ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Fax +45 72 24 59 04
Internet www.etadanmark.dk

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

European Technical Assessment ETA-15/0710 of 23/11/2015

General Part

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

Trade name of the construction product:	FLAMRO BSB-K Combi Seal EN
Product family to which the above construction product belongs:	Fire Stopping and Sealing with mixed penetration seals, made of foam blocks.
Manufacturer:	FLAMRO Brandschutz- Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen Tel. + 49 6746 9410 - 0 Fax +49 6746 9410 - 10 Internet www.FLAMRO.de
Manufacturing plant:	FLAMRO Brandschutz- Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen
This European Technical Assessment contains:	22 pages including 3 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	Guideline for European technical approval of "Fire Stopping and Fire Sealing Products", ETAG 026 Part 2: "Penetration Seals", used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.
This version replaces:	-

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
FLAMRO-KL coating in and an average thickness of 2-4 mm (dry film) on both sides is necessary depending on the situation. Density of approx. 1600 kg/m^3 ± 10%. The dried film is classified as Euroclass A1 according to EN 13501-1

The FLAMRO BSB-K Combi Seal EN penetration seal is a 2-component polyurethane foam block with flame retardants building material. It has the dimension 160*130 mm, and a thickness of 60 mm with a density of approx. 350 kg/m^3 ± 10%. The blocks are classified as Euro class E in accordance with EN 13501-1.

ROKU® strip (self-adhesive) is a flexible, intumescent material on the basis of exfoliated graphite that foams up under high pressure with thermal influence. It has thickness 2 mm and width 50 mm, and is used to wrap in one or more layers around the pipe.

FLAMRO UBB strip (not self-adhesive) is a flexible, intumescent material on the basis of exfoliated graphite that foams up under high pressure with thermal influence. It has thickness 2 mm and width 50 mm, and is used to wrap in one or more layers around the pipe.

The FLAMRO BSB-K Combi Seal EN, mixed penetration seals made of foam blocks with accessory materials combined in a system are installed in openings in fire classified walls and floors around cables, cable bundles, cable ladders, cable trays and pipes through drywall constructions of flexible lightweight partition structures double leaf with 12,5 mm plasterboard in accordance with EN 520, cavity filled with 40 mm mineral wool in accordance with Euro class A1 (Density 100 kg/m^3) or rigid structures with thicknesses equal to or greater than the tested construction. The structures must be ≥ 100 mm. Additionally the FLAMRO BSB-K Combi Seal EN with accessory materials can be installed in rigid floor construction, aerated concrete brick and concrete. The structure must be ≥ 150 mm thick and have a density of ≥ 500 kg/m^3.

Detailed specifications for identification and performance criteria relevant for fire safety with regard to the construction products are given in Annex 1.

Specification of the intended use in accordance with the applicable European Assessment Document
The construction product FLAMRO BSB-K Combi Seal EN blocks is intended for use as components with a fire protection effect in walls and floors made of flexible lightweight partition, rigid structures made of masonry, aerated concrete or concrete structures, that are subject to requirements related to fire protection. Their fire resistant capability prevents heat transmission and fire spreading in the event of fire.

Within the scope of this ETA, the fire resistance was demonstrated for cables, cable bundles, cable ladders, cable trays and pipes. The system which consisted of the components listed in table 1. FLAMRO BSB-K Combi Seal EN blocks are used to seal off openings in fire resistant walls and floors, which are penetrated by cables, cable bundles, cable ladders, cable trays and pipes), and serves to preserve the fire resistance of the floors and walls in the area of the penetrations.

Table 1 – components of the verified penetration seals

Product type	Trade name
Coating	FLAMRO-KL
Flexible foam blocks	FLAMRO BSB-K
Intumescent strip	ROKU® Strip
Intumescent strip	FLAMRO UBB

Detailed information and data on the verified penetration seals are given in Annexes 1 to 3.

The performances given in Section 3 exclusively relate to this penetration seals (e.g. with respect to the design and arrangement of the components of the penetration seals and the type and position of the services).

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of at least 10 years for FLAMRO BSB-K Combi Seal EN.

The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as a means for choosing the right product in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic
3.2 Safety in case of fire (BWR 2)	
Reaction to fire	The FLAMRO-KL coating is classified as **Euro class A1** in accordance with EN 13501-1. The FLAMRO BSB-K foam block is classified as **Euro class E** in accordance with EN 13501-1. The ROKU® Strip (self-adhesive) strip is classified as **Euro class E** in accordance with EN 13501-1. The FLAMRO UBB (not self-adhesive) strip is classified as **Euro class E** in accordance with EN 13501-1.
Resistance to fire	The FLAMRO BSB-K Combi Seal EN Blocks used in mixed penetrations seals as described in annex 1-3 is classified in accordance with EN 13501-2
3.3 Hygiene, health and the environment (BWR 3)	
Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated March 2012.
3.7 Sustainable use of natural resources (BWR 7)	No Performance Determined

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

3.9 General aspects

The verification of durability is part of testing the essential characteristics. The FLAMRO-KL coating and FLAMRO BSB-K foam blocks may be used in end-use applications according to the provisions for use category Y_2 without expecting significant changes of the characteristics relevant for fire protection.

