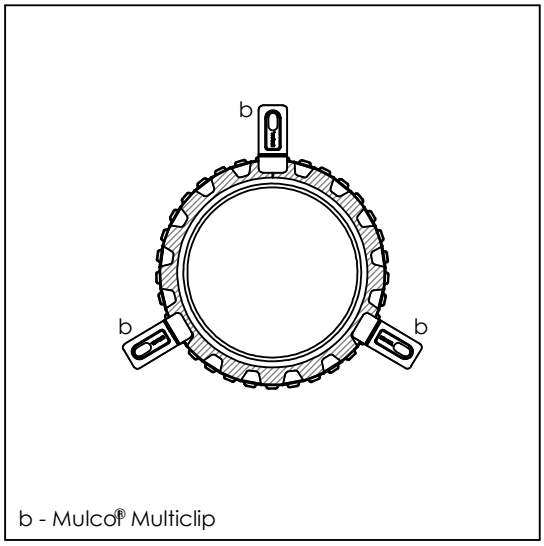


American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-PP-11.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 24-5-2023	Draftsman : K.J.	

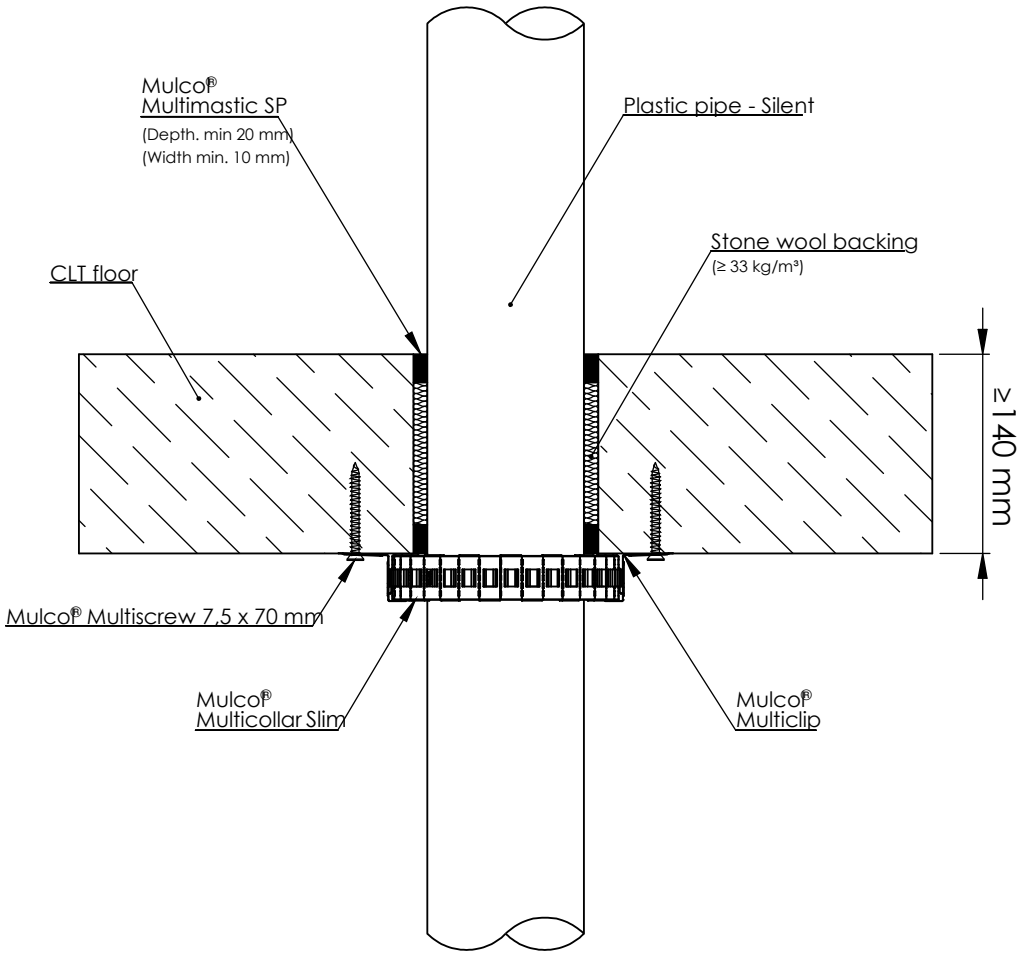
MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

Bottom view



b - Mulcol® Multiclip



American projection	Scale :	Company : Mulcol International B.V.	FCLT-MC30-PPS-11.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 24-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® MulticollarSlim
Installation in wooden CLT floor

5.9.2 Mulcol® Multisealant GR

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

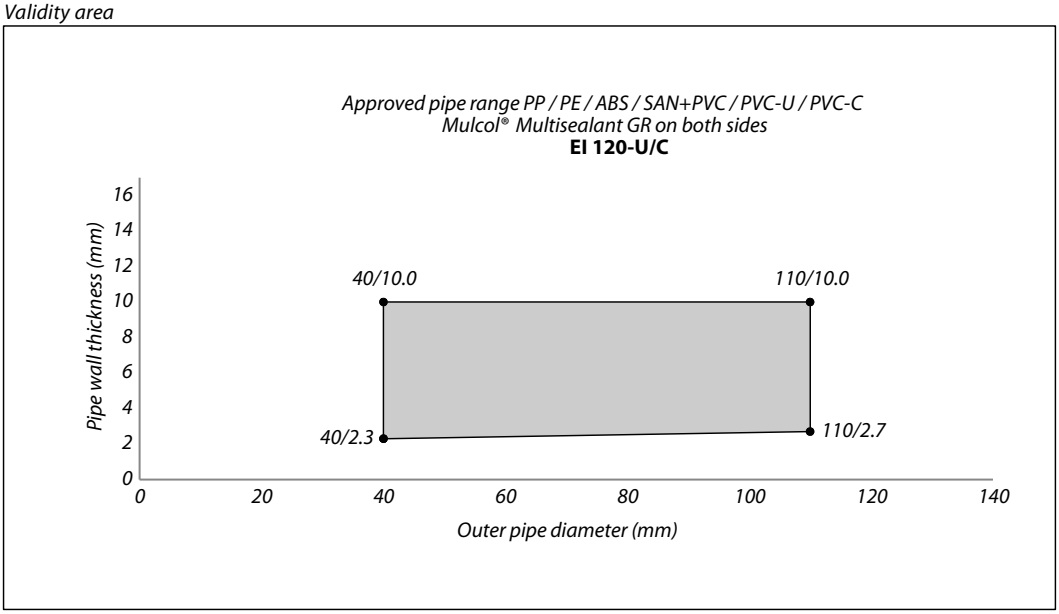
A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System	See figure
Outer diameter	Wall thickness				
Drawing FCLT-PP-G2.19.10					
≥ 40	2.3 to 10.0	EI 120–U/C	PP / PE / ABS / SAN+PVC / PVC-U / PVC-C	Mulcol® Multisealant GR (≥ 10 x ≥ 25) (backing 90 mm)	5.37
≤ 110	2.7 to 10.0				

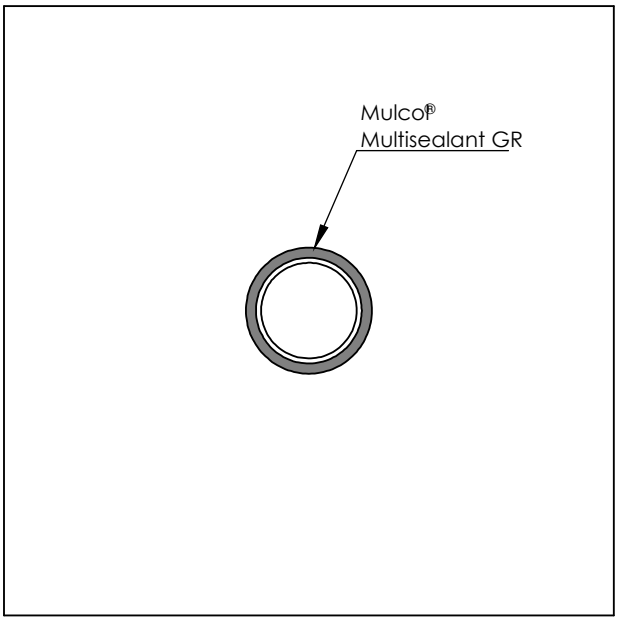
For plastic pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

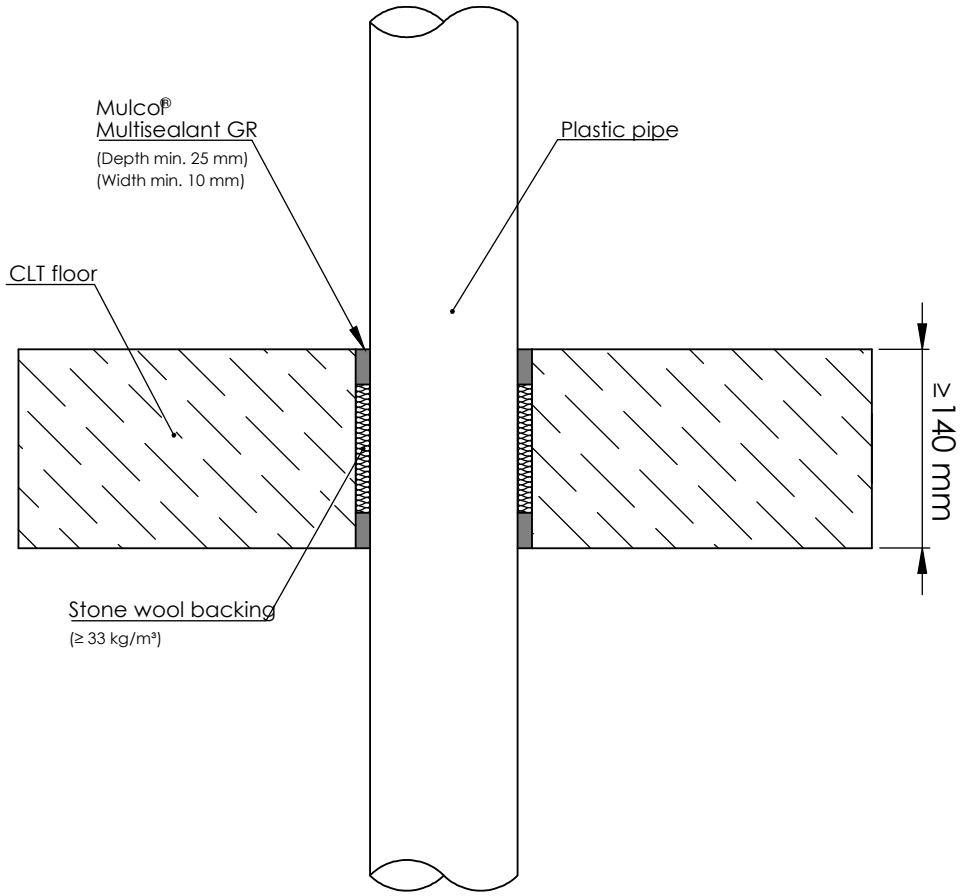
It is mandatory to apply Mulcol® Multisealant GR in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

f5.37 Validity area



Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-PP-G2.19.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 30-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

5.9.3 Mulcol® Multiwrap

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

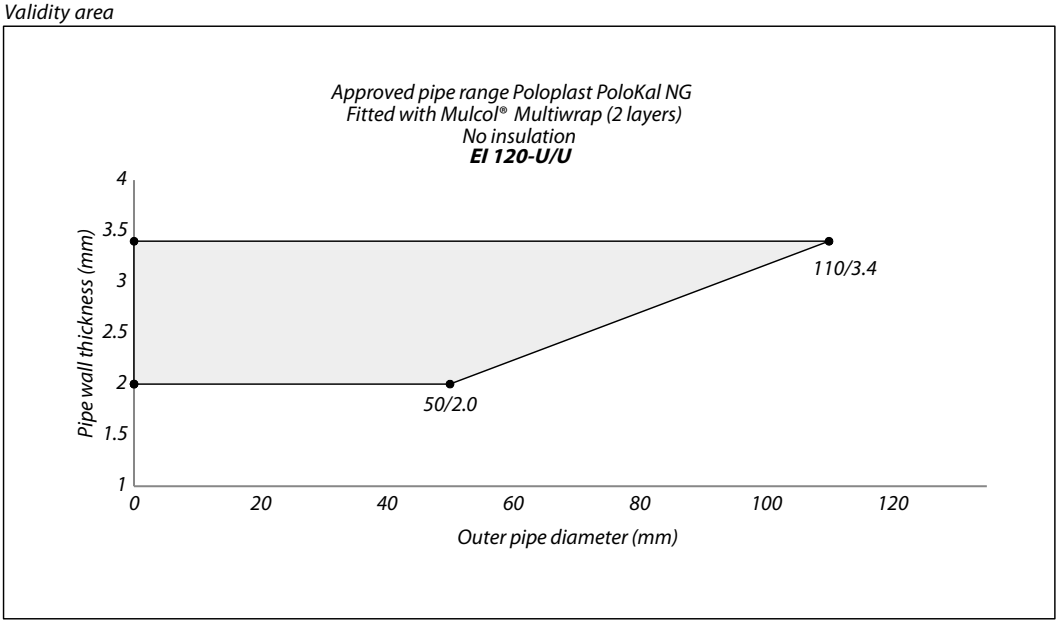
Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material (no insulation)	System	See figure
Outer diameter	Wall thickness				
Drawing FCLT-PP-MW1.1.2					
≤ 110	3.2	EI 120–U/C	PVC-U / PVC-C	Mulcol® Multiwrap (2 layers)	N.a.
≤ 50	2.0	EI 120–U/U	Poloplast PoloKal NG		5.38
≤ 110	3.4				
≤ 56	3.2	EI 120–U/U	Geberit Silent dB 20		N.a.
≤ 56	3.2	EI 120–U/C			5.39
≤ 110	6.0				
Drawing FCLT-PPS-MW1.1.4					
≤ 125	3.9	EI 120–U/C	Poloplast PoloKal NG	Mulcol® Multiwrap (4 layers)	N.a.

It is mandatory to apply Mulcol® Multiwrap in annular gap on the bottom side of the floor. It is mandatory to apply Mulcol® Multimastic SP in annular gap on the top side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

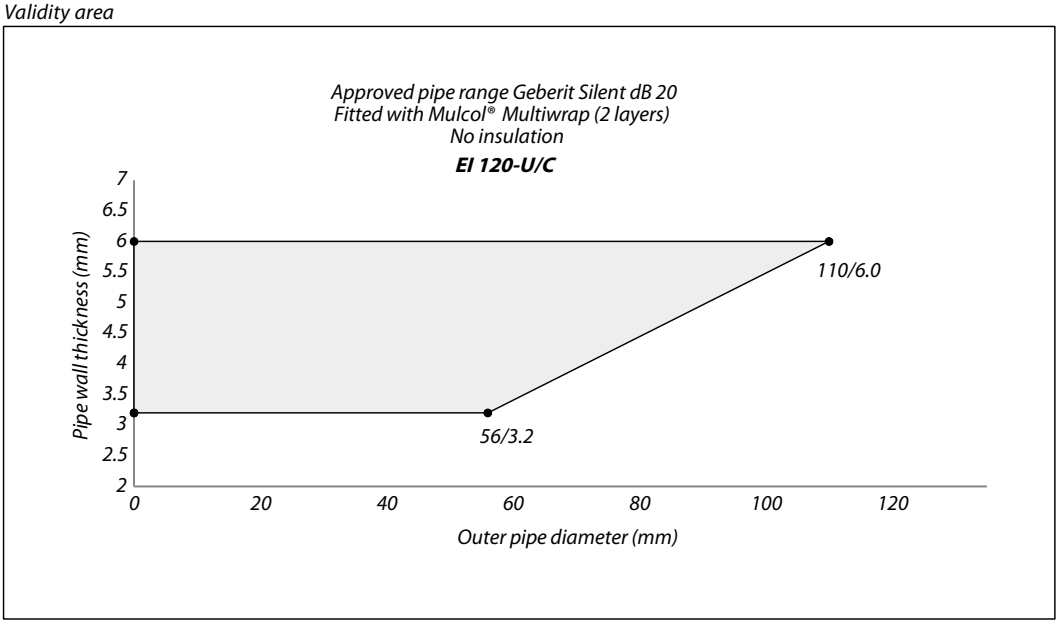
For plastic pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

The Mulcol® Multiwrap may protrude a maximum of 5 mm from the surface of the CLT floor.