4 Assessment and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 1999/454/EC of the European Commission, as amended by 2001/596/EC, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark

Issued in Copenhagen on 2015-11-23 by

Thomas Bruun
Managing Director, ETA-Danmark

Annex 1
Product details and definitions

Product and performance of the FLAMRO BSB-K system and accessory components:
Product and performance of the FLAMRO-KL coating:

Manufacturer	Description	
FLAMRO Brandschutz- Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen	FLAMRO-KL Ablative coating has values as stated below according to data sheet:	
Property	Parameter	Method
Density	1600 kg/m^3 ± 10%	TR024 clause 3.1.4
Dynamic viscosity	35000mPas – 55000mPas	EN ISO 3219

Product and performance of the The FLAMRO BSB-K foam block:

Manufacturer	Description	
FLAMRO Brandschutz- Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen	FLAMRO BSB-K foam block 2-component polyurethane foam with flame retardants building material forming an insulating layer / intumescent material molded article, Structural fire protection has values as stated below according to data sheet:	
Property	Parameter	Method
Density	350 kg/m^3 ± 10%	TR024 clause 3.1.4
Weight loss due to heating	62,5% ± 5 %	TR024 clause 3.1.8
Dimensions	160*130*60 mm	TR024 clause 3.1.2
Expansion ratio	2,3 – 4,0 times	TR024 clause 3.1.11

Product and performance of the The ROKU® Strip:

Manufacturer	Description	
Rolf Kuhn GmbH Jägersgrund 10 57339 Erndtebrück Germany	ROKU Strip (self-adhesive) Intumescent material has values as stated below according to data sheet:	
Property	Parameter	Method
Density	1200 kg/m^3 ± 10%	TR024 clause 3.1.4
Dimensions	2 mm ± 10% (thickness of the sheet) 50 mm (width of the sheet)	TR024 clause 3.1.2
Expansion ratio	Expansion ratio 18-38 times (550°C)	TR024
Expansion pressure	≥ 0,8 N/mm² (300°C)	Test procedure: A

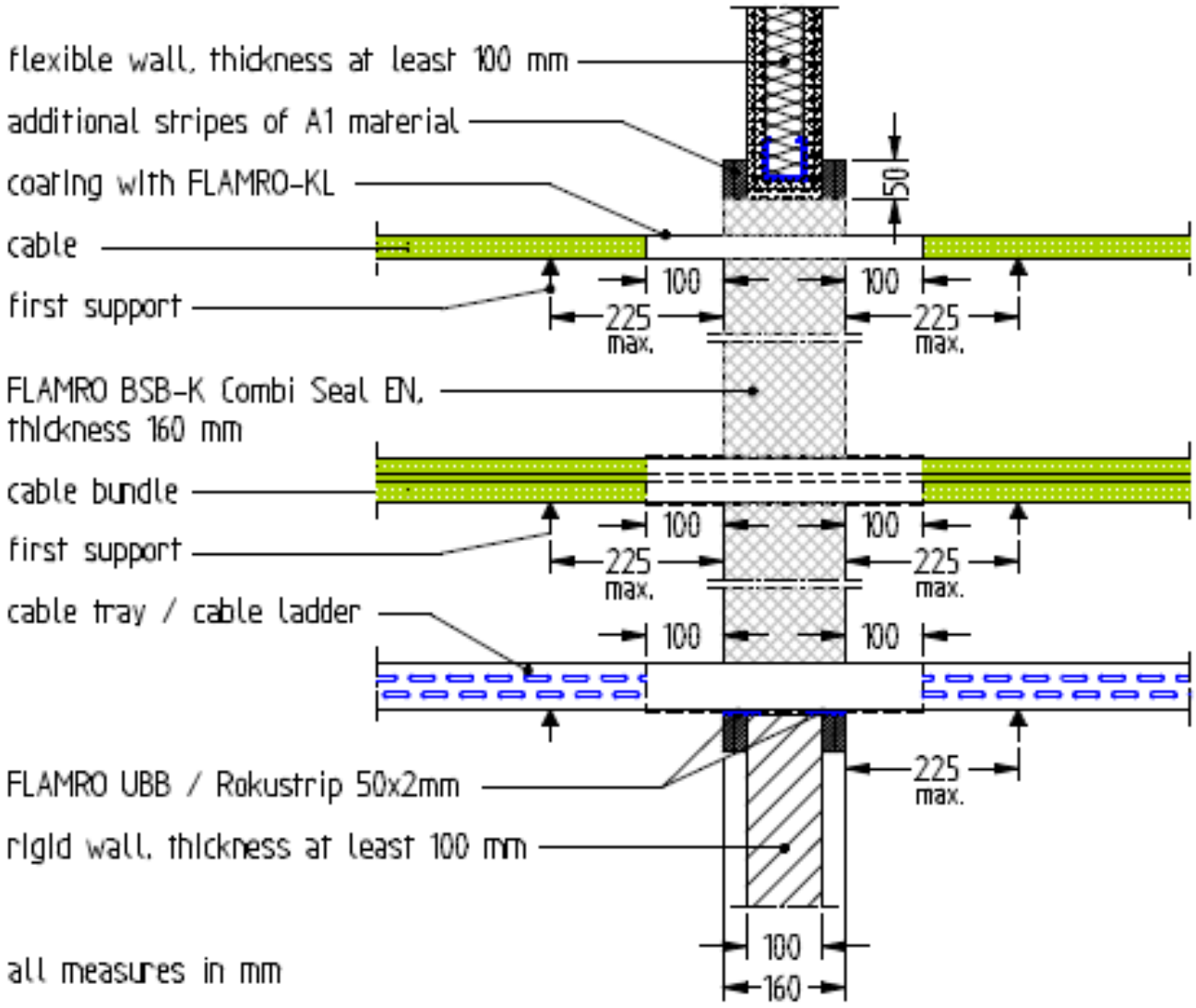
Product and performance of the FLAMRO UBB:

Manufacturer	Description	
FLAMRO Brandschutz- Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen	FLAMRO UBB (not self-adhesive) Intumescent material has values as stated below according to data sheet:	
Property	Parameter	Method
Weight loss on heating	52% - 62%	EN ISO 3451-1
Dimensions(thickness of the sheet)	2 mm ± 10% (thickness of the sheet) 50 mm (width of the sheet)	ETAG 026-2 clause B 10.1
Weight per unit area	1,7 kg/m² - 2,3 kg/m²	TR 024 clause 3.1.5
Content of non-volatile components	97% - 100%	EN ISO 3251
Expansion ratio	Expansion ratio 10-20 times (400°C)	TR024 3.1.11
Expansion pressure	1 - 2 N/mm² (350°C)	TR024 3.1.12 Test procedure: B

Annex 2
Detailed information for the confirmation of fire resistance

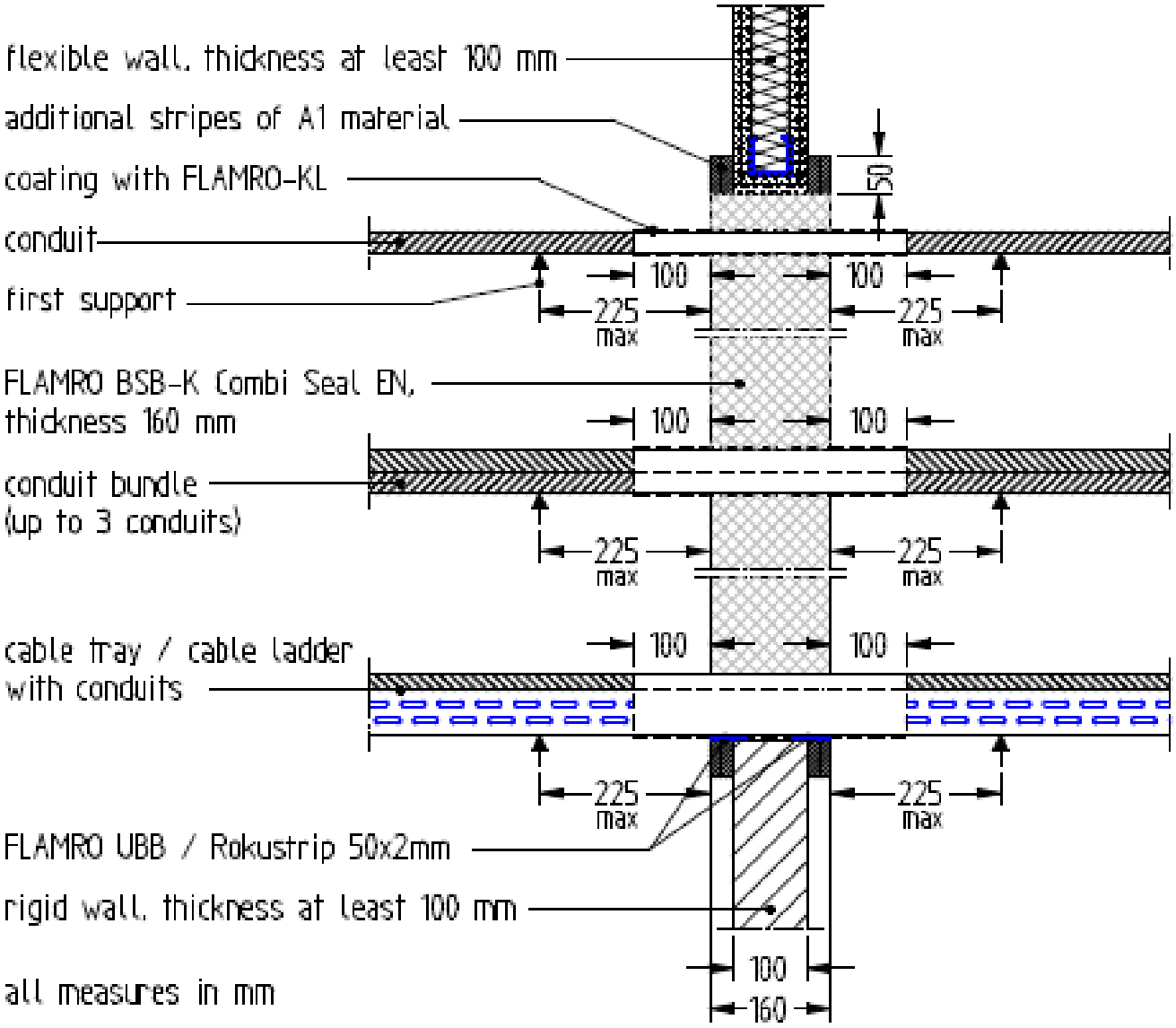
Use as part of a penetration seal. Wall installation - section view

annex 1: Penetration of cables, cable bundles, cabel trays / ladders, rigid and flexible walls