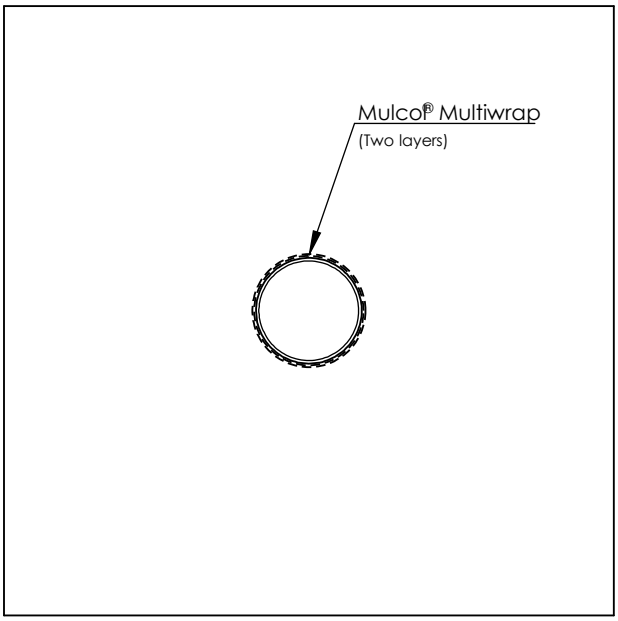
f5.38 *Validity area*

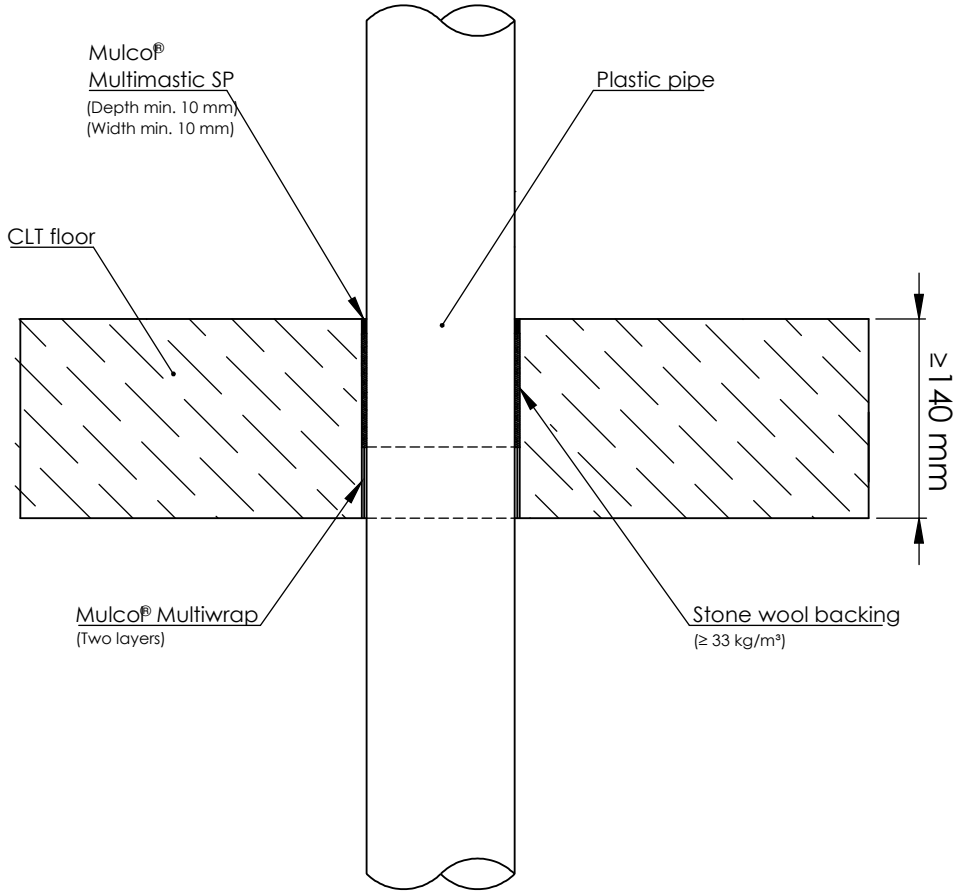


f5.39 *Validity area*



Bottom view



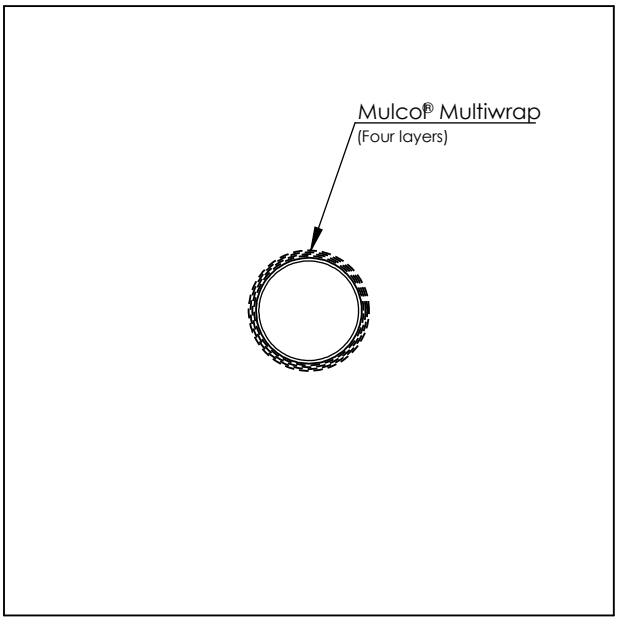


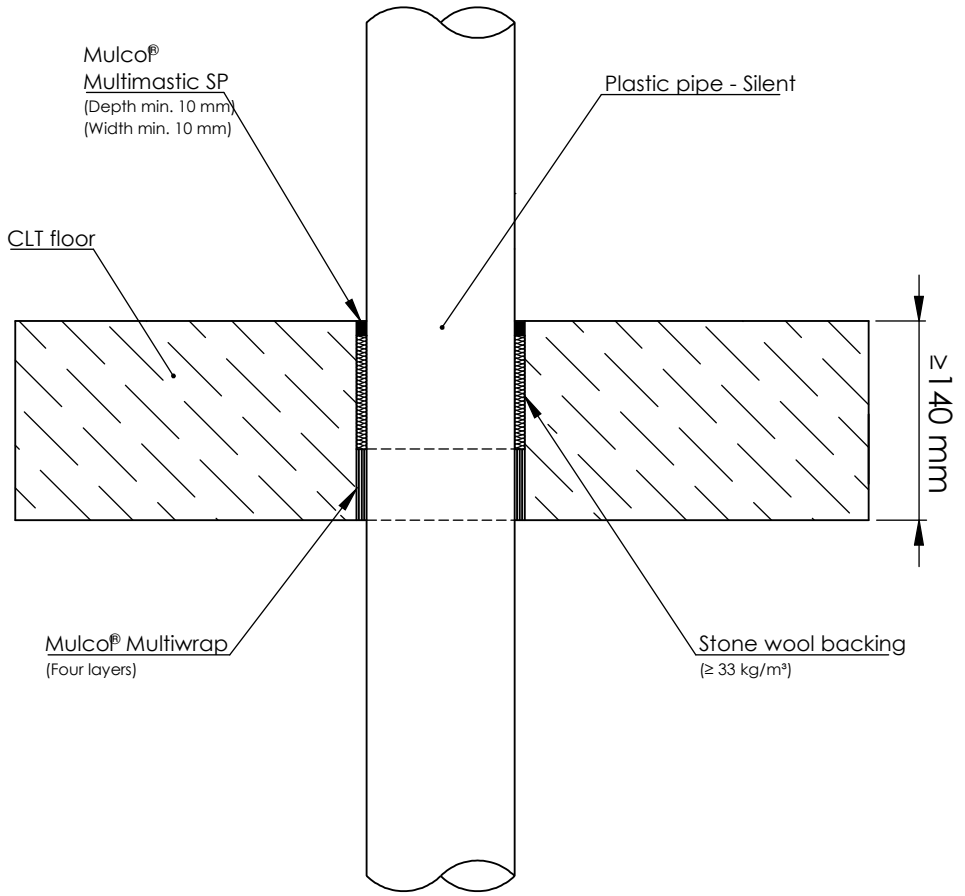
American projection	Scale :	Company : Mulcol International B.V.	FCLT-PP-MW1.1.2
	Unit of measure : mm	Department : Research & Development	A4
	Date : 2-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multiwrap
Installation in wooden CLT floor

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-PPS-MW1.1.4
	Unit of measure : mm	Department : Research & Development	A4
	Date : 2-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multiwrap
Installation in wooden CLT floor

5.9.4 Mulcol® Multidisc

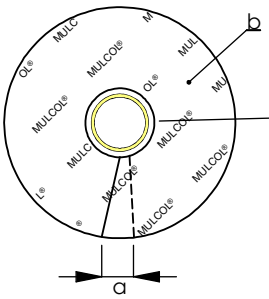
The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification			
Outer diameter pipe (mm)	**Performance class with pipe end configuration**	**Pipe material ET-pipes**	**System**
Drawing FCLT-EP-M2.0.10			
≤ 16	**EI 120–U/C**	**PVC-C / PVC-U**	**Mulcol® Multidisc**

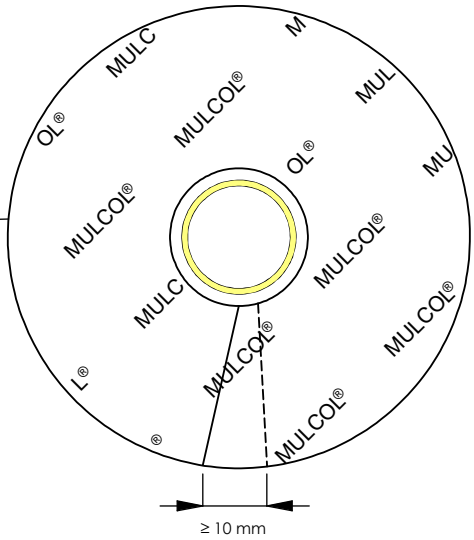
The holes for the penetration seal shall be ≤ Ø26 mm. It is mandatory to apply one Mulcol® Multidisc below the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

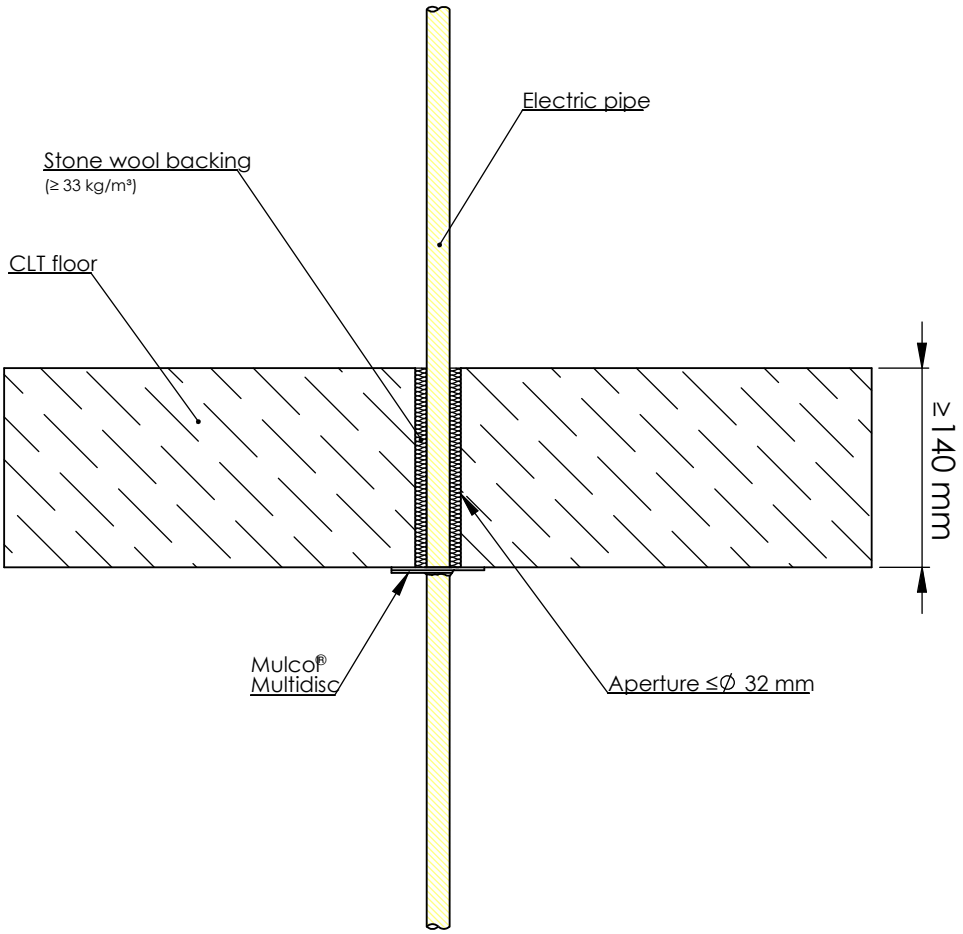
Bottom view

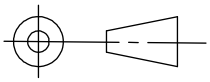


a - Overlay size
(Minimum 10 mm overlay)
b - Mulcol® Multidisc

Detail A





American projection 	Scale :	Company : Mulcol International B.V.	FCLT-EP-M1.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 1-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multidisc
Installation in wooden CLT floor

5.10 Metal pipes – directly through the CLT floor

5.10.1 Mulcol® Multisealant GR

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-G2.19.22 and FCLT-ST-G2.19.22						
≤ 22	≥ 1.1	EI 90–C/U E 120–C/U	AF/Armaflex (12)	Copper / (stainless-) steel / cast iron	Mulcol® Multisealant GR (≥ 10 x ≥ 25) (backing 90 mm)	5.40
≤ 54	≥ 1.5	EI 45–C/U E 120–C/U	AF/Armaflex (13.5)			5.41
		EI 120–C/U	AF/Armaflex (38)			5.42
≤ 114.3	≥ 3.6	EI 120–C/U	AF/Armaflex (15 to 32)	(Stainless-) steel / cast iron		5.43

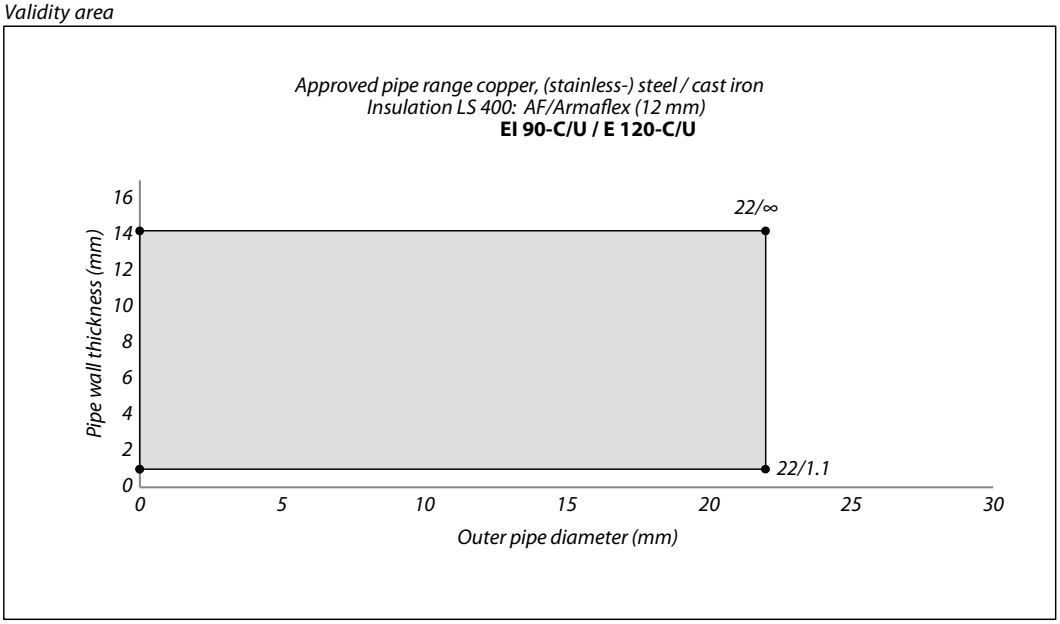
The classifications are valid for insulation AF/Armaflex with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

It is mandatory to apply Mulcol® Multisealant GR in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

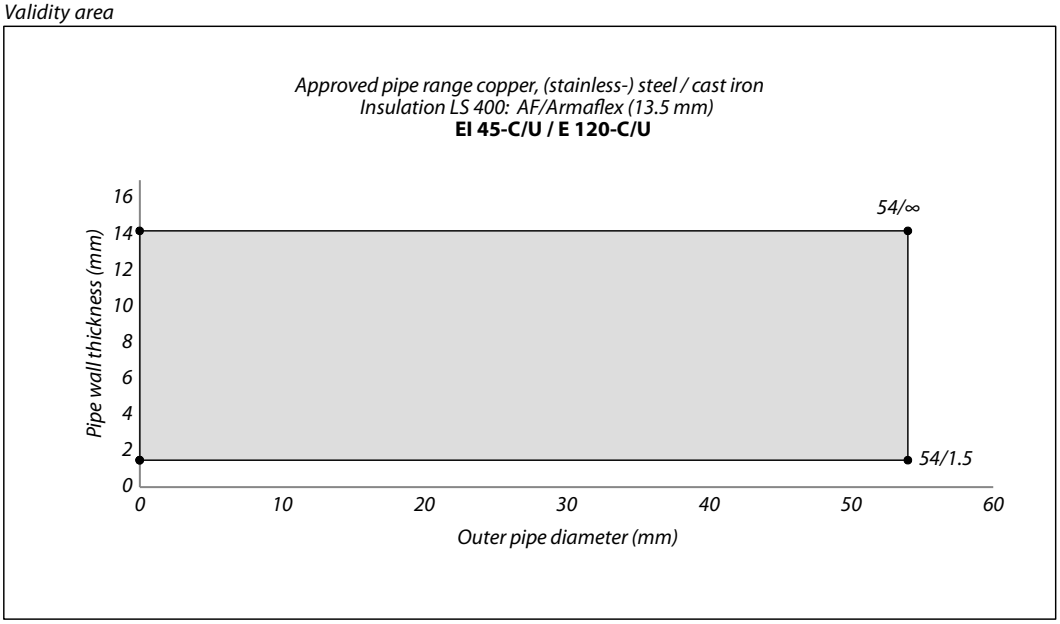
For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

When the insulation consist out of multiple parts or splices are present, the insulation is glued together with appropriate glue for the insulation type.

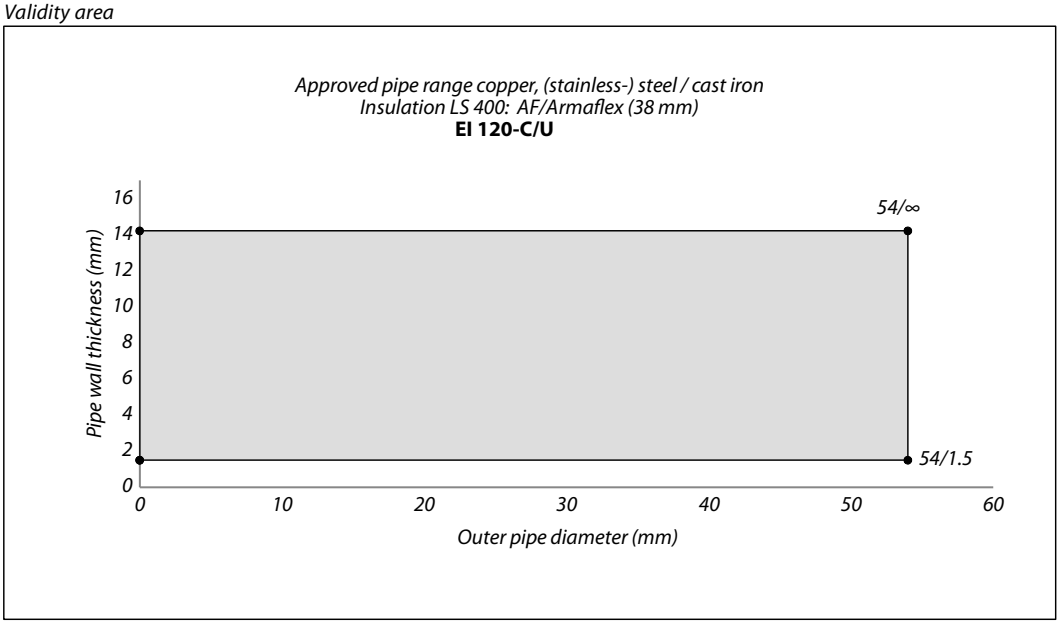
f5.40 Validity area



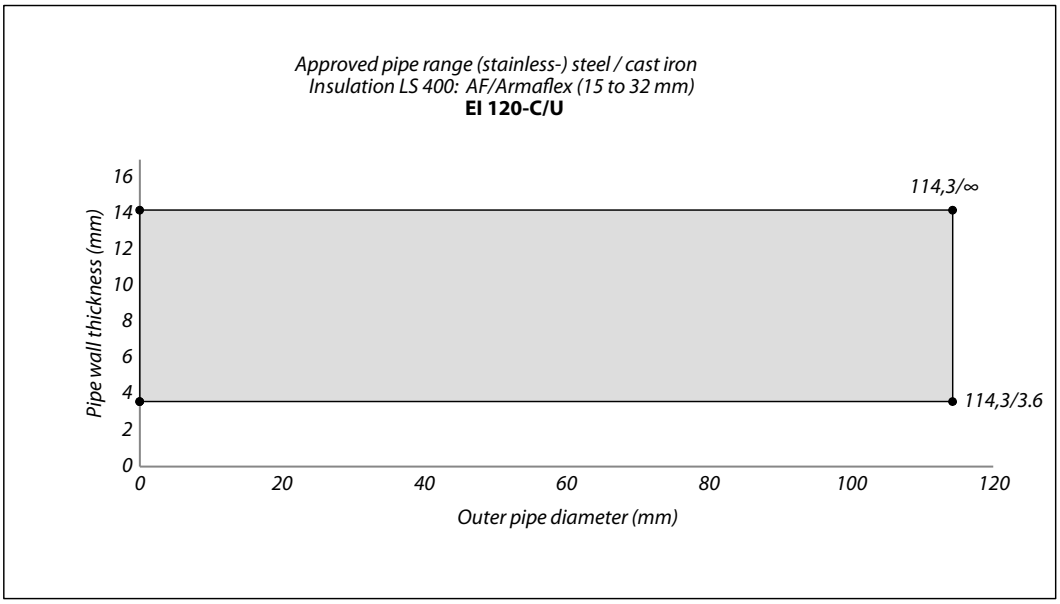
f5.41 Validity area



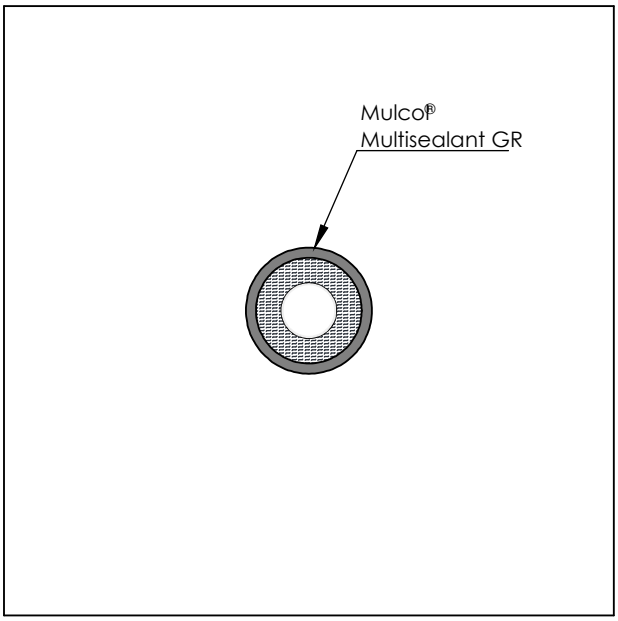
f5.42 Validity area

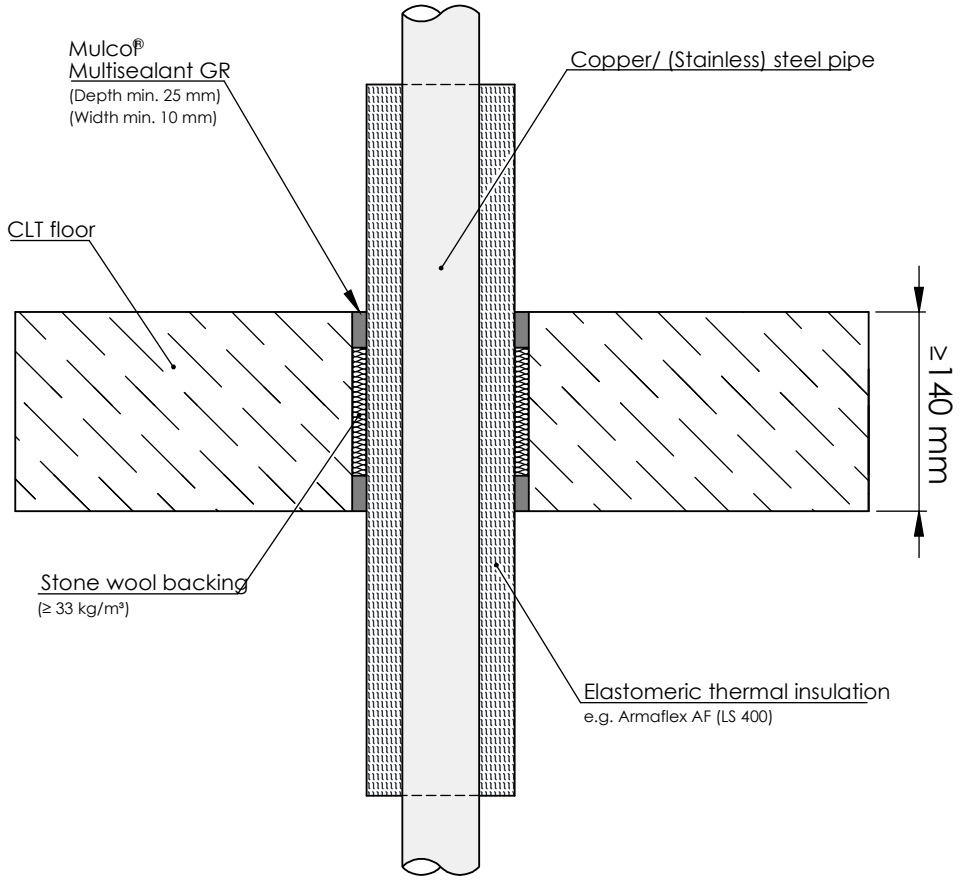


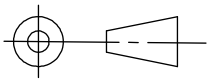
f5.43 Validity area



Bottom view



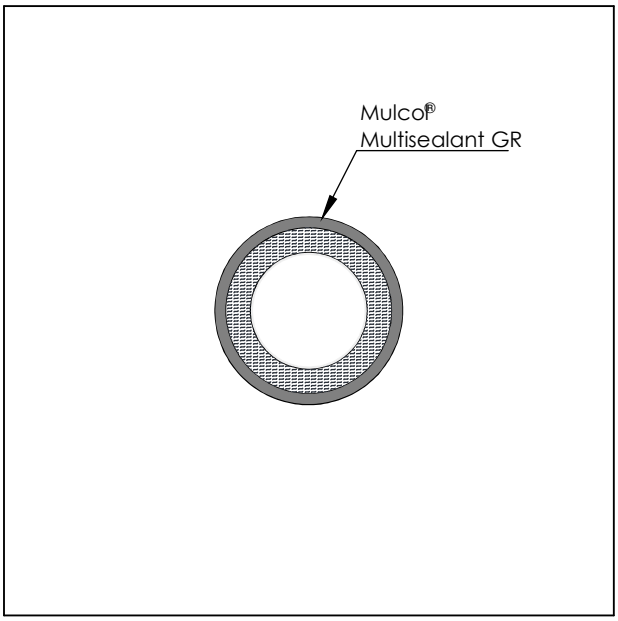


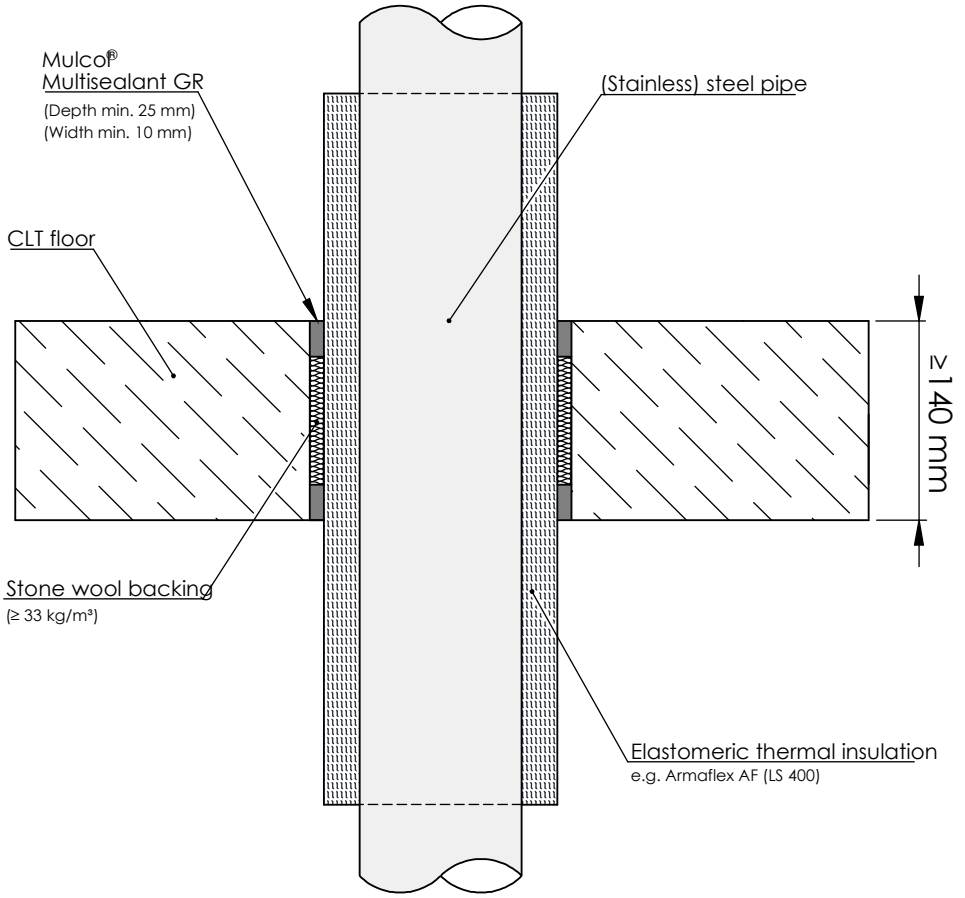
American projection 	Scale :	Company : Mulcol International B.V.	FCLT-CU-G2.19.22
	Unit of measure : mm	Department : Research & Development	
	Date : 26-5-2023	Draftsman : K.J.	A4

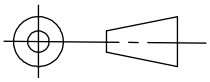
MULCOL FIRE PROTECTION

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

Bottom view





American projection 	Scale :	Company : Mulcol International B.V.	FCLT-ST-G2.19.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 26-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-G1.19.22 and FCLT-ST-G1.19.22						
≤ 22	≥ 1.0	EI 60–C/U E 120–C/U	AF/Armaflex (8.5)	Copper / (stainless-) steel / cast iron	Mulcol® Multisealant GR (≥ 10 x ≥ 20)	5.44
		EI 60–C/U E 90–C/U	AF/Armaflex (8.5 to 33.5)			
		EI 120–C/U	NH/Armaflex (9 to 25)			5.45
		EI 60–C/U E 120–C/U	Armaflex Ultima (9 to 25)			5.44
		EI 90–C/U E 120–C/U	Armaflex Ultima (25 to 32)			5.46
≤ 26.9	≥ 2.3	EI 120–C/U	AF/Armaflex (8.5 to 35)	(Stainless-) steel / cast iron		5.47
			NH/Armaflex (9 to 25)			5.48
		EI 60–C/U E 90–C/U	Armaflex Ultima (9 to 25)			5.49
		EI 90–C/U E 120–C/U	Armaflex Ultima (25)			5.50
		EI 60–C/U E 120–C/U	Kaiflex KK Plus (8.5)			5.51

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-G1.19.22 and FCLT-ST-G1.19.22						
≤ 54	≥ 1.5	EI 120–C/U* (CS)	AF/Armaflex (13.5)	Copper / (stainless-) steel / cast iron	Mulcol® Multisealant GR (≥ 10 x ≥ 20)	5.52
		EI 90–C/U E 120–C/U	AF/Armaflex (13.5 to 38)			5.53
		EI 120–C/U	NH/Armaflex (13)			5.54
		EI 90–C/U	NH/Armaflex (13 to 25)			5.55
		EI 60–C/U EI 90–C/U* (CS) E 120–C/U	Armaflex Ultima (13 to 32)			5.56 5.57
		EI 90–C/U	Armaflex Ultima (32)			5.53
≤ 114.3	≥ 3.6	EI 90–C/U E 120–C/U	AF/Armaflex (15 to 43)	(Stainless-) steel / cast iron		5.58
		EI 120–C/U* (CS)	AF/Armaflex (15)			5.59
		EI 120–C/U	NH/Armaflex (19 to 25)			5.60
		EI 90–C/U E 120–C/U	Armaflex Ultima (13)			5.61
		EI 60–C/U E 120–C/U	Armaflex Ultima (13 to 32)			5.62

* These specific classifications only apply with continued sustained insulation (CS in accordance with Table 1 of EN 1366-3).

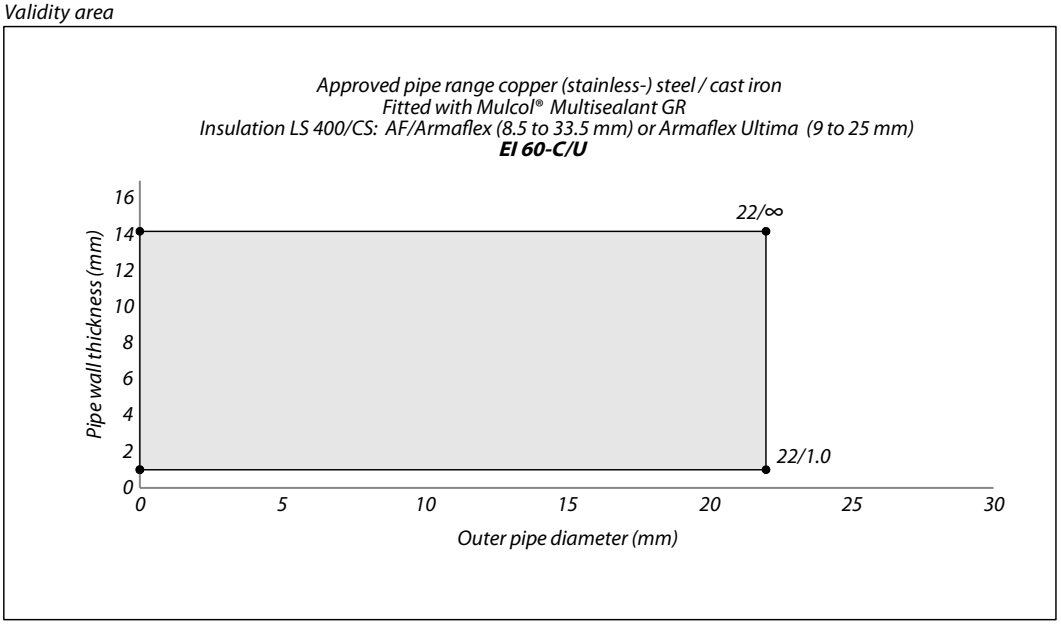
The classifications are valid for insulation AF/Armaflex, NH/Armaflex or Armaflex Ultima with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

It is mandatory to apply Mulcol® Multisealant GR in annular gap on the bottom side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

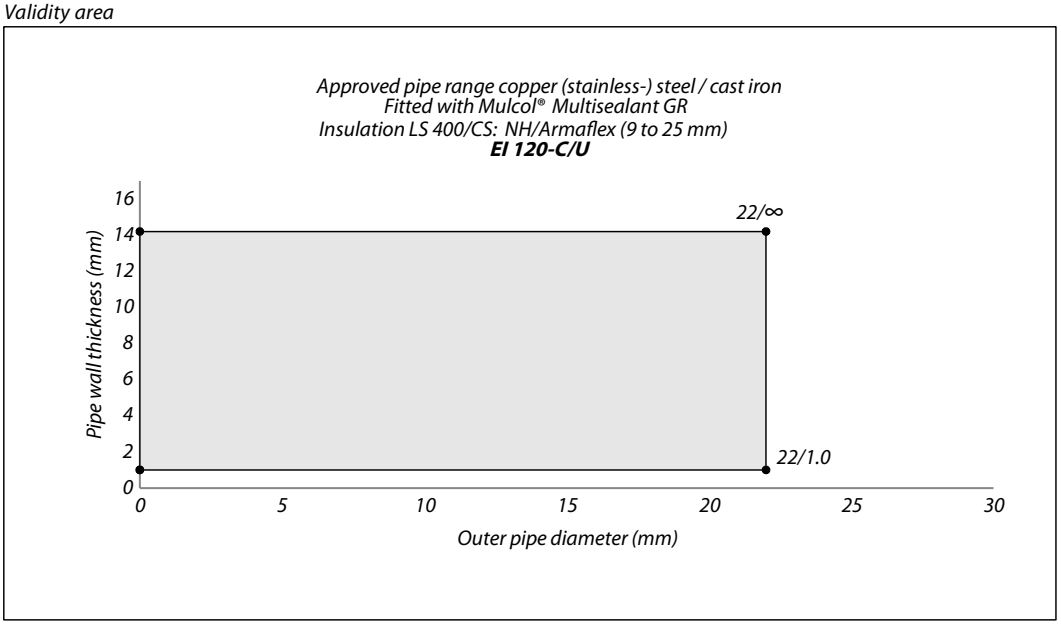
For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

When the insulation consist out of multiple parts or splices are present, the insulation is glued together with appropriate glue for the insulation type.