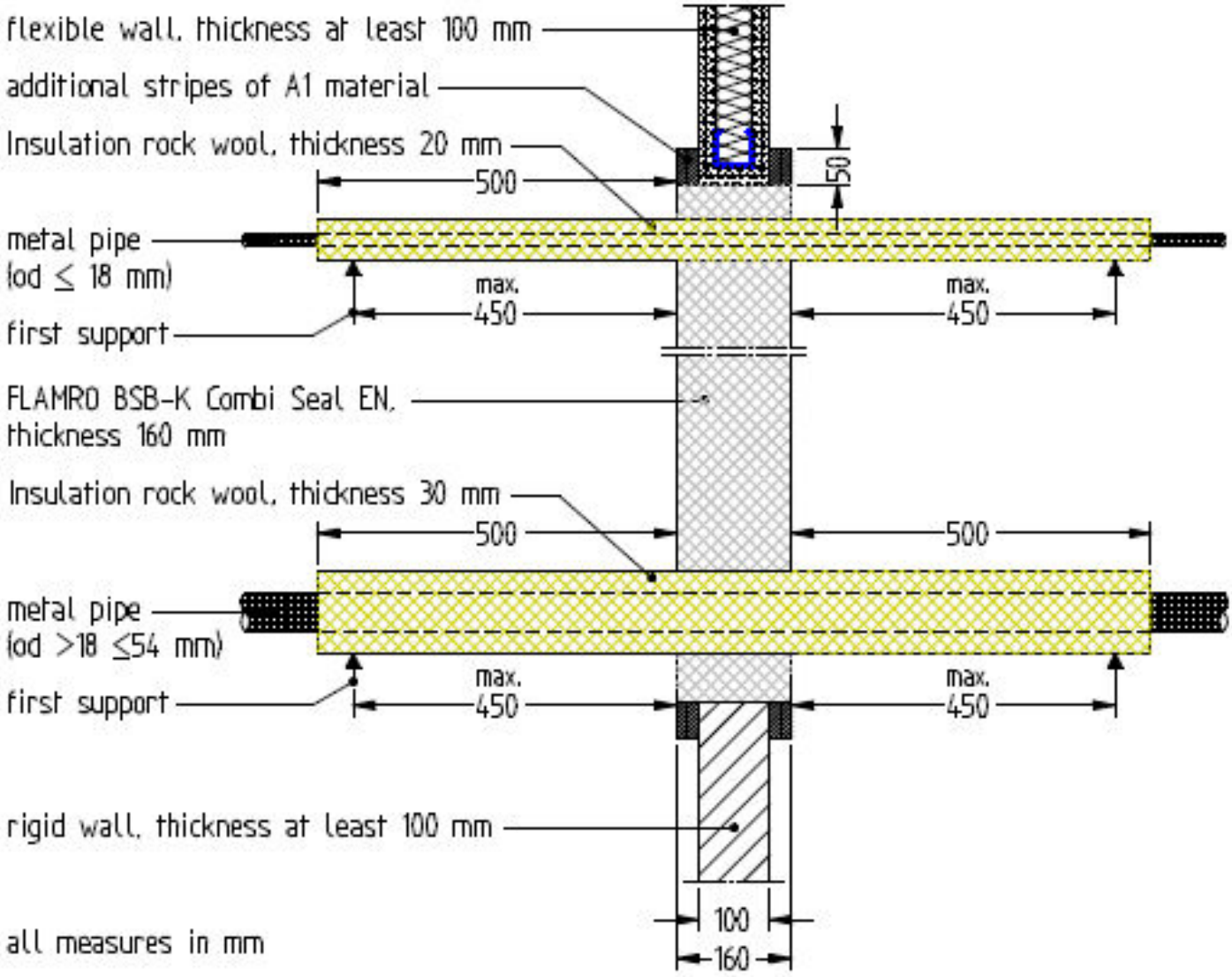
CAD / bibliothek_FLAMRO_dokumente / Index 0005 / Box eta-1