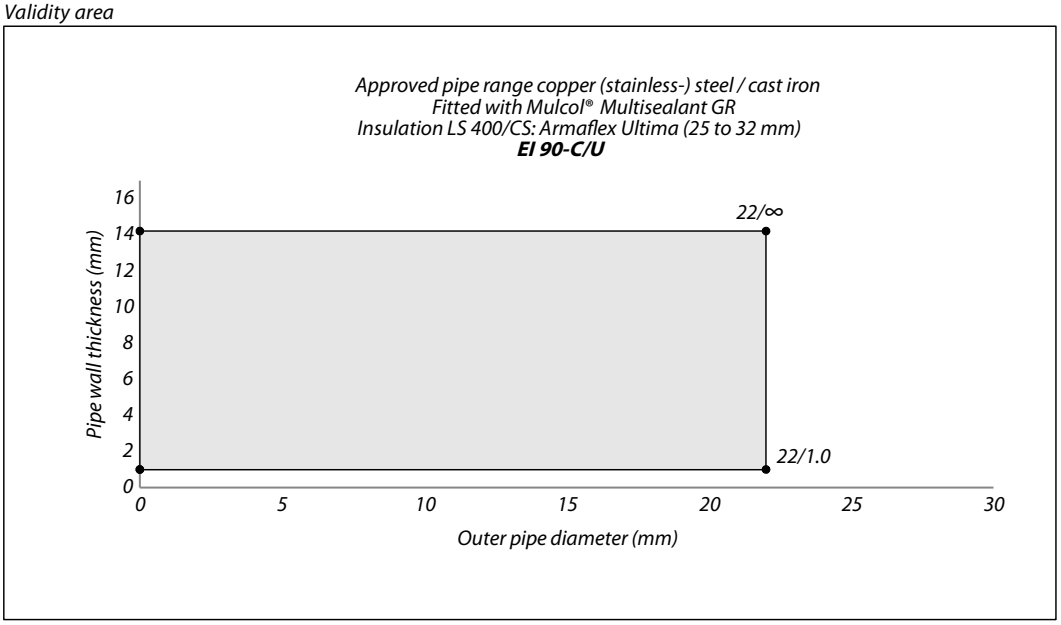
f5.44 Validity area



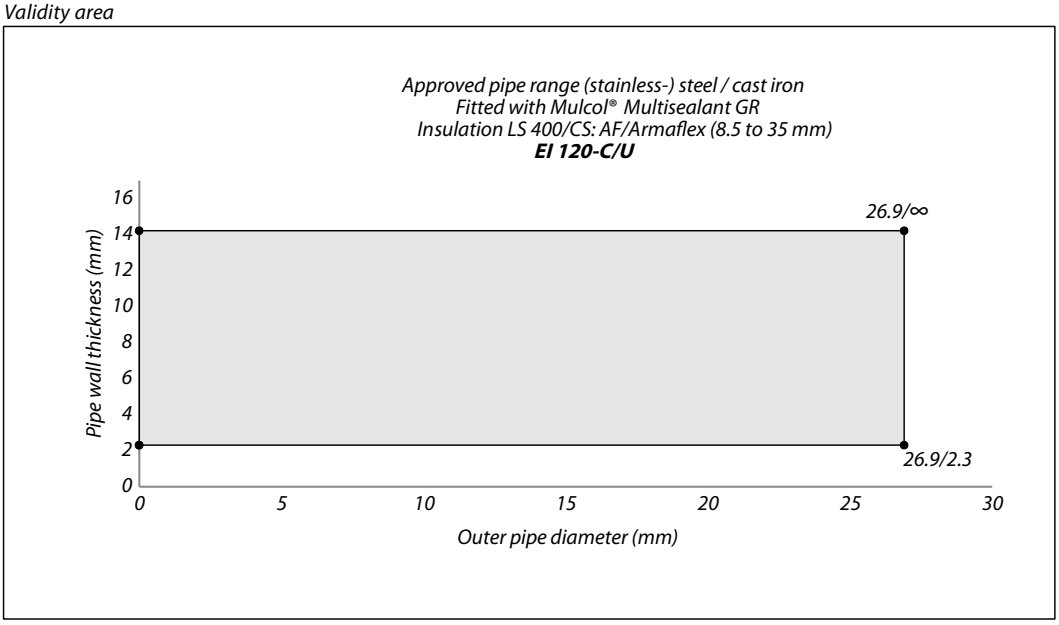
f5.45 Validity area



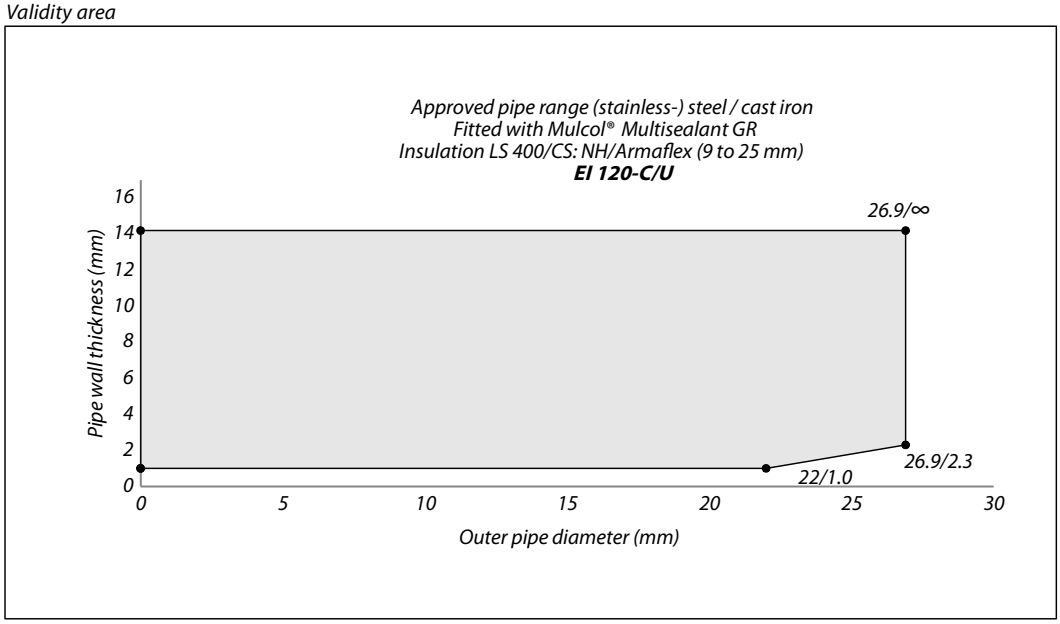
f5.46 Validity area



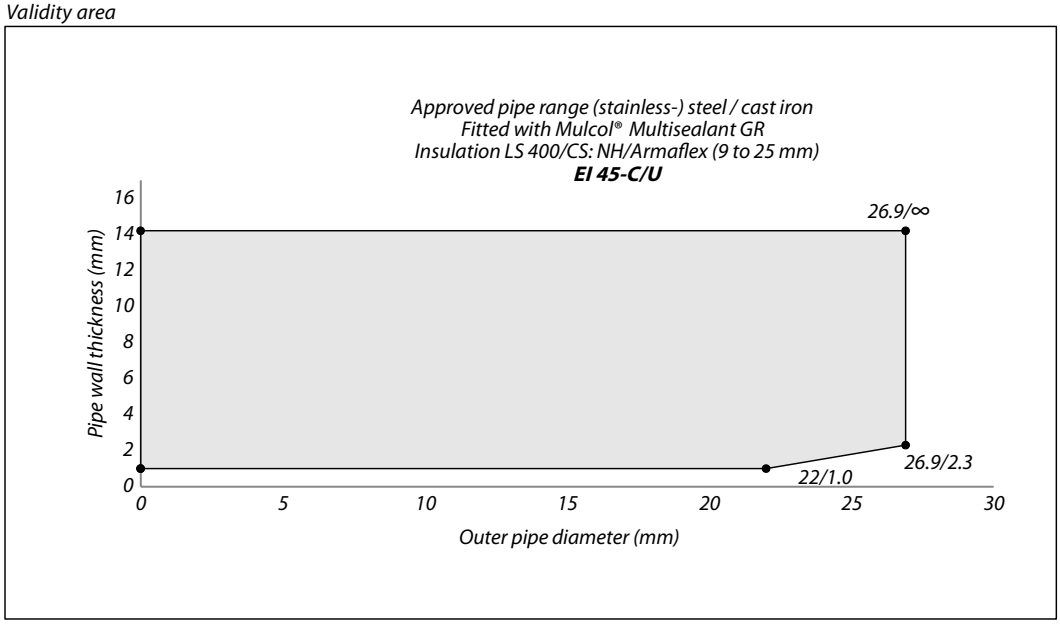
f5.47 Validity area



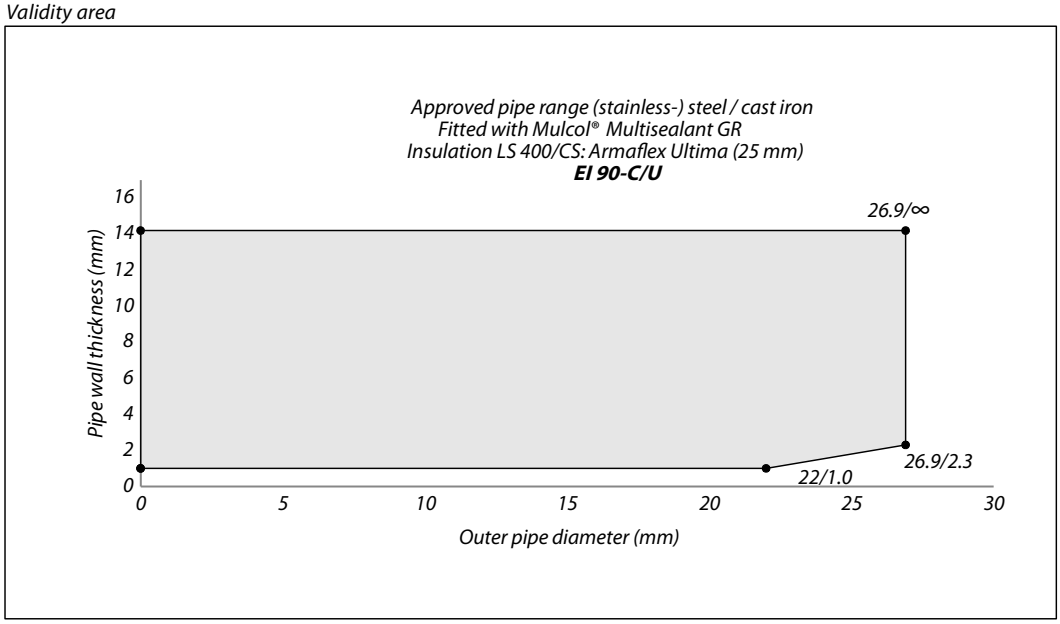
f5.48 Validity area



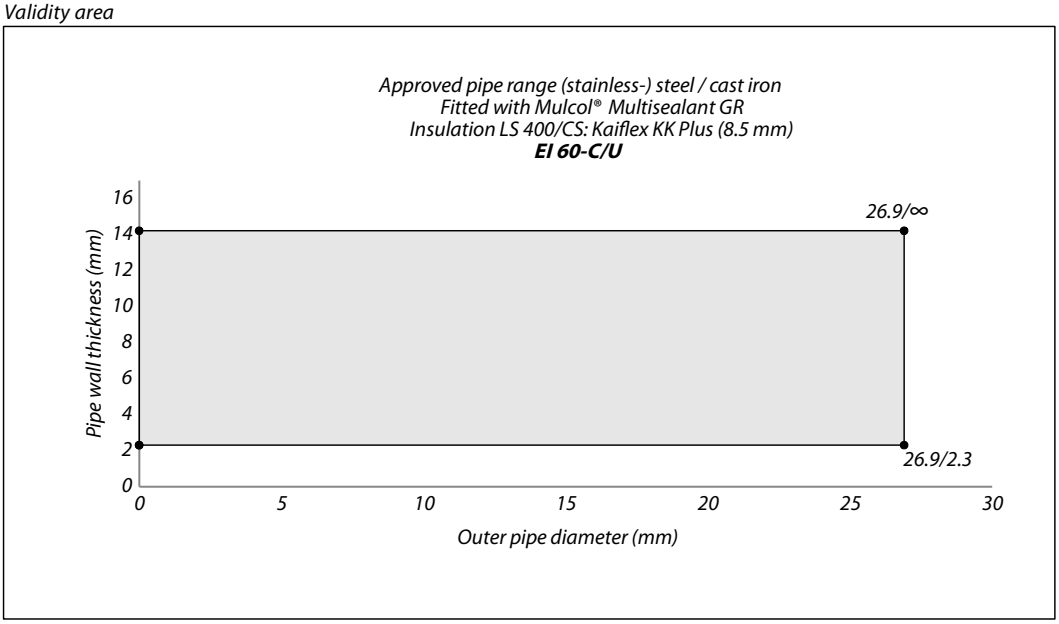
f5.49 Validity area



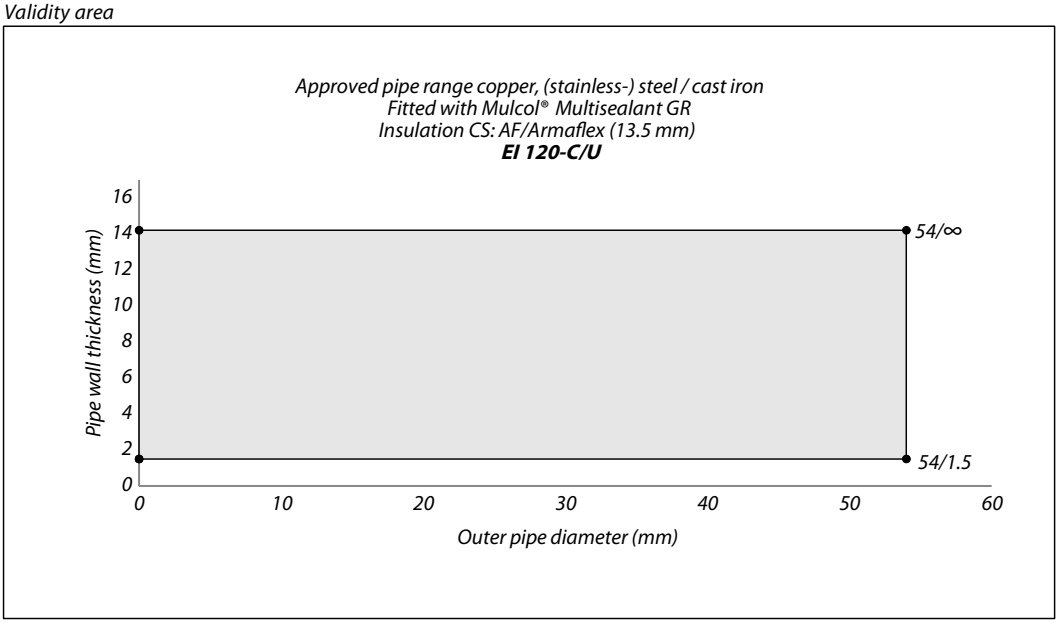
f5.50 *Validity area*



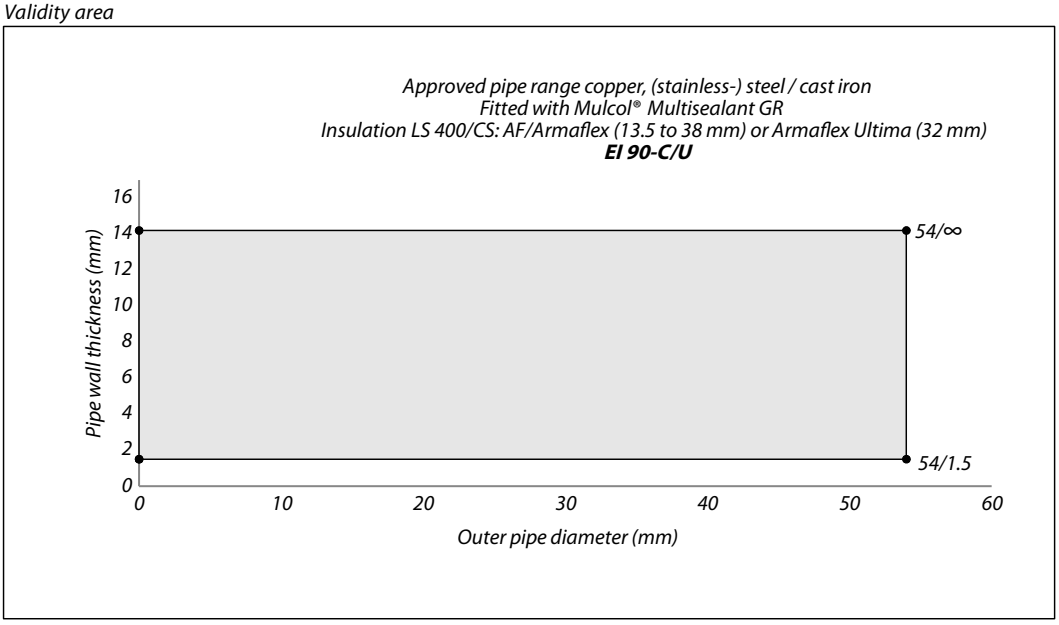
f5.51 *Validity area*



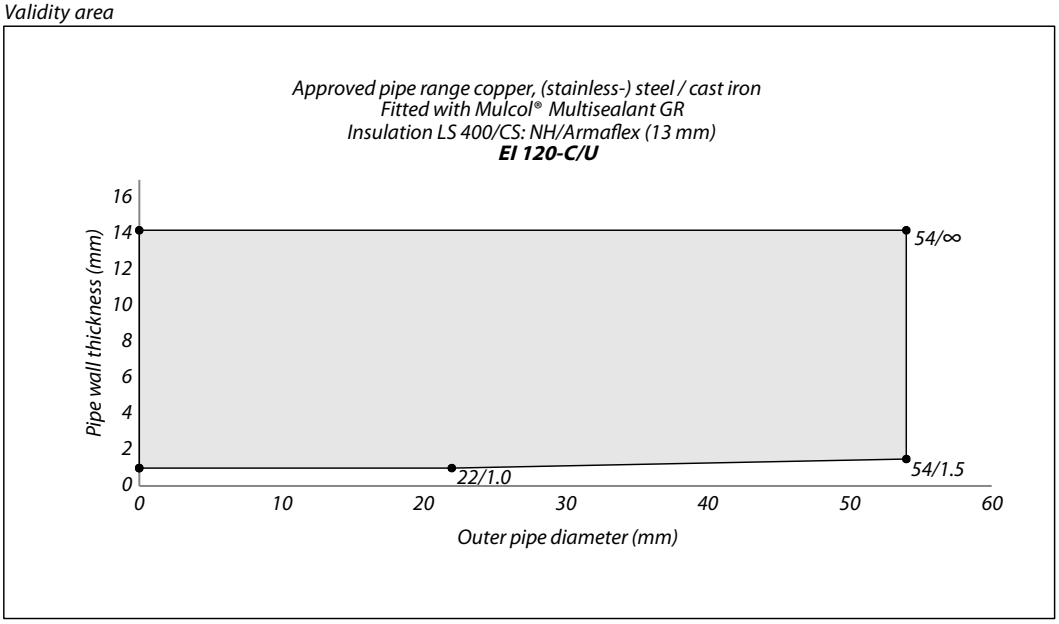
f5.52 Validity area



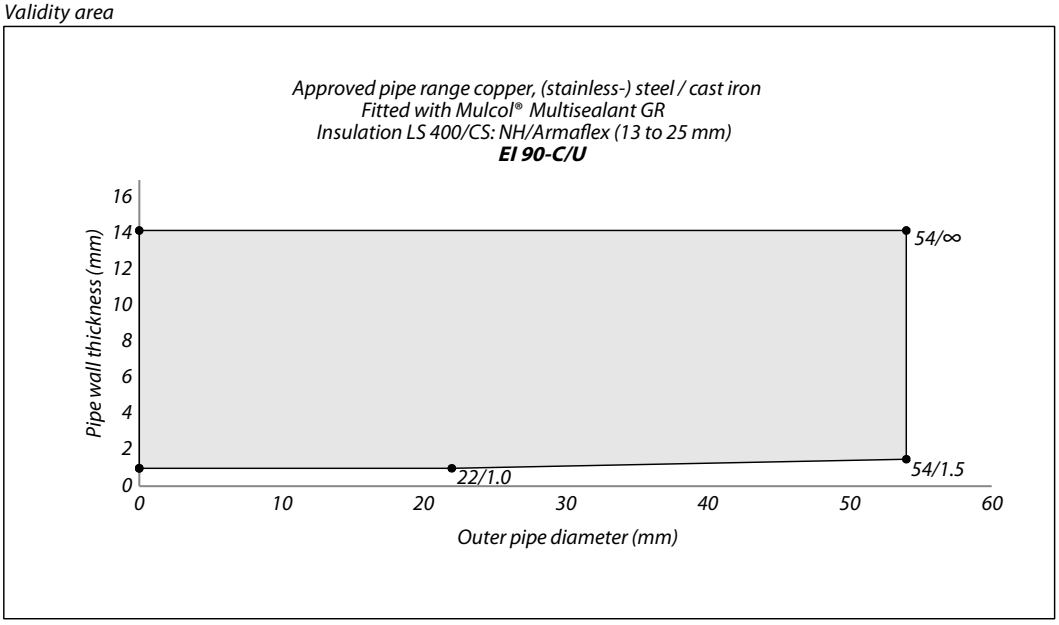
f5.53 Validity area



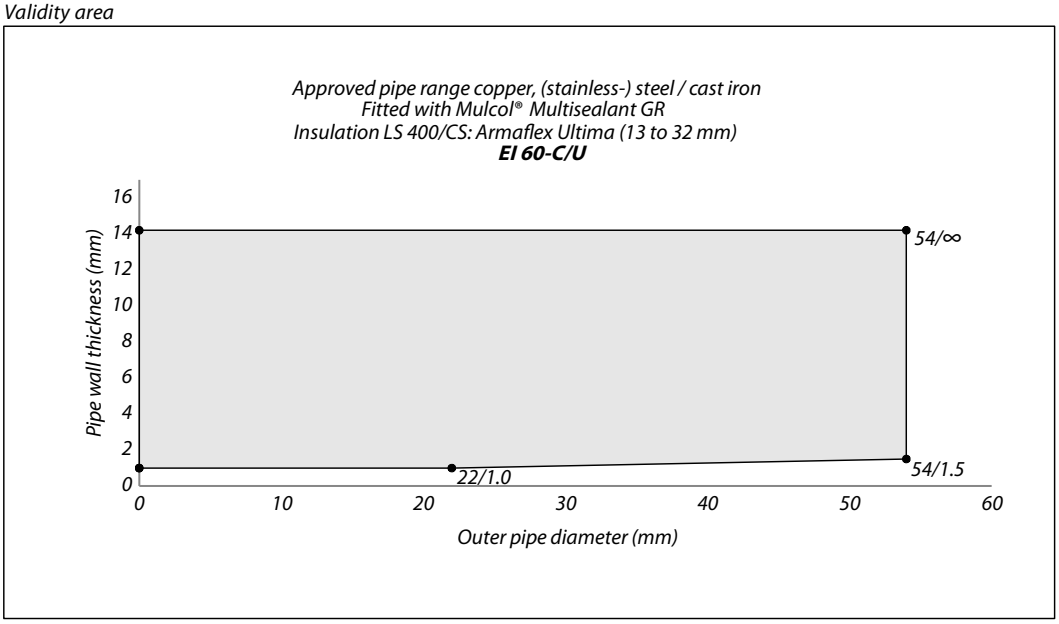
f5.54 *Validity area*



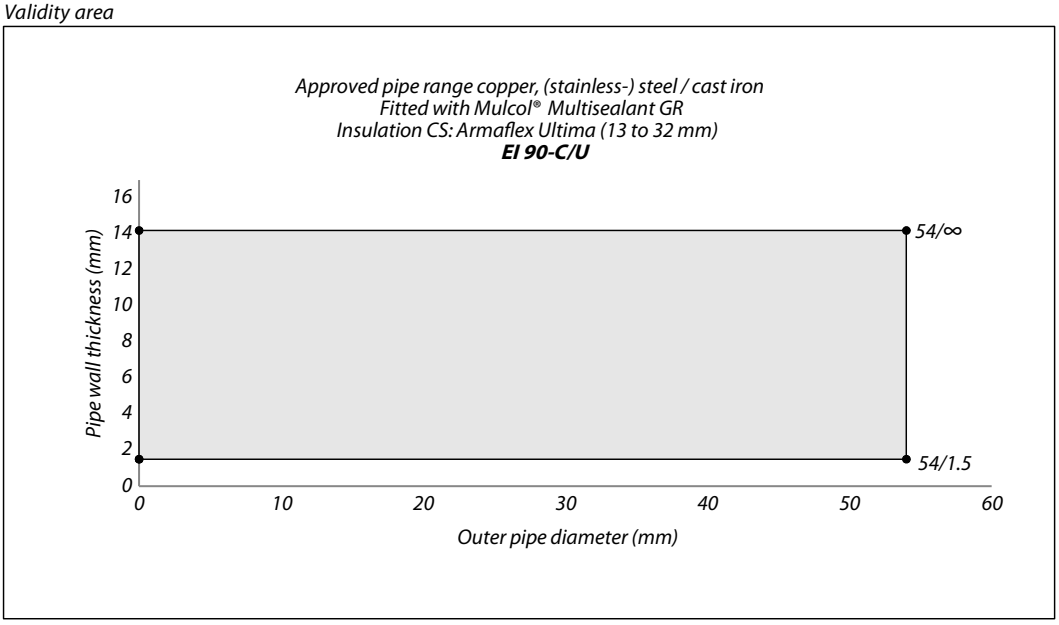
f5.55 *Validity area*



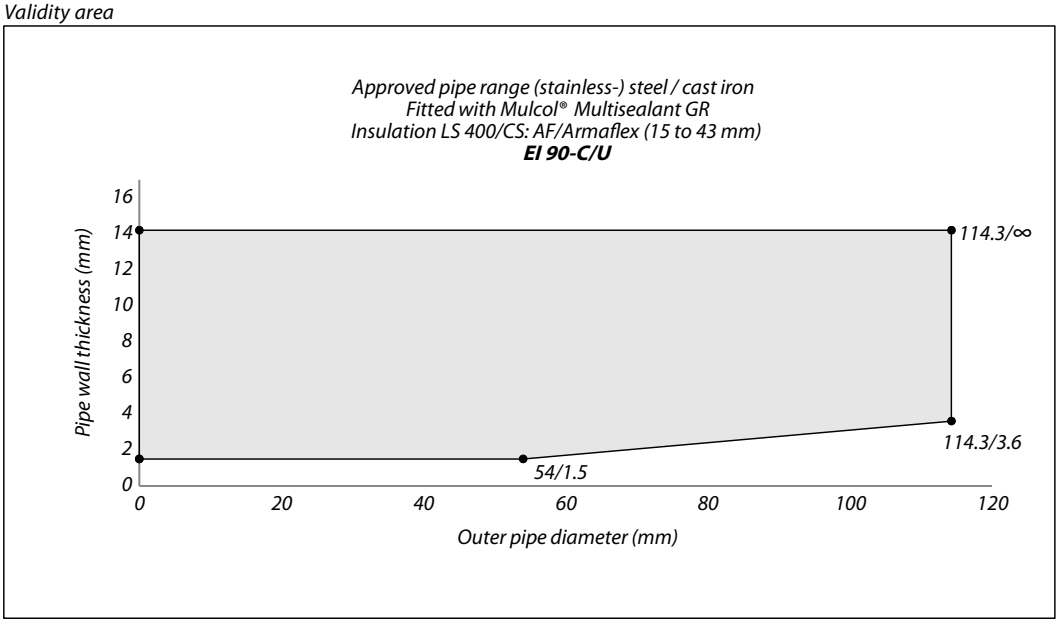
f5.56 *Validity area*



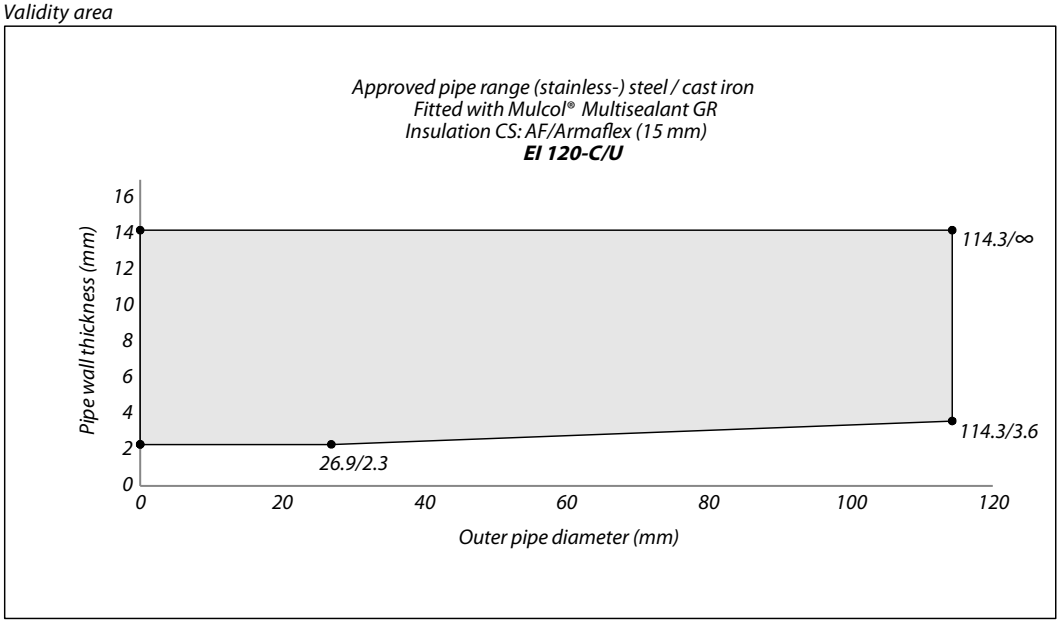
f5.57 *Validity area*



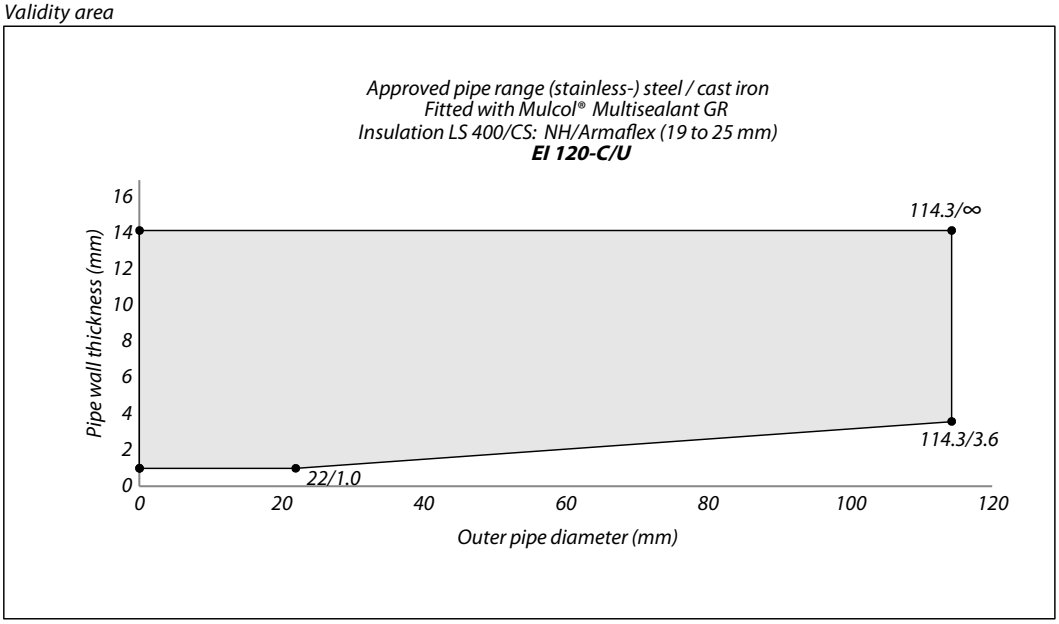
f5.58 *Validity area*



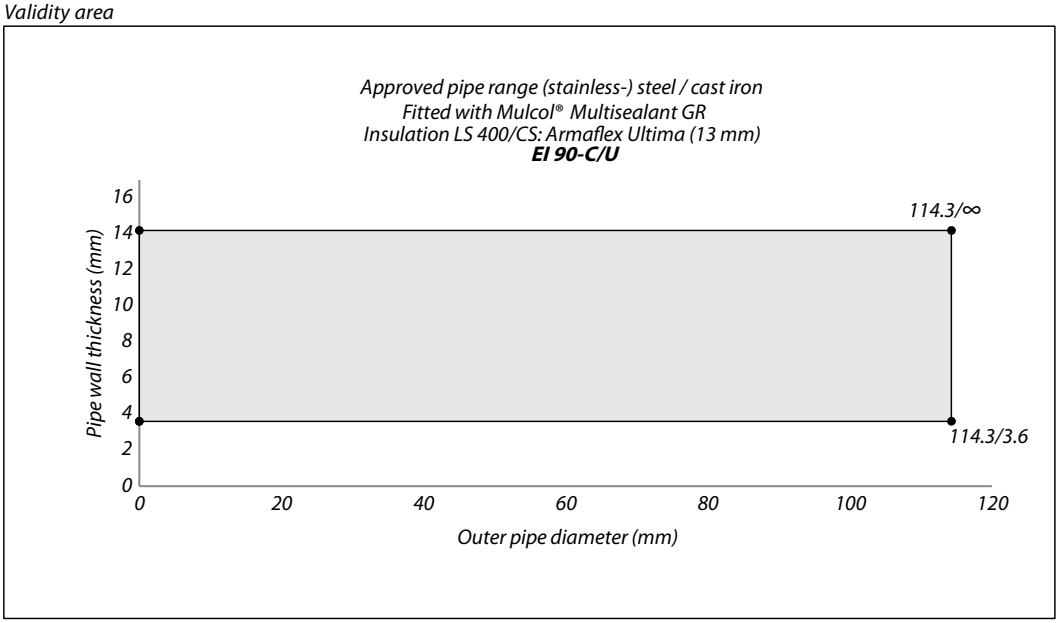
f5.59 *Validity area*



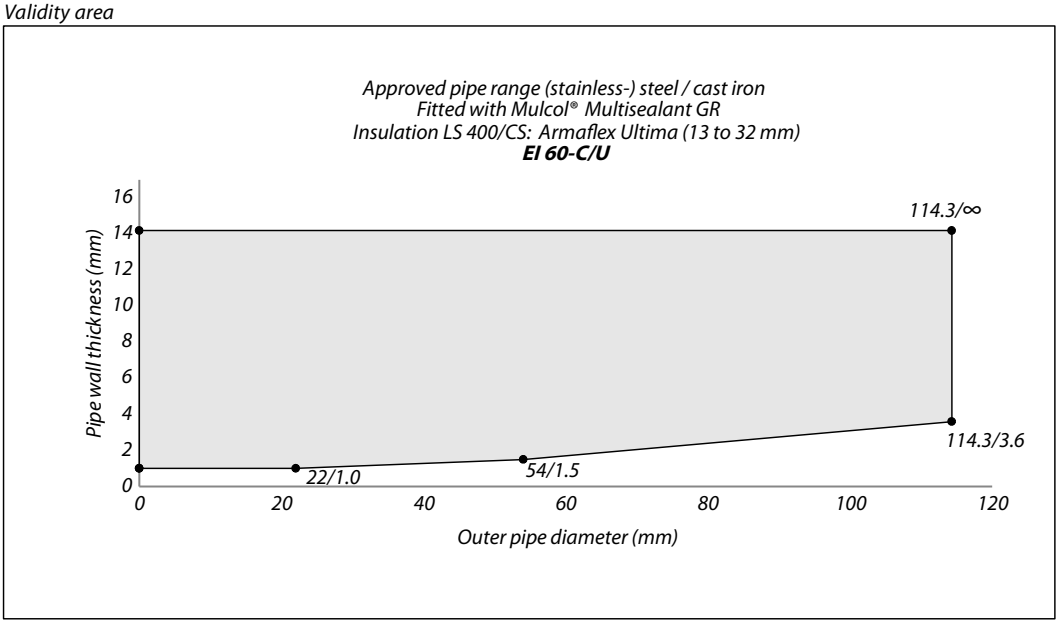
f5.60 Validity area



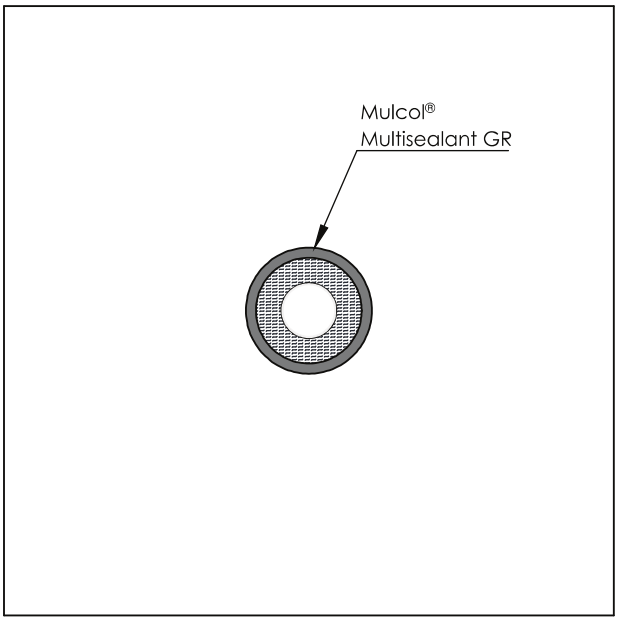
f5.61 Validity area

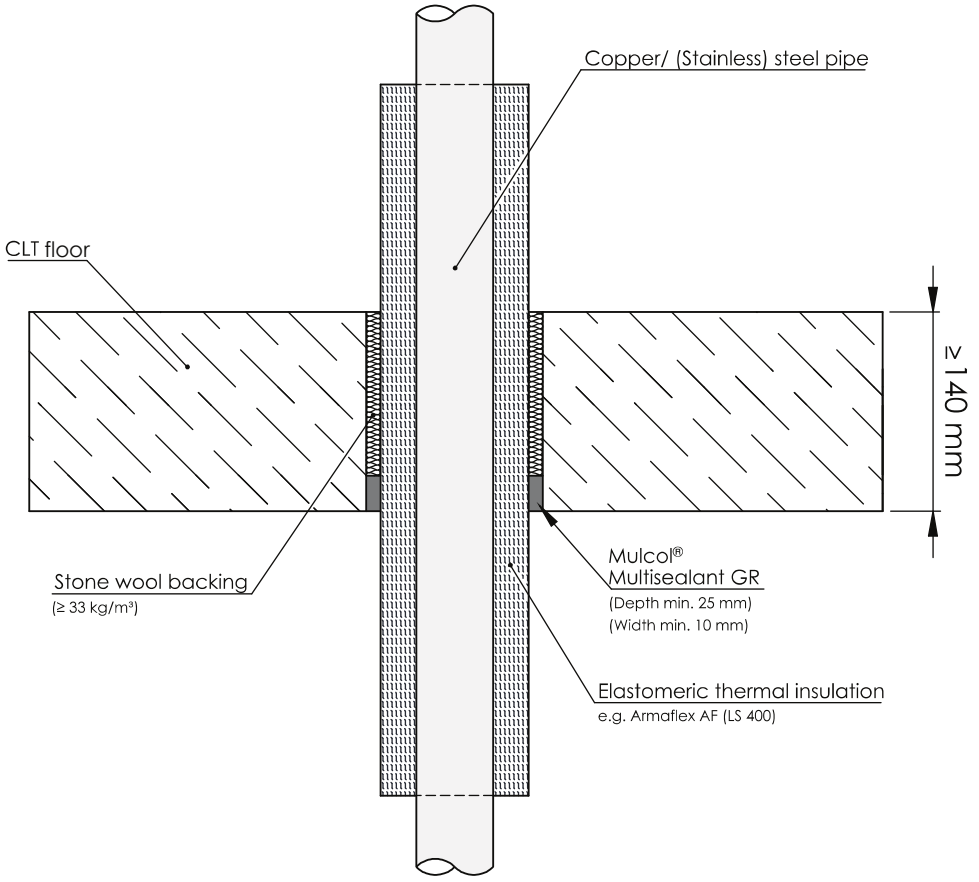


f5.62 Validity area



Bottom view



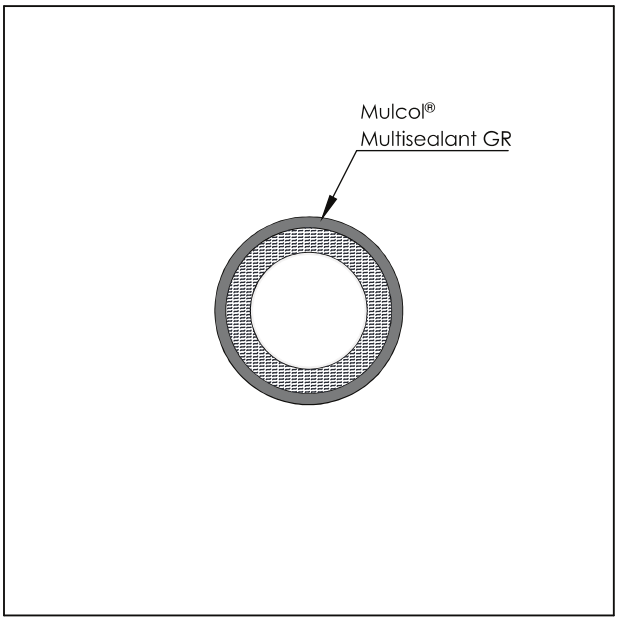


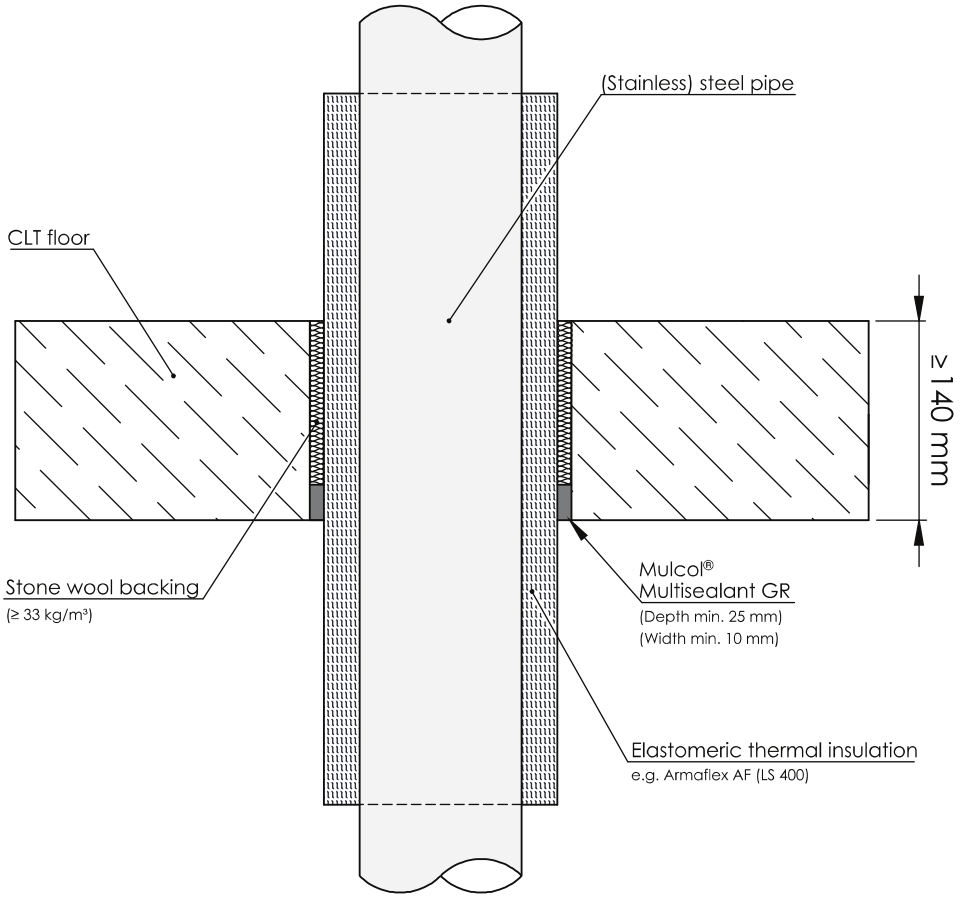
American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-G1.19.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 26-5-2023	Draftsman : K.J.	

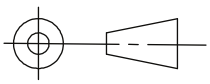
MULCOL FIRE PROTECTION

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

Bottom view





American projection 	Scale :	Company : Mulcol International B.V.	FCLT-ST-G1.19.22
	Unit of measure : mm	Department : Research & Development	
	Date : 26-5-2023	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

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

5.10.2 Mulcol® Multiwrap

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-MW1.1.2 and FCLT-ST- MW1.1.2						
≤ 22	≥ 1.1	EI 120–C/U	AF/Armaflex (12)	Copper / (stainless-) steel / cast iron	Mulcol® Multiwrap 2 layers (≥ 10 x ≥ 25) (backing 90 mm)	5.63
≤ 54	≥ 1.5	EI 60–C/U E 120–C/U	AF/Armaflex (13.5)			5.64
		EI 120–C/U	AF/Armaflex (38)			5.65
≤ 114.3	≥ 3.6	EI 120–C/U	AF/Armaflex (15)	(Stainless-) steel / cast iron		5.66
		EI 90–C/U E 120–C/U	AF/Armaflex (32)			5.67

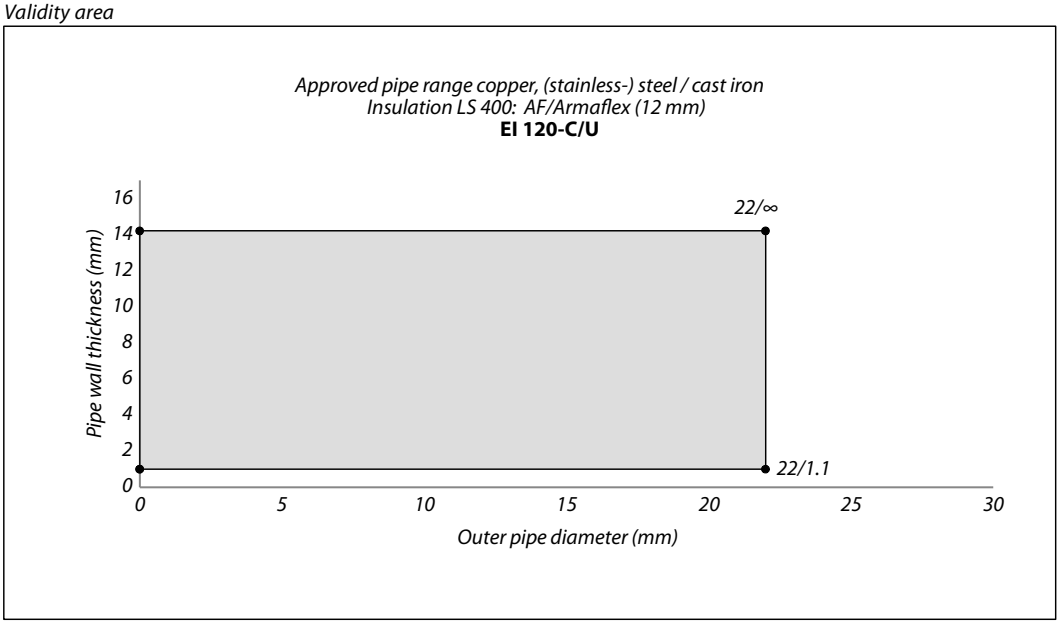
The classifications are valid for insulation AF/Armaflex with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

It is mandatory to apply Mulcol® Multiwrap in annular gap on the bottom side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

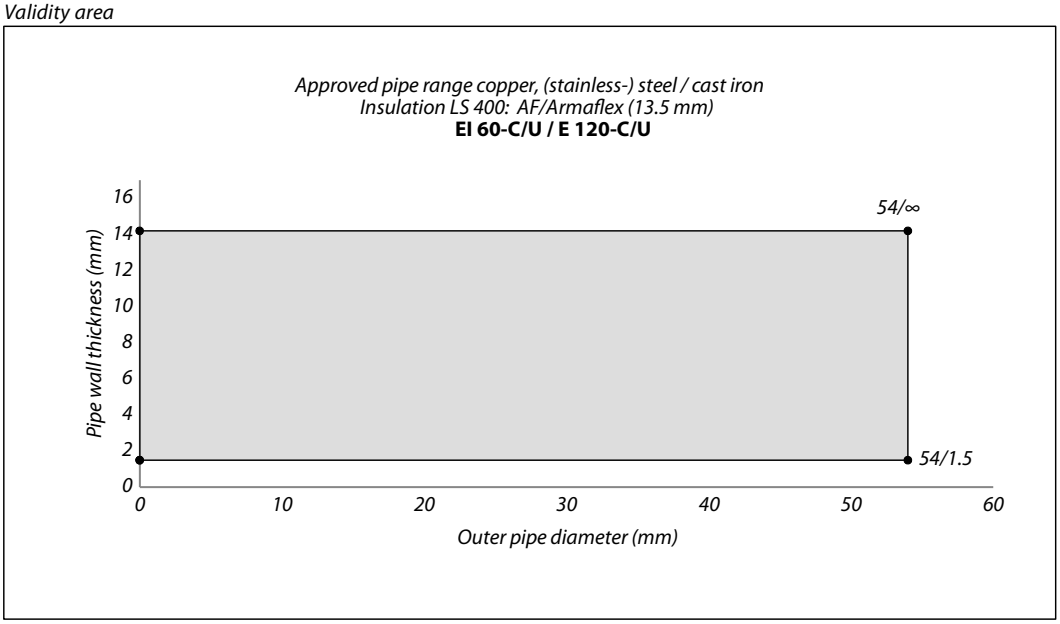
For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

When the insulation consist out of multiple parts or splices are present, the insulation is glued together with appropriate glue for the insulation type.