annex 2: Penetration of conduits and conduits bundles, rigid and flexible walls

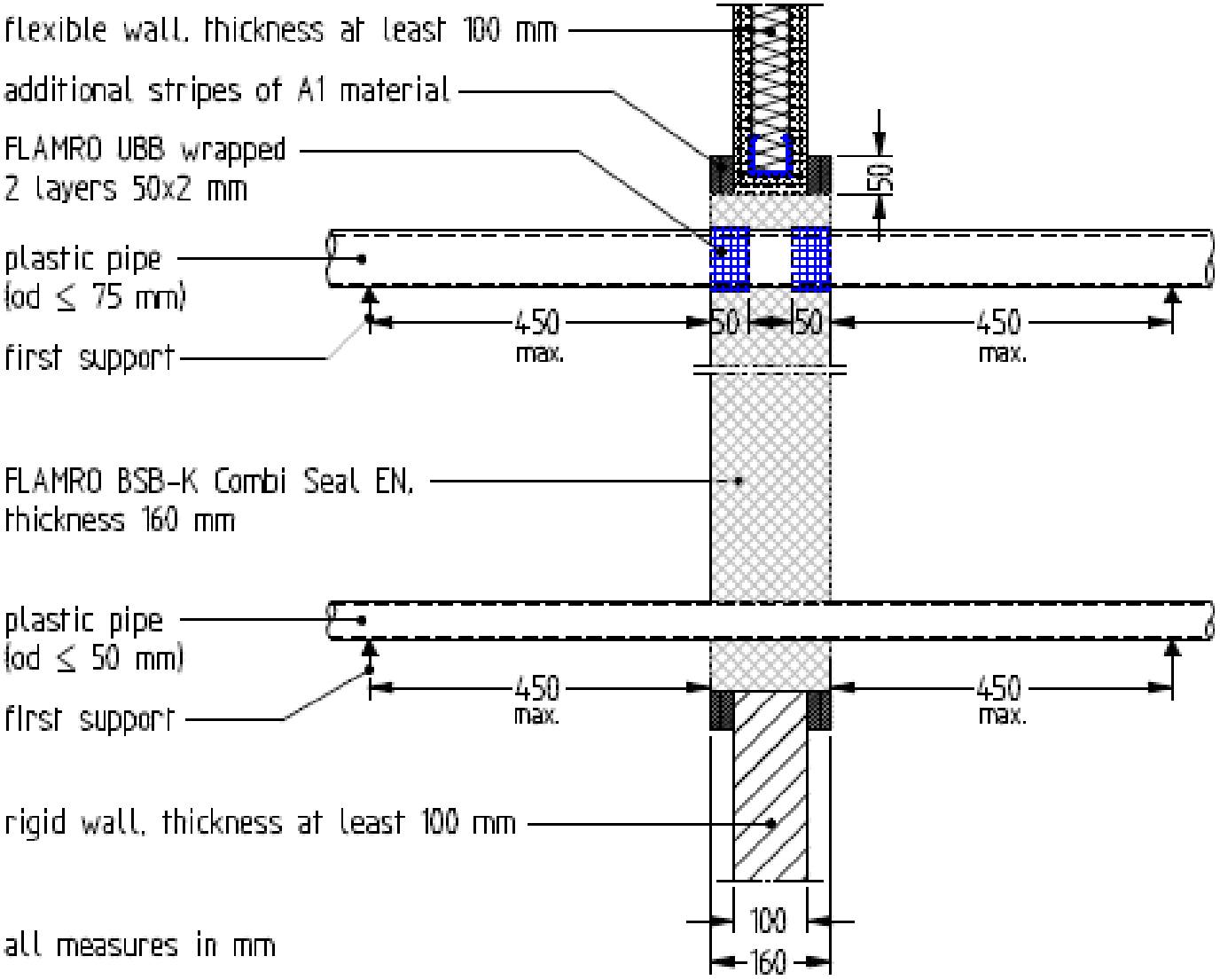


Conduits made of plastic or steel, rigid or flexible, with or without cables, outer diameter max. 25 mm

annex 3: Penetration of non combustible pipes (metal pipes), rigid and flexible walls

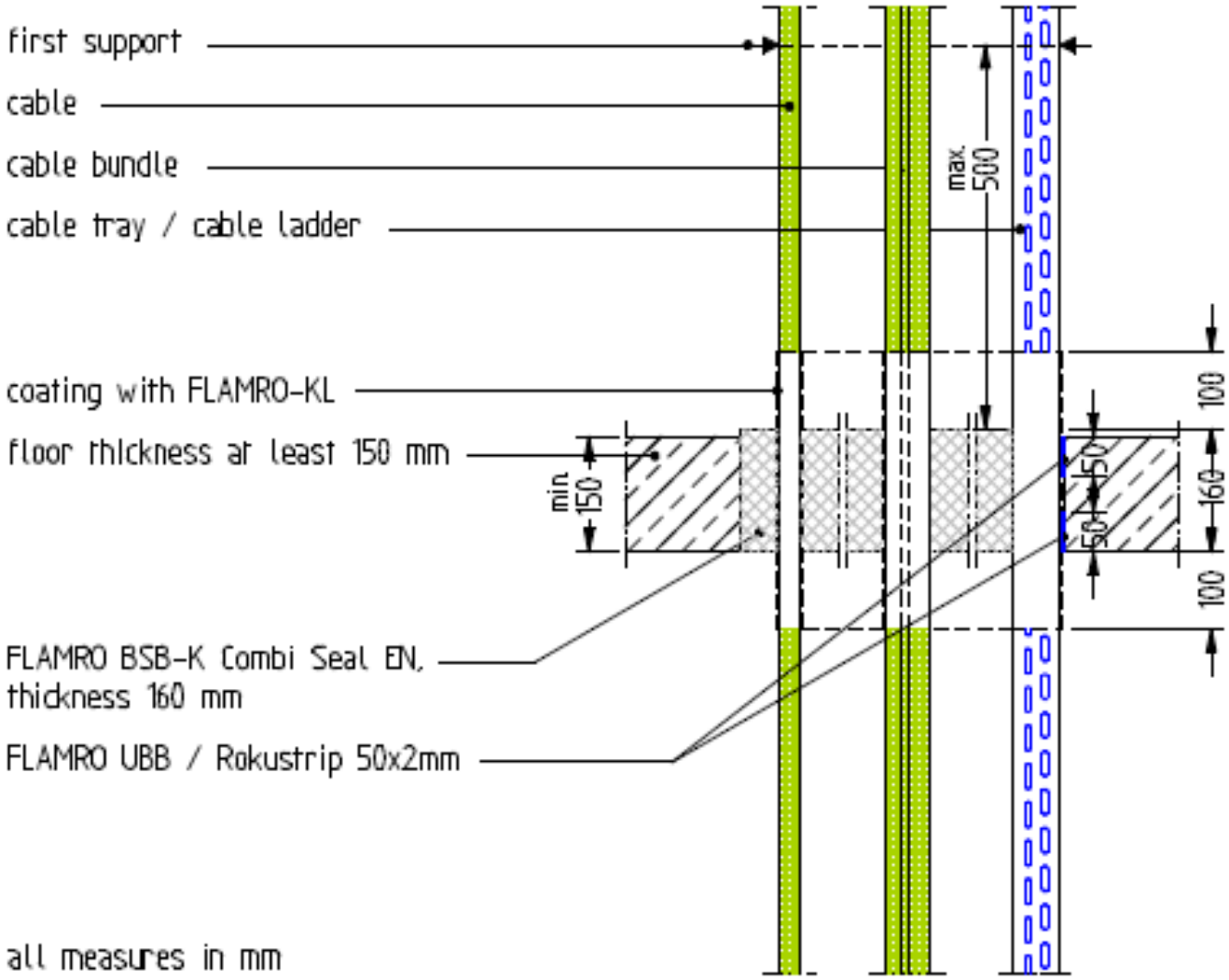


annex 4: Penetration of combustible pipes (plastic pipes), rigid and flexible walls