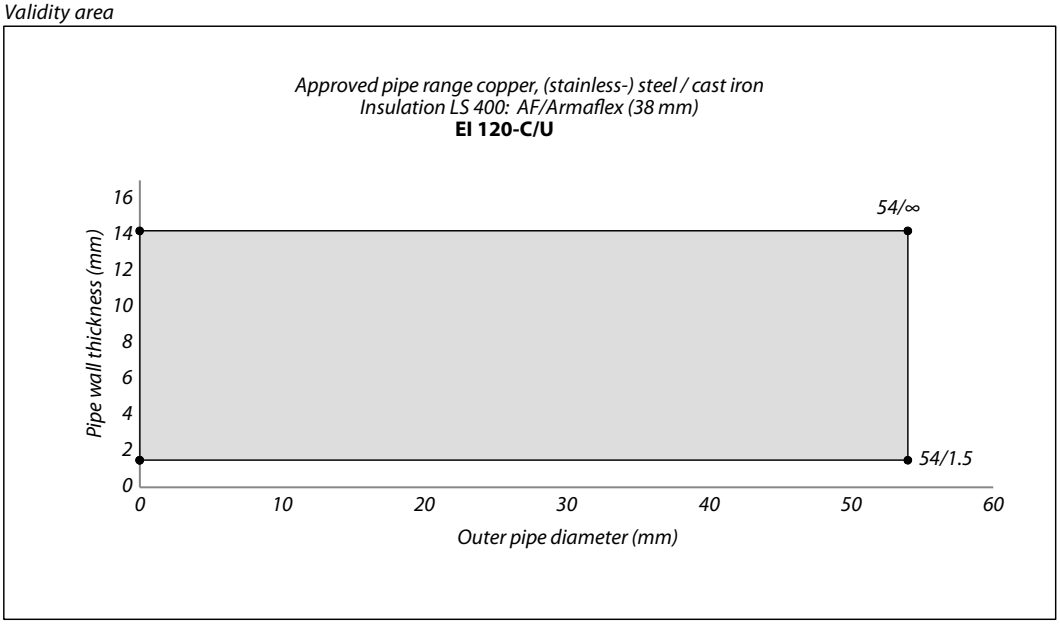
f5.63 Validity area



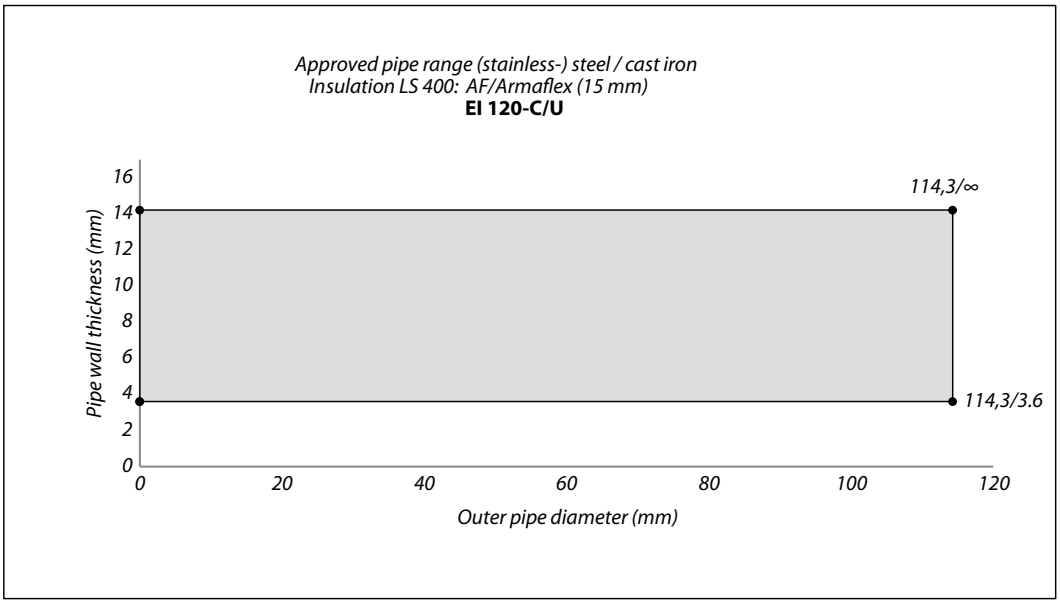
f5.64 Validity area



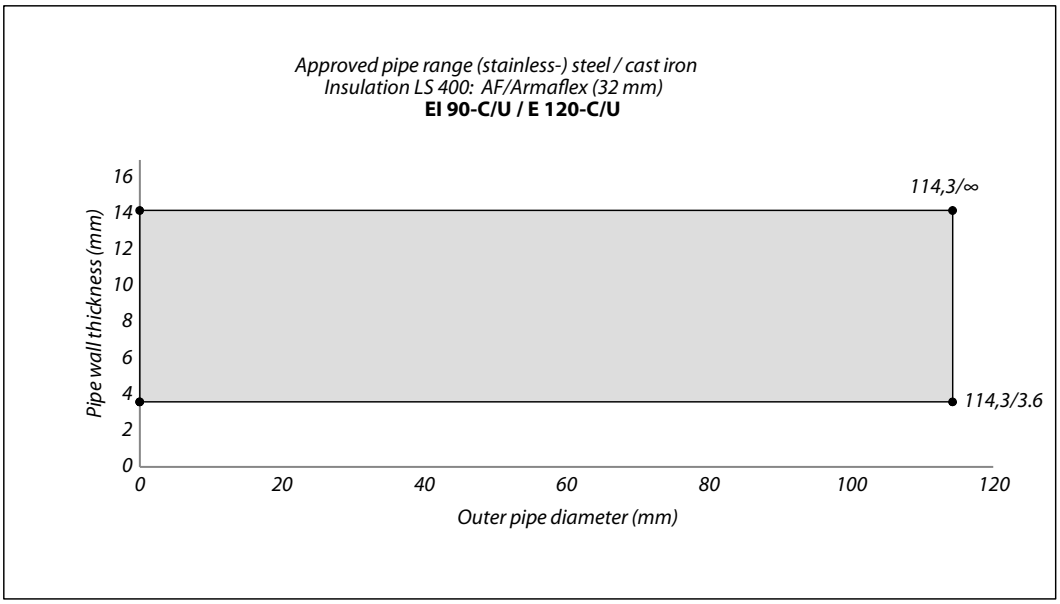
f5.65 Validity area



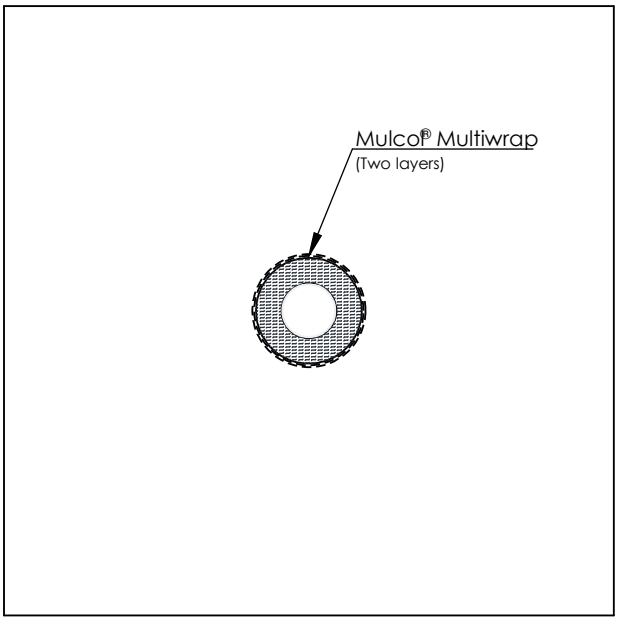
f5.66 Validity area

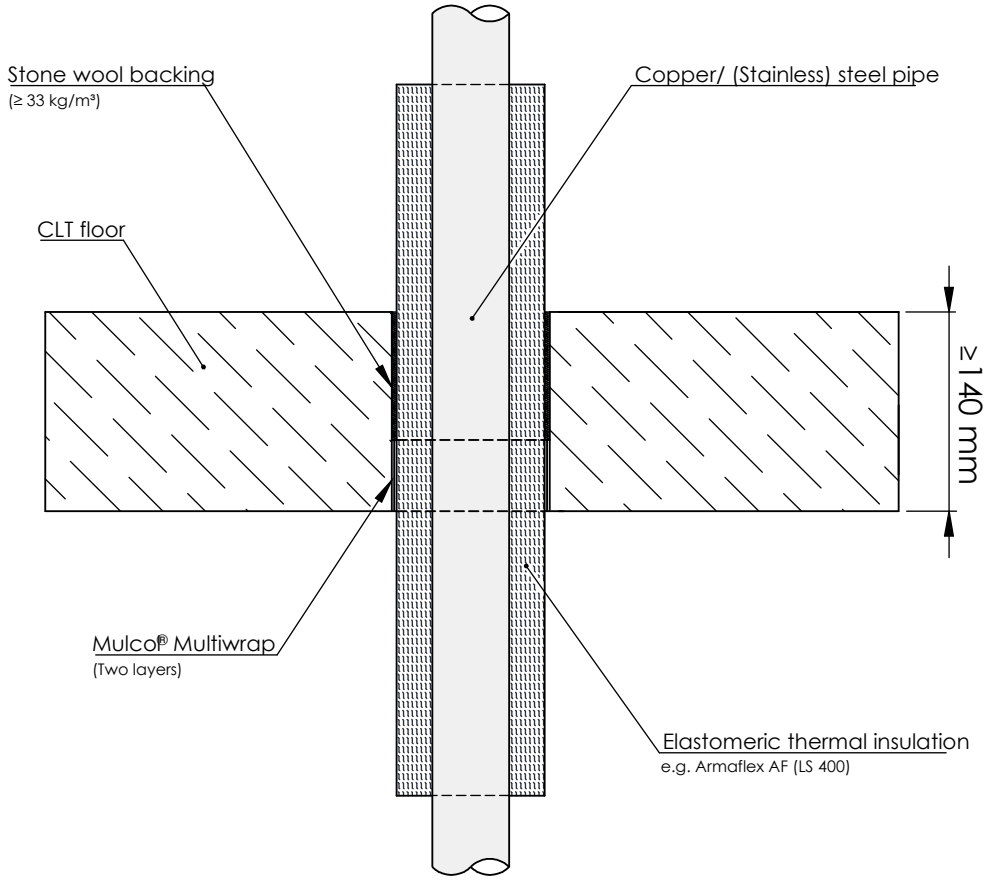


f5.67 Validity area



Bottom view



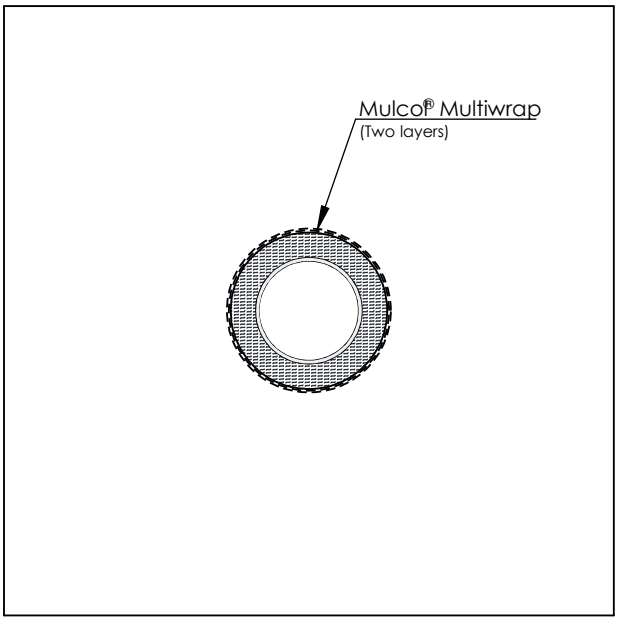


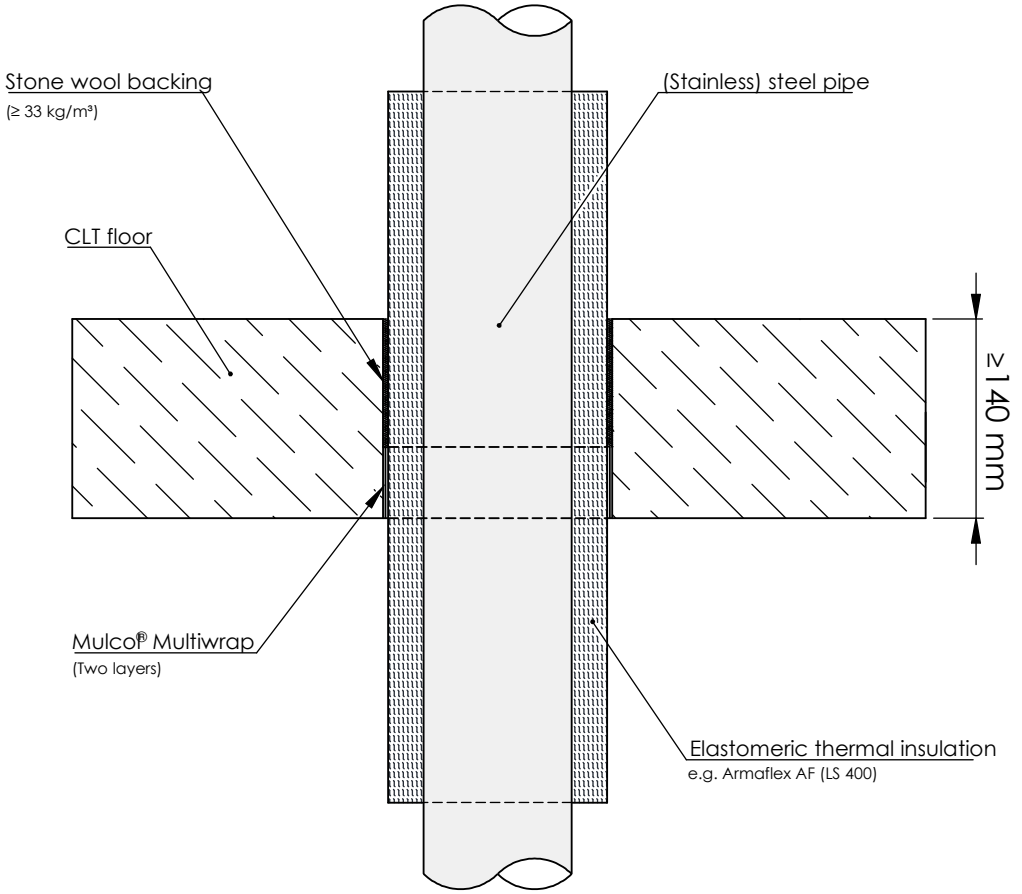
American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-MW1.1.2
	Unit of measure : mm	Department : Research & Development	A4
	Date : 2-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multiwrap
Installation in wooden CLT floor

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-ST-MW1.1.2
	Unit of measure : mm	Department : Research & Development	A4
	Date : 2-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multiwrap
Installation in wooden CLT floor

5.10.3 Mulcol® Multimastic SP

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

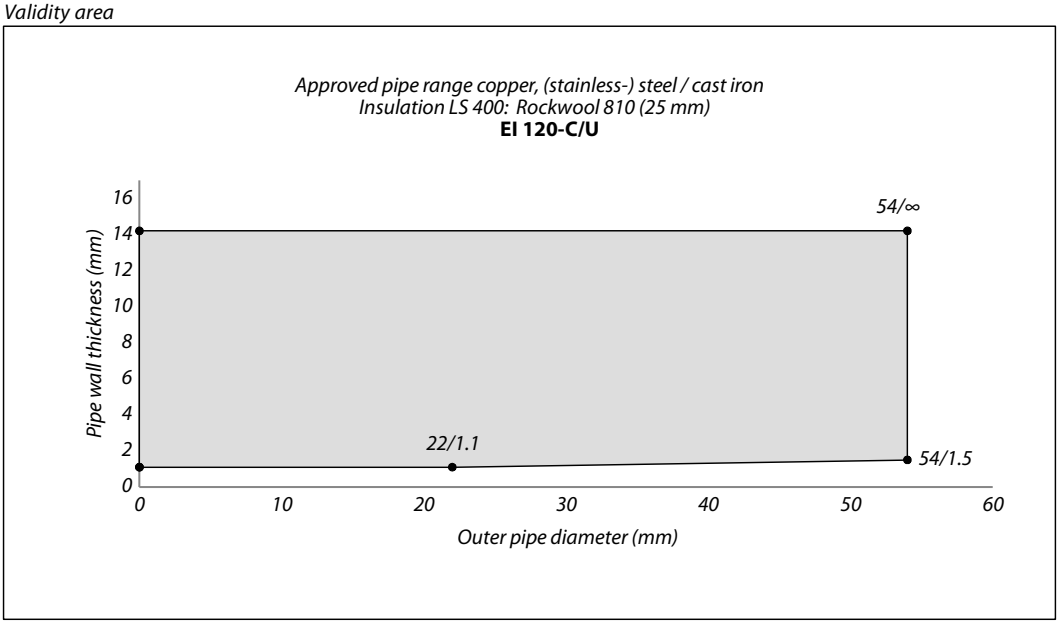
Fire resistance classification						
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)	See Figure
Outer diameter	Wall thickness					
Drawing FCLT-CU-MSP2.2.20 and FCLT-ST-MSP2.2.20						
≤ 22	≥ 1.1	EI 120–C/U	Rockwool 810 (≥ 25)	Copper / (stainless-) steel / cast iron	Mulcol® Multimastic SP (≥ 10 x ≥ 20) (backing 60 mm)	5.68
≤ 54	≥ 1.5					
≤ 114.3	≥ 3.6		Rockwool 810 (≥ 30)	(Stainless-) steel / cast iron		5.69

The classifications are valid for insulation Rockwool 810 with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

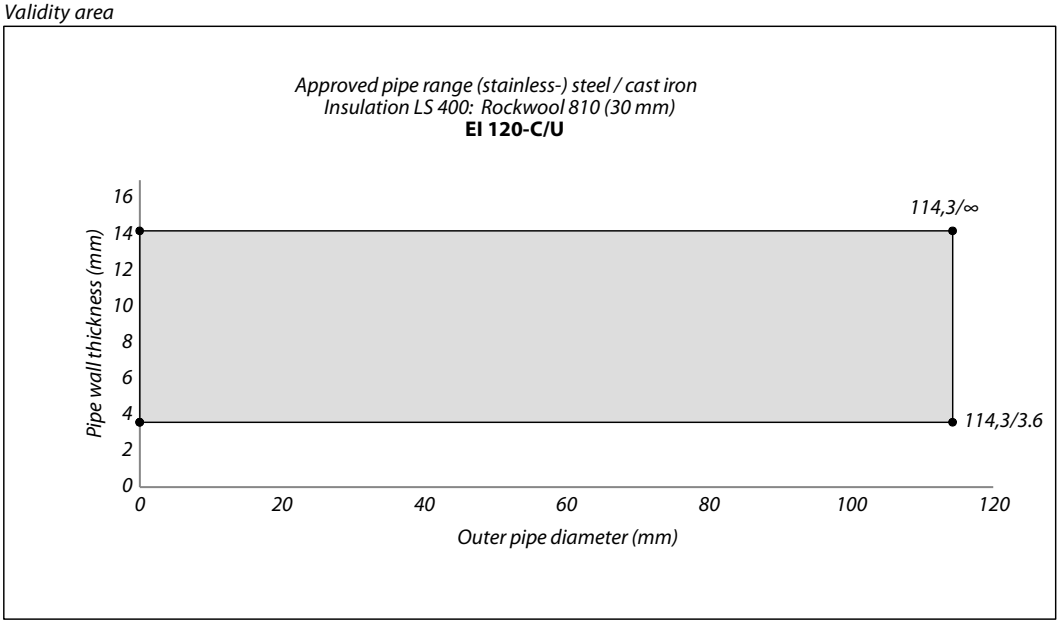
It is mandatory to apply Mulcol® Multimastic SP in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

For steel and cast iron pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

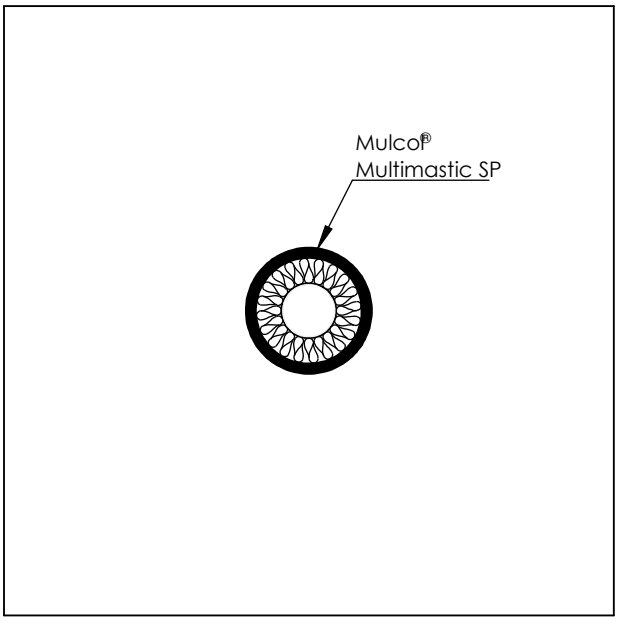
f5.68 Validity area

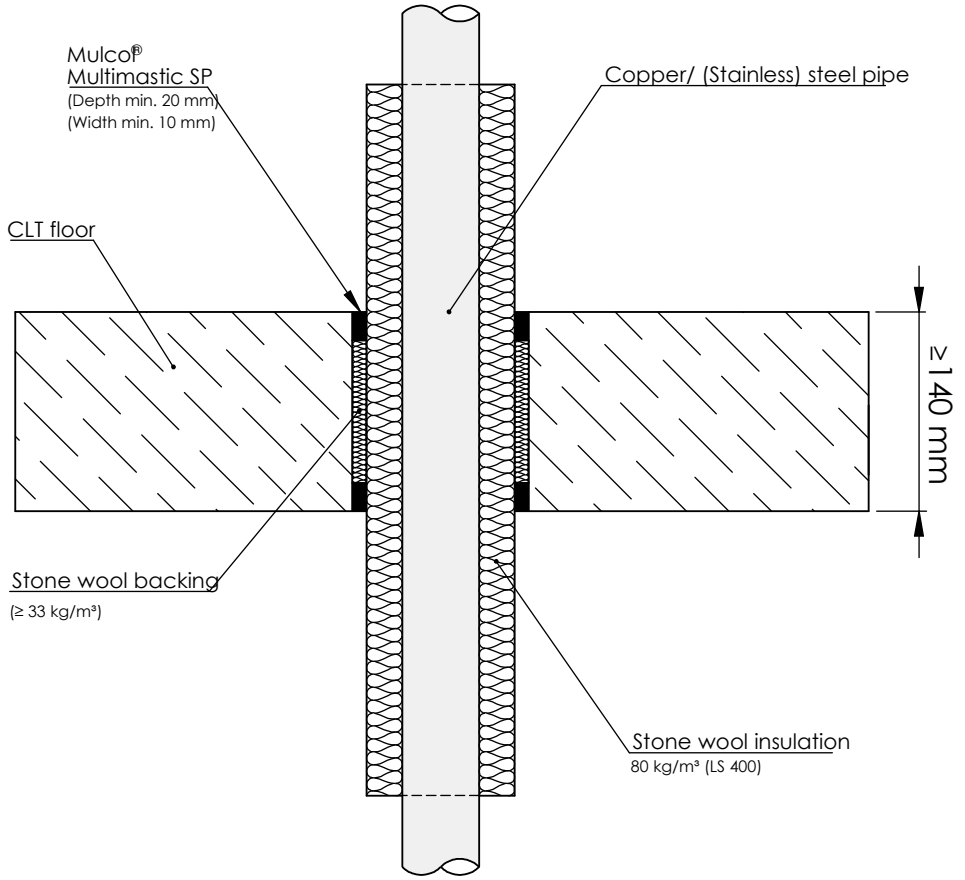


f5.69 Validity area



Bottom view



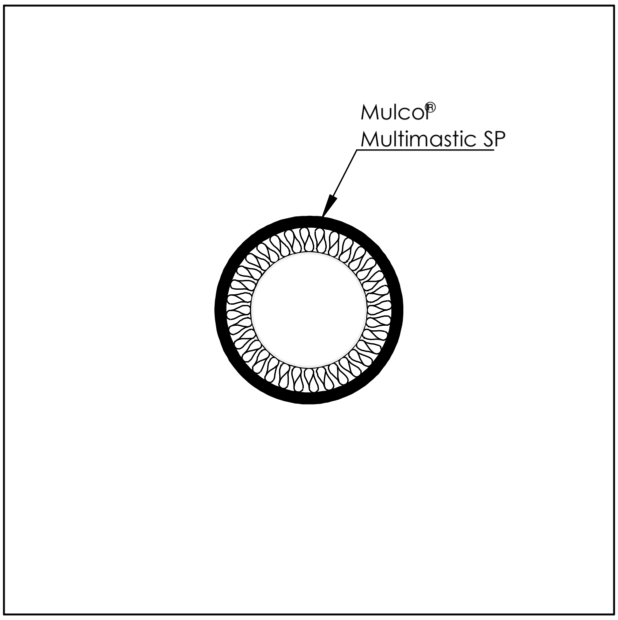


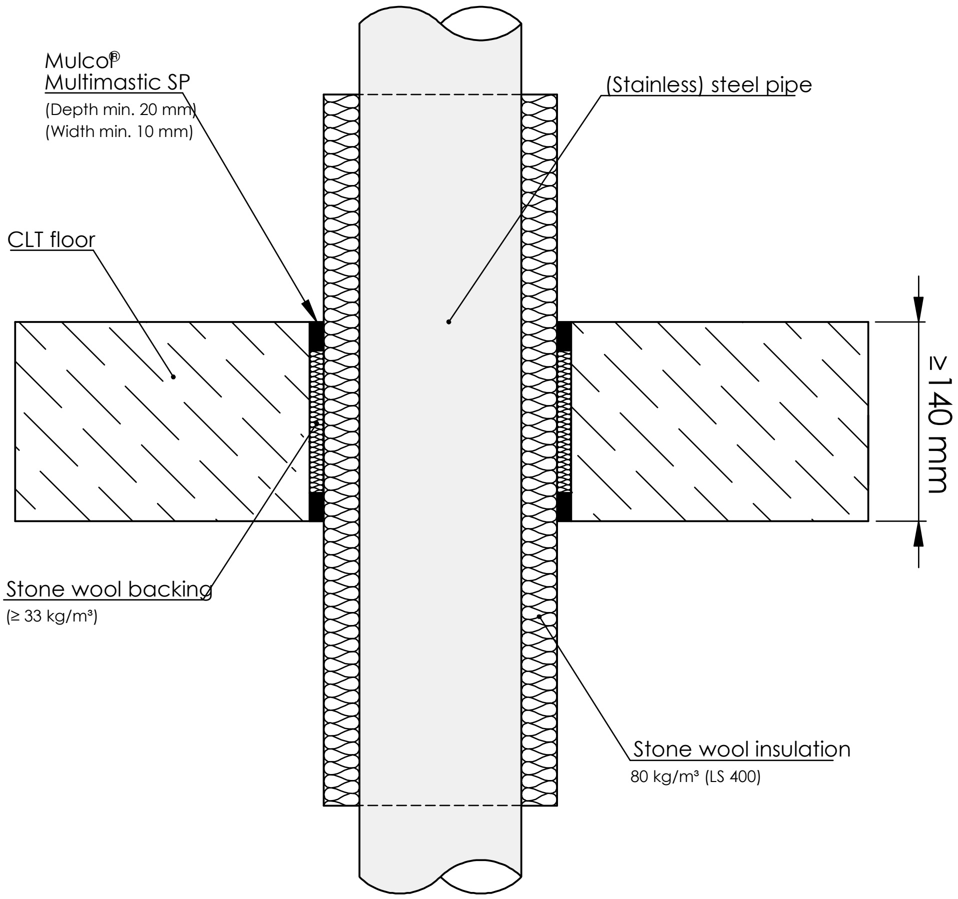
American projection	Scale :	Company : Mulcol International B.V.	FCLT-CU-MSP2.2.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 26-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic SP
Installation in wooden CLT floor

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-ST-MSP2.2.20
	Unit of measure : mm	Department : Research & Development	A4
	Date : 26-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic SP
Installation in wooden CLT floor

5.11 Aluminium composite pipes – directly through the CLT floor

5.11.1 Mulcol® Multisealant GR

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification				
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material and / or insulation (mm)	System width x depth (mm)
Outer diameter	Wall thickness			
Drawing FCLT-MLA-G2.19.10				
≤ 16	2.0	EI 120–U/C	Wavin PE-Xc/AL/PE-HD	Mulcol® Multisealant GR (≥ 15 x ≥ 25) (backing 90 mm)
≤ 63	6.0	EI 30–U/C E 120–U/C		

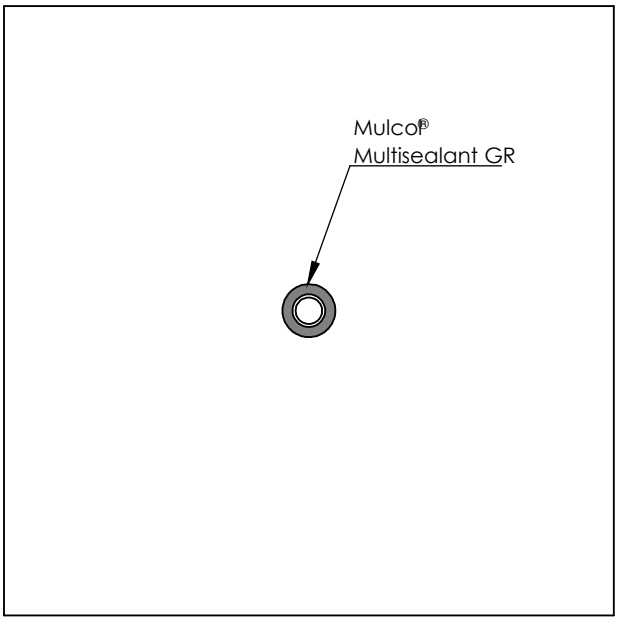
Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LS 400/CS)	Pipe material	System width x depth (mm)
Outer diameter	Wall thickness				
Drawing FCLT-MLA-G2.19.22					
≤ 16	2.0	EI 120–U/C	AF/Armaflex (12) LS 400/CS	Wavin PE-Xc/AL/PE-HD	Mulcol® Multisealant GR (≥ 10 x ≥ 25) (backing 90 mm)
≤ 63	6.0	EI 90–U/C E 120–U/C	AF/Armaflex (14) LS 400/CS		

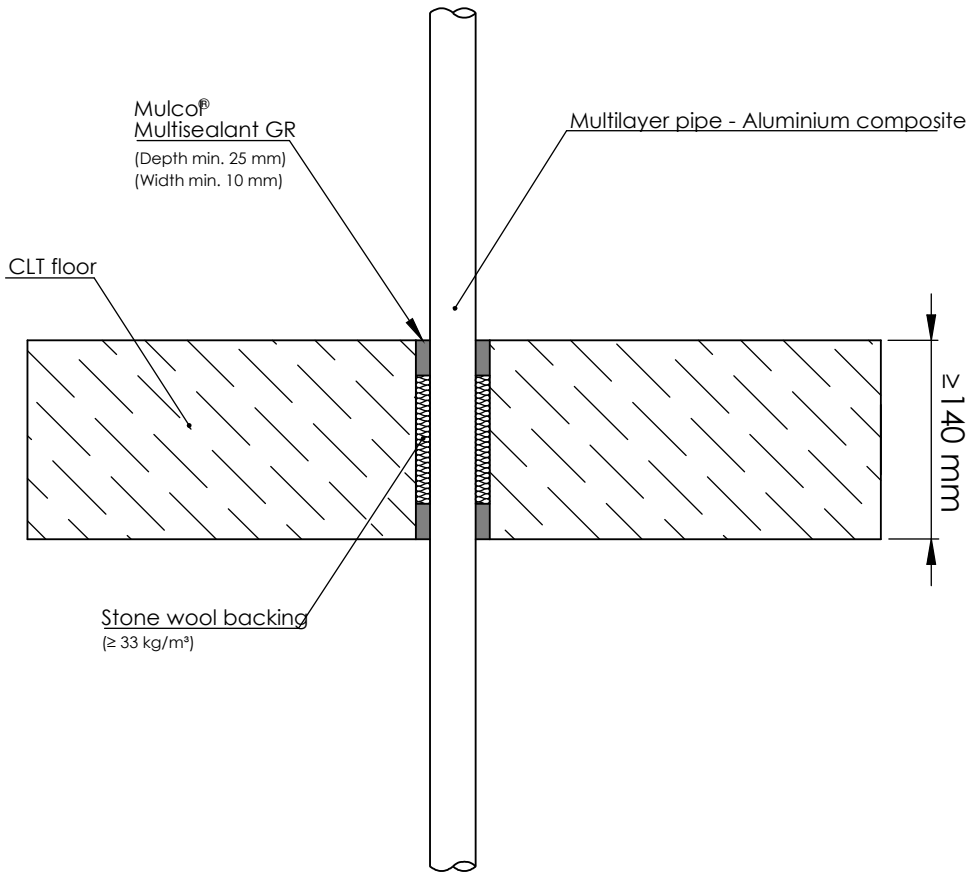
The classifications are valid for insulation Armaflex with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 300 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

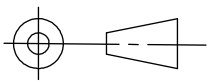
It is mandatory to apply Mulcol® Multisealant GR in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

For aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

Bottom view



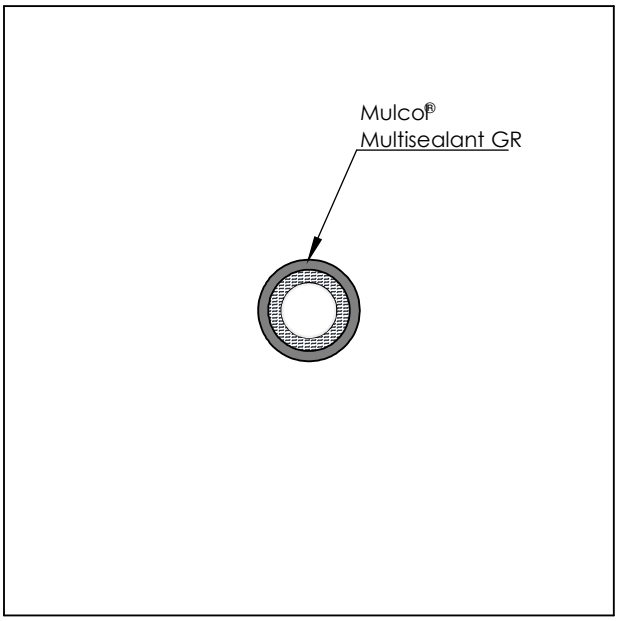


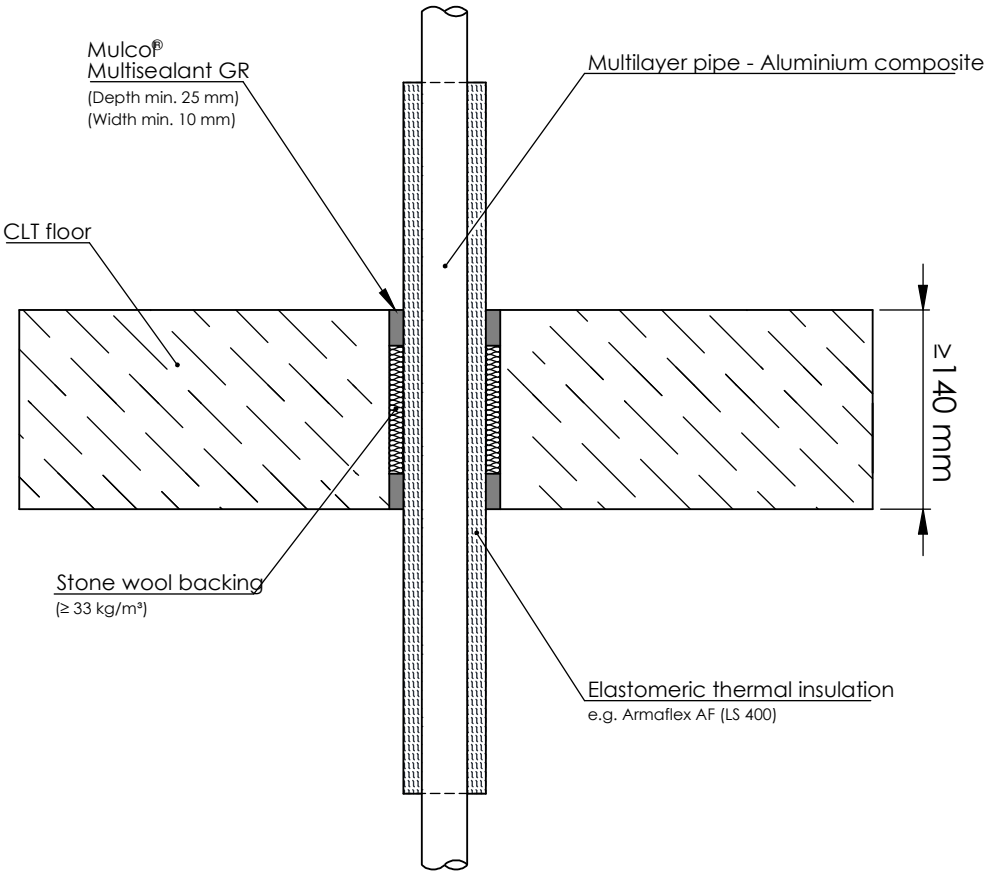
American projection 	Scale :	Company : Mulcol International B.V.	FCLT-MLA-G2.19.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 30-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLA-G2.19.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 26-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm)	Pipe material	System width x depth (mm)
Outer diameter	Wall thickness				
Drawings FCLT-MLAH-G1.19.10, FCLT-MLAH-G1.4.23 and FCLT-MLAH-G1.4.22					
≤ 32	3.0	EI 30–U/C E 90–U/C	N.a.	Henco PE-Xc/AL/PE-Xc	Mulcol® Multimastic GR (≥ 15 x ≥ 20)
≤ 32	3.0	EI 30–U/C E 90–U/C	Henco PE-Foam (6) LS 300/CS LI 300/CI		
≤ 75	6.0	EI 90–U/C E 90–U/C	AF/Armaflex (9 to 32) LS 400/CS		

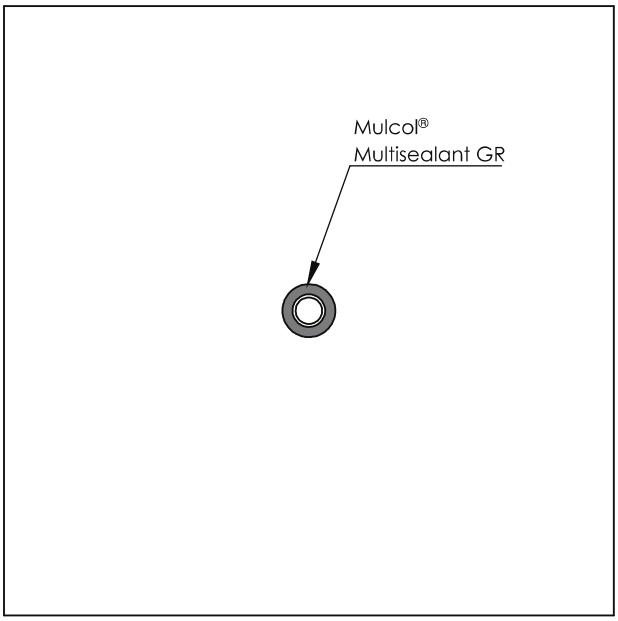
The classifications are valid for insulation Armaflex with a thickness as mentioned. The insulation shall be applied sustained through the aperture with a minimum distance of 400 mm on both sides from the point where the pipe emerges out of the floor (LS in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS).

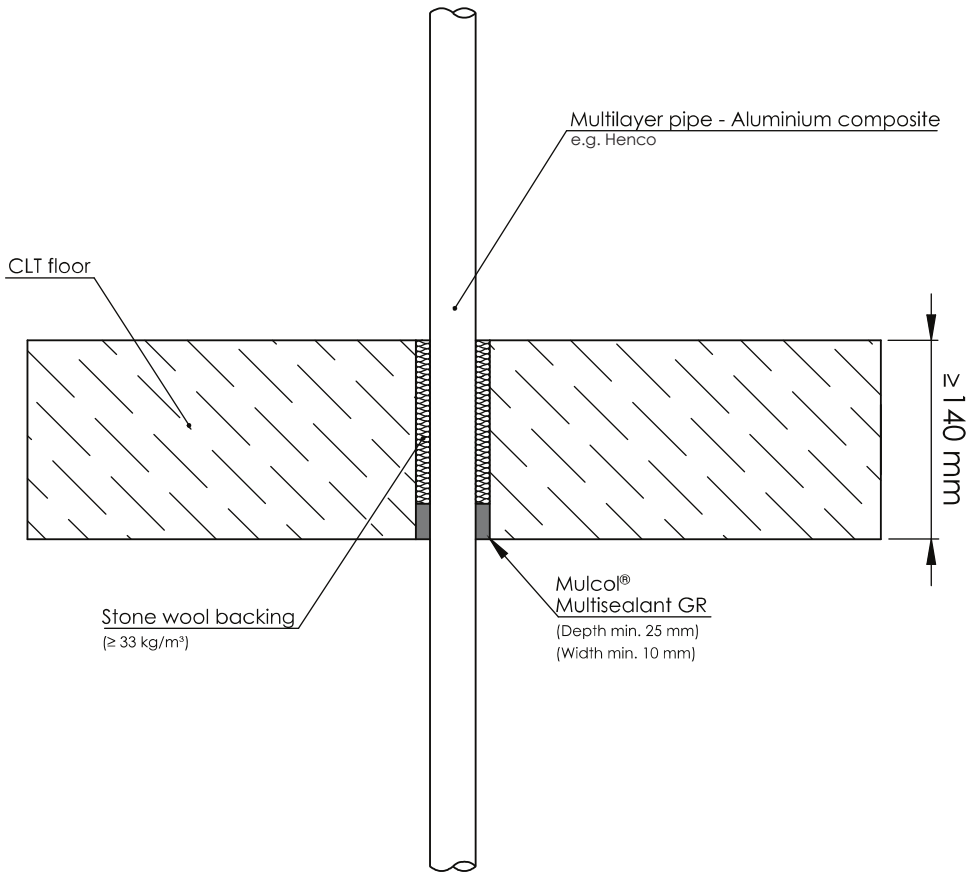
The classifications are valid for insulation Henco PE-Foam with a thickness as mentioned and is also valid for insulation other PE-foam with a reaction to fire class C_L-s1-d0 (or better) in accordance with EN 13501-1 (thickness ≤ 6 mm). The insulation shall be applied sustained or interrupted through the aperture with a minimum distance of 300 mm on both sides from the point where the pipe emerges out of the floor (LS or LI in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CS or CI).