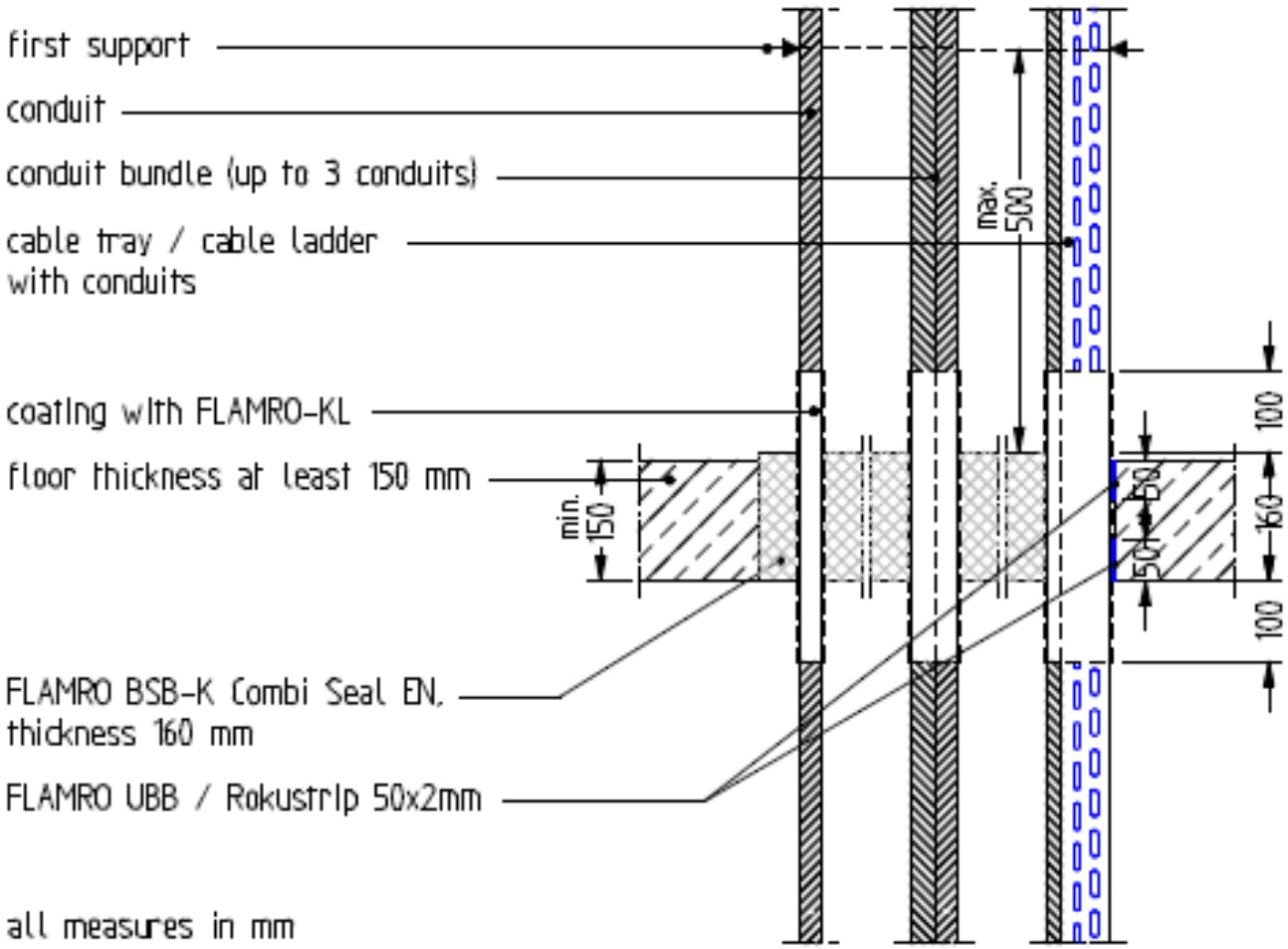


Use as part of a penetration seal. floor installation - section view

annex 5: Penetration of cables and cable bundles, rigid floor

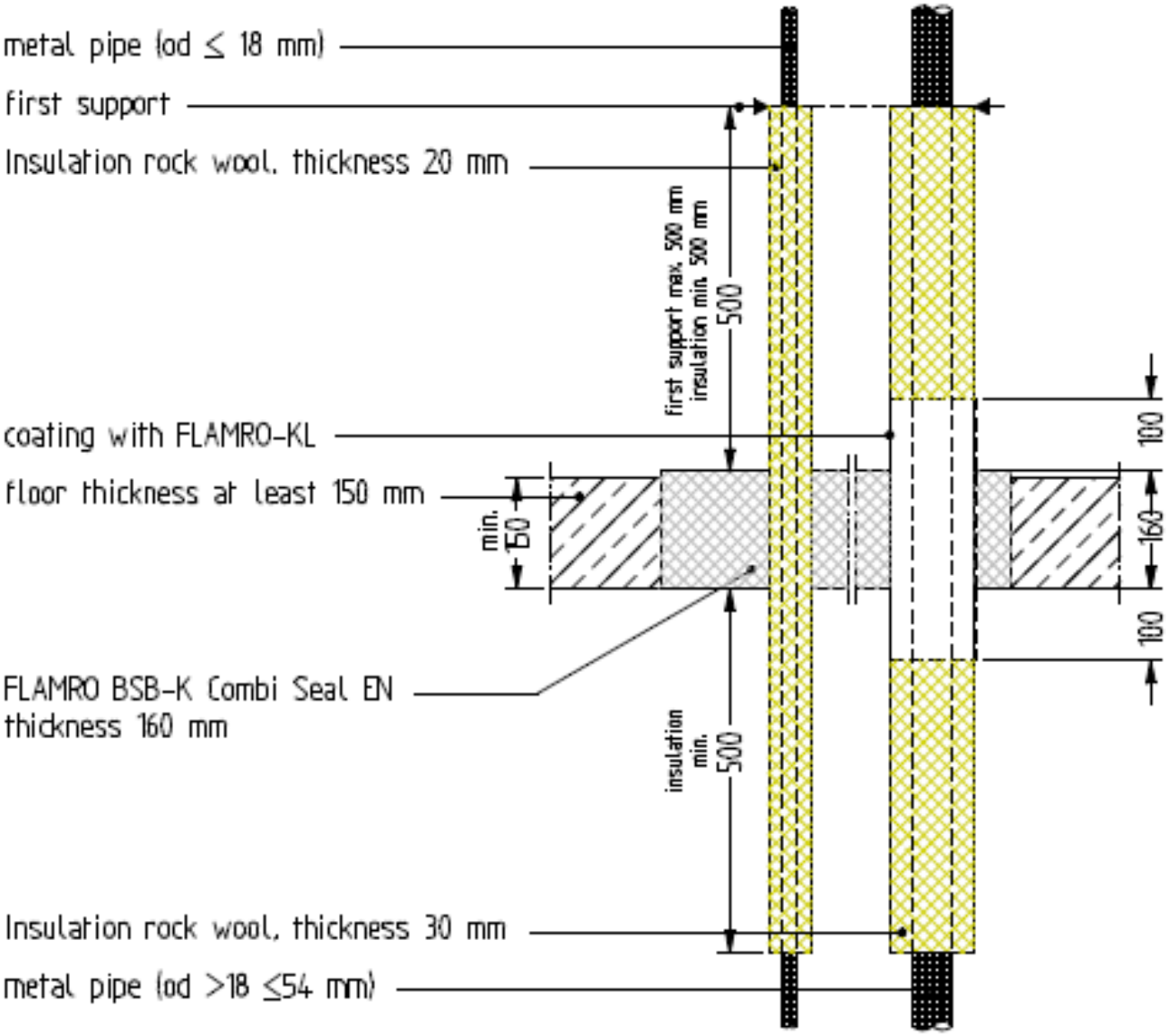