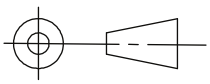
It is mandatory to apply Mulcol® Multisealant GR in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

For aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

Bottom view



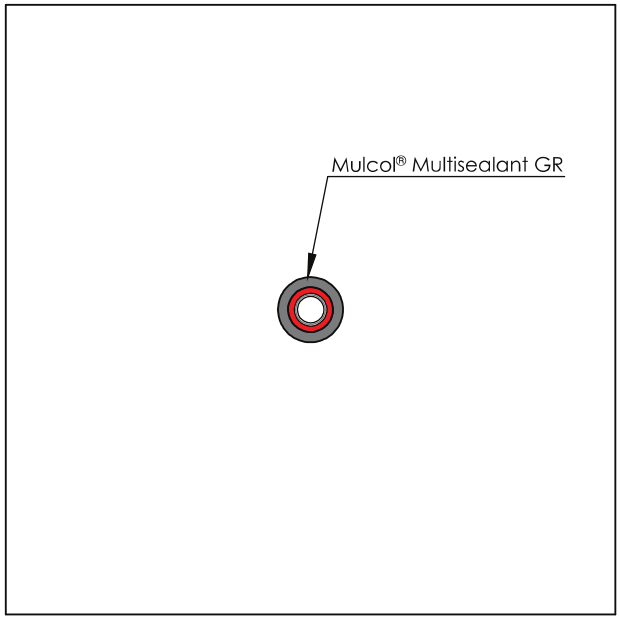


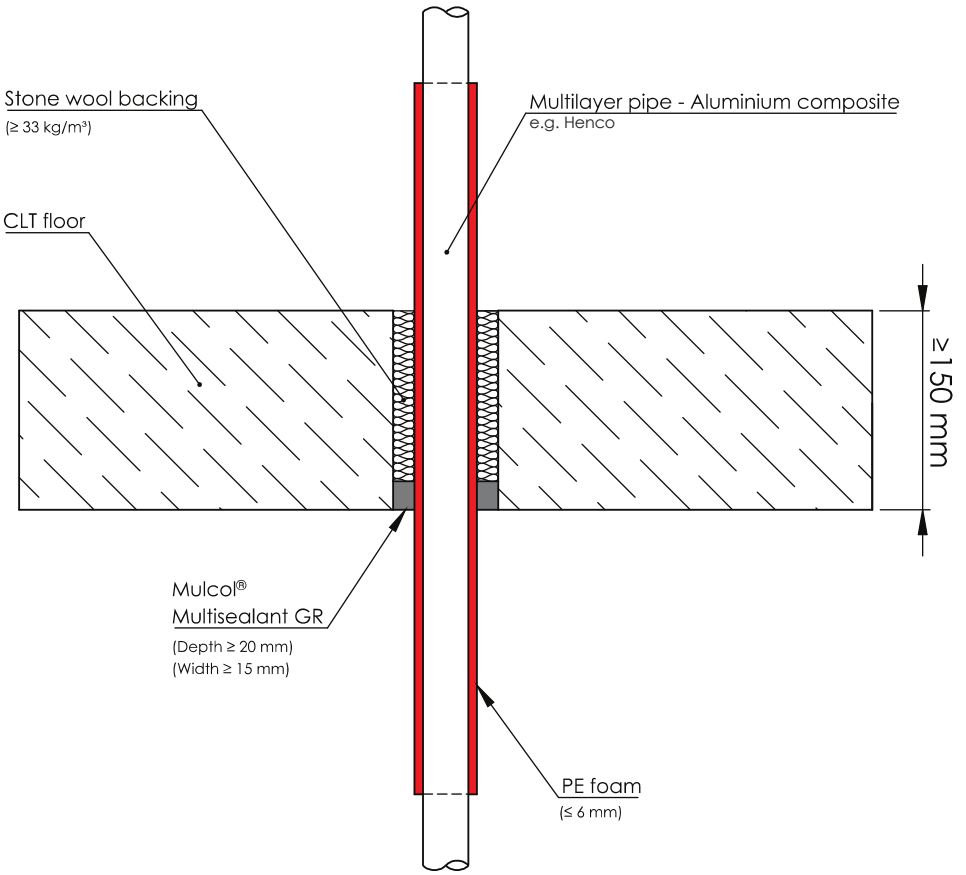
American projection 	Scale :	Company : Mulcol International B.V.	FCLT-MLAH-G2.19.10
	Unit of measure : mm	Department : Research & Development	
	Date : 30-5-2023	Draftsman : K.J.	A4

MULCOL FIRE PROTECTION

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

Bottom view



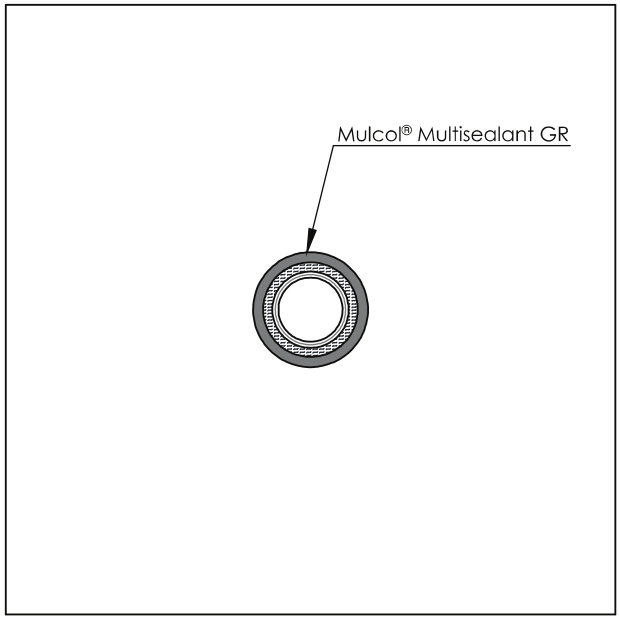


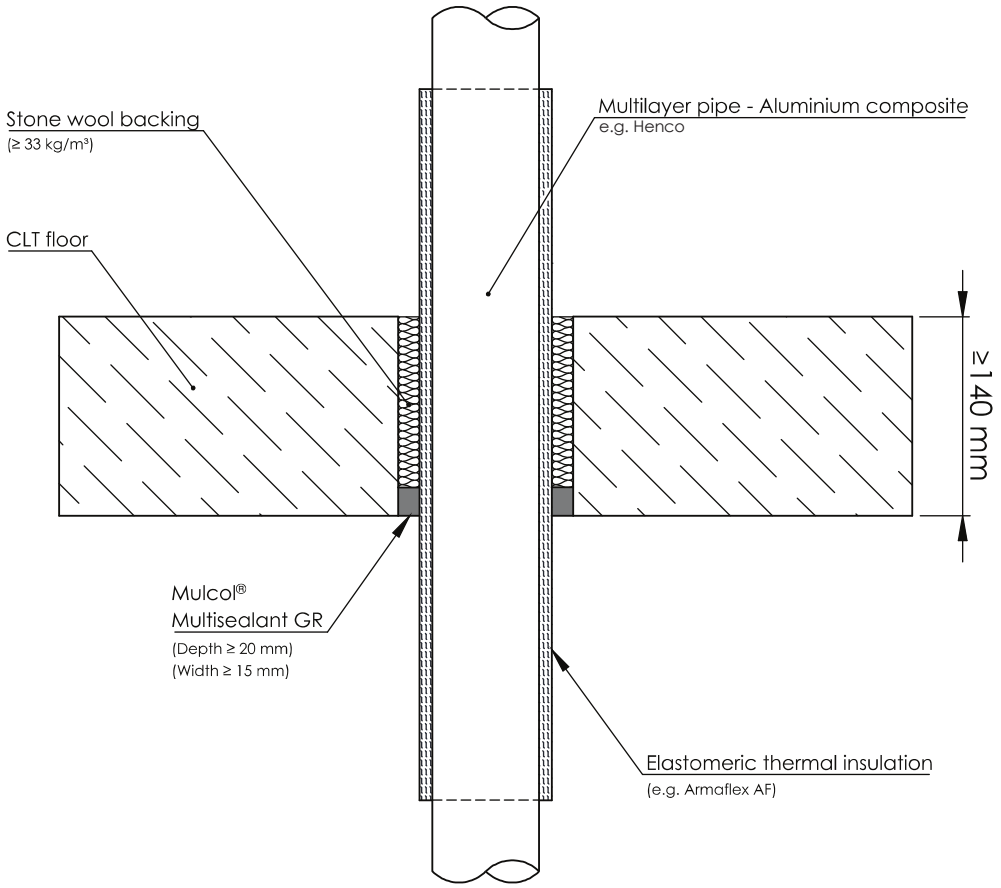
American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLAH-G1.4.23
	Unit of measure : mm	Department : Research & Development	A4
	Date : 29-11-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLAH-G1.4.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 29-11-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

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

5.11.2 Mulcol® Multimastic SP

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

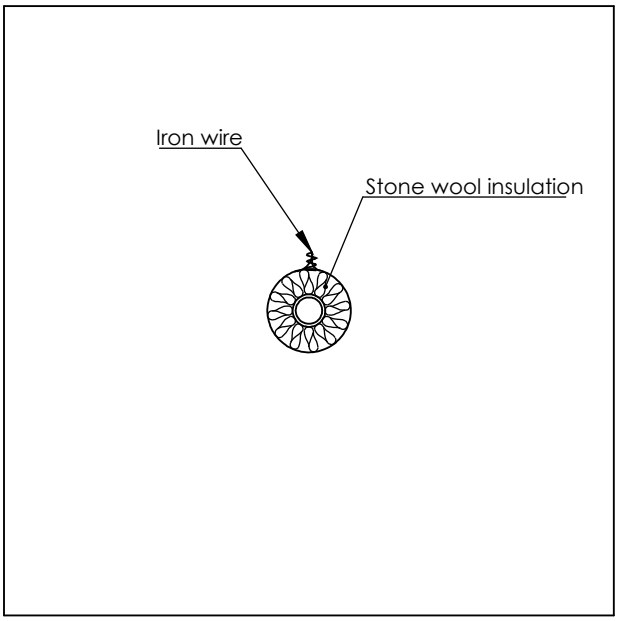
Fire resistance classification					
Pipe dimensions (mm)		Performance class with pipe end configuration	Insulation type and thickness (mm) (LI 400/CI)	Pipe material	System width x depth (mm)
Outer diameter	Wall thickness				
Drawing FCLT-MLA-MSP2.2.22					
≤ 16	2.0	EI 90–C/U	Rockwool 810 (25)	Wavin PE-Xc/AL/PE-HD	Mulcol® Multimastic SP (≥ 10 x ≥ 20) (backing 100 mm)
≤ 63	6.0				

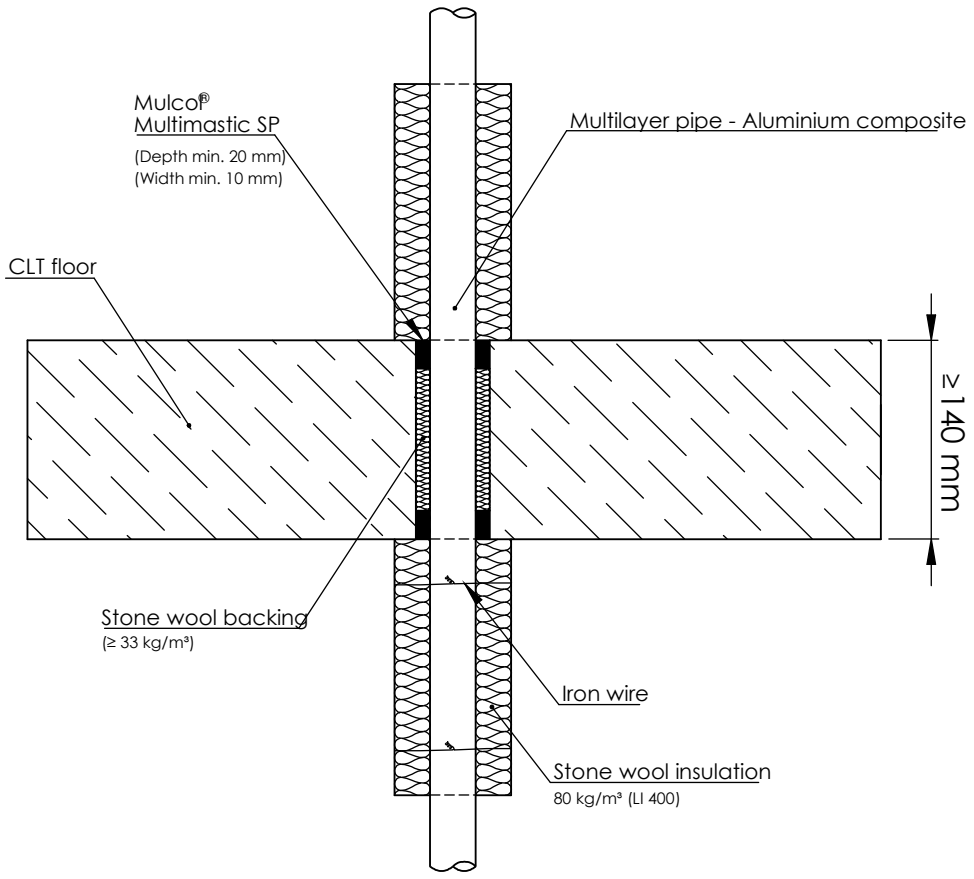
The classifications are valid for insulation Rockwool 810 with a thickness as mentioned. The insulation shall be applied over a minimum length of 400 mm on both sides from the point where the pipe emerges out of the wall (LI in accordance with Table 1 of EN 1366-3). The insulation may also be applied continued (CI). It is mandatory to fix the insulation with 2 steel wires at the exposed side of the seal.

It is mandatory to apply Mulcol® Multimastic SP in annular gap on each side of the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

For aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

Bottom view





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLA-MSP2.2.22
	Unit of measure : mm	Department : Research & Development	A4
	Date : 30-5-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multimastic SP
Installation in wooden CLT floor

5.11.3 Mulcol® Multidisc

The classification is applicable to floors according Paragraph 5.2.2. If more penetrations are placed in the floor, the working minimum distances are given in Paragraph 5.2.3.

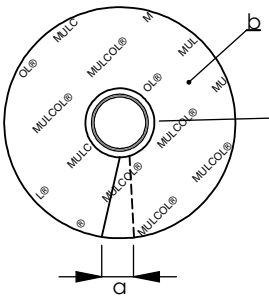
A classification of elements according to the following combinations of performance parameters and classes directly through the floor applies.

Fire resistance classification				
Pipe dimensions (mm)		Performance class with pipe end configuration	Pipe material	System
Outer diameter	Wall thickness			
Drawing FCLT-MLA-M1.0.10				
≤ 16	2.0	EI 120–U/C	Wavin PE-Xc/AL/PE-HD	Mulcol® Multidisc

The holes for the penetration seal shall be ≤ Ø26 mm. It is mandatory to apply one Mulcol® Multidisc below the floor. A backing of Rockwool (density 33 kg/m^3) is mandatory.

For aluminium composite pipes the field of application is extended to a maximum 0.25 mm thinner pipe wall thickness as mentioned above.

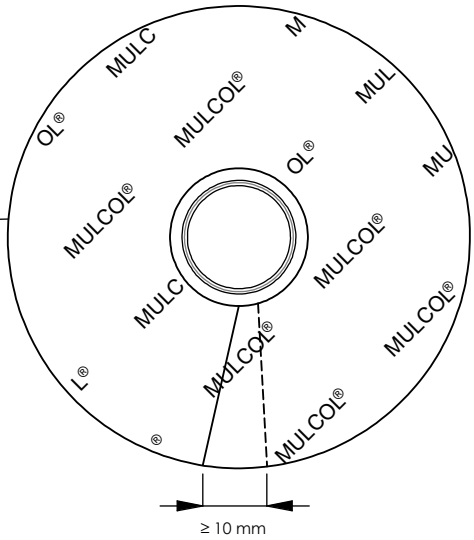
Bottom view

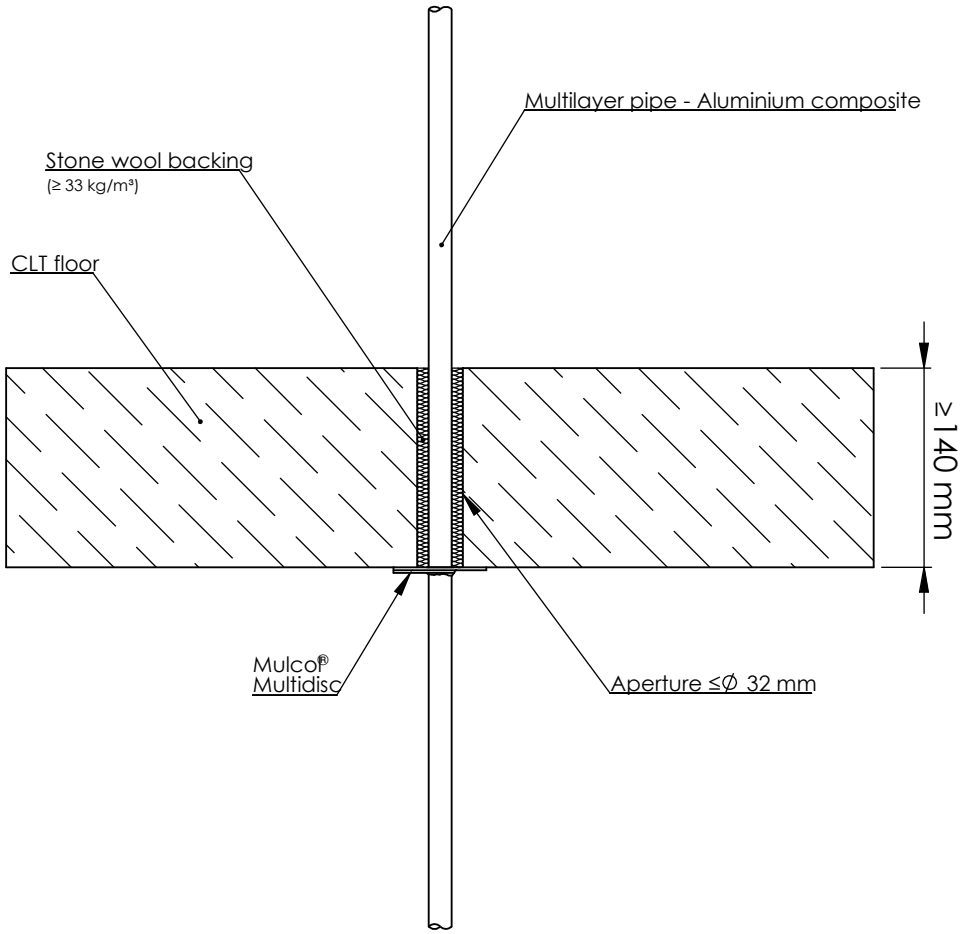


a - Overlay size
(Minimum 10 mm overlay)
b - Mulcol® Multidisc

A

Detail A





American projection	Scale :	Company : Mulcol International B.V.	FCLT-MLA-M1.0.10
	Unit of measure : mm	Department : Research & Development	A4
	Date : 1-6-2023	Draftsman : K.J.	

MULCOL FIRE PROTECTION

Fire test pipe penetration seal
Mulcol® Multidisc
Installation in wooden CLT floor

6 Limitations

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

H.H.A. Leenders, BSc.

Head of Laboratory for Fire Safety

Haps,

D.J. den Boer, BSc.

Management

This report contains 146 pages.