annex 6: Penetration of conduits and conduits bundles,
rigid floor



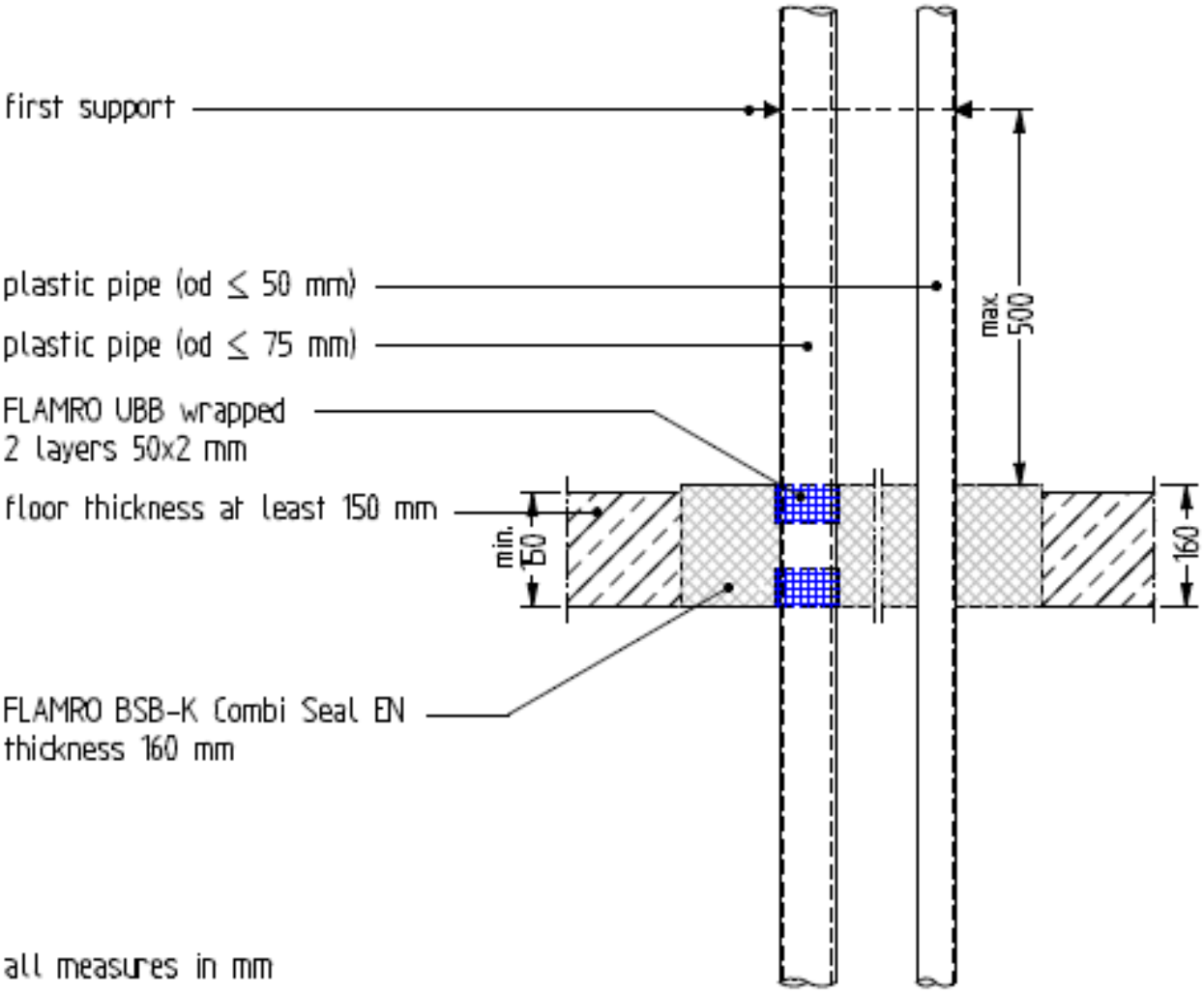
Conduits made of plastic or steel, rigid or flexible, with or without cables,
outer diameter max. 25 mm

annex 7: Penetration of non combustible pipes (metal pipes).
rigid floors



all measures in mm

annex 8: Penetration of combustible pipes (plastic pipes).
rigid floors



all measures in mm

Annex 3
Description of the installations for the confirmation of fire resistance

<table>
<tr><th>Type of installation</th><th>Description</th></tr>
<tr><td></td><td>The below applies to seals tested in wall construction, drywall light weight partition structures 100 mm double leaf with ≥12,5 mm plasterboard in accordance with EN 520, cavity filled with 40 mm mineral wool in accordance with Euroclass A1 (Density 100 kg/m^3).</td></tr>
<tr><td>Cables</td><td>Cable module seal:
Apertures 0,36m^2 with cable fill as per EN 1366-3:2009: Table A.1 cable groups 1-6. Sealing with FLAMRO BSB-K Fire Stop Blocks. Coating of the penetrating cables, cables bundles, cable trays and cable ladders with FLAMRO-KL, length 360 mm on both sides symmetrical to the supporting structure.
Cable ladders and trays, coating thickness: 2 mm
Cable group 1-4, coating thickness: 3 mm
Cable group 5, coating thickness: 4 mm
Cable group 6, coating thickness: 2 mm
Steel conduits are coated over a length of 360 mm continuous.
Plastic conduits are coated for 100 mm on both sides of the penetration seal only</td></tr>
<tr><td>Flammable pipes</td><td>Plastic pipe penetration seal
Apertures 0,36m^2 with the following flammable pipes.
<table>
<tr><th>Plastic type</th><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Fire protection tape</th><th>Number of layers</th></tr>
<tr><td>PE</td><td>75</td><td>4,5</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PVC</td><td>75</td><td>1,8</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PVC</td><td>75</td><td>1,8</td><td>UBB</td><td>2</td></tr>
<tr><td>PE</td><td>75</td><td>4,5</td><td>UBB</td><td>2</td></tr>
<tr><td>PVC</td><td>75</td><td>5,6</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PE</td><td>75</td><td>2,3</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PE</td><td>50</td><td>2,3</td><td></td><td></td></tr>
<tr><td>PVC</td><td>50</td><td>5,6</td><td></td><td></td></tr>
<tr><td>PVC</td><td>50</td><td>1,8</td><td></td><td></td></tr>
<tr><td>PE</td><td>50</td><td>4,6</td><td></td><td></td></tr>
</table>
Pipe end configurations: U/C</td></tr>
<tr><td>Empty seal</td><td>Empty seal. Aperture 0,36 m^2 with. Sealing via inserted FLAMRO BSB-K Fire Stop Blocks.

Empty seal. Aperture 0,36 m^2 with. Sealing via inserted FLAMRO BSB-K Fire Stop Blocks with steel grids (50*50*2 mm) fitted in centre on both sides.</td></tr>
<tr><th>Type of installation</th><th>Description</th></tr>
<tr><td></td><td>The below applies to seals tested aerated lightweight concrete floor structure thickness 150 mm, density ≥ 500 kg/m^3</td></tr>
<tr><td>Cables</td><td>Cable module seal:
Apertures 0,6 m^2 with cable fill as per EN 1366-3:2009: Table A.1 cable groups 1-6. Sealing with FLAMRO BSB-K Fire Stop Blocks. Coating of the penetrating cables, cables bundles, cable trays and cable ladders with FLAMRO-KL, length 360 symmetrical to the supporting structure.
Cable ladders and trays, coating thickness: 2 mm
Cable group 1-4, coating thickness: 2 mm
Cable group 5, coating thickness: 4 mm
Cable group 6, coating thickness: 2 mm
Steel conduits are coated over a length of 360 mm continuous.</td></tr>
</table>

<table>
<tr><td></td><td>• Plastic conduits are coated for 100 mm above of the penetration seal only</td></tr>
<tr><td>Flammable pipes</td><td>Plastic pipe penetration seal
Apertures 0,6 m^2 with the following flammable pipes.
<table>
<tr><th>Plastic type</th><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Fire protection tape</th><th>Number of layers</th></tr>
<tr><td>PE</td><td>75</td><td>4,5</td><td>UBB</td><td>2</td></tr>
<tr><td>PVC</td><td>75</td><td>1,8</td><td>UBB</td><td>2</td></tr>
<tr><td>PVC</td><td>75</td><td>1,8</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PE</td><td>75</td><td>4,5</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PE</td><td>75</td><td>2,3</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PVC</td><td>75</td><td>5,6</td><td>ROKU-strip</td><td>2</td></tr>
<tr><td>PVC</td><td>50</td><td>5,6</td><td>-</td><td>-</td></tr>
<tr><td>PE</td><td>50</td><td>3,0</td><td>-</td><td>-</td></tr>
<tr><td>PE</td><td>50</td><td>4,6</td><td>-</td><td>-</td></tr>
<tr><td>PVC</td><td>50</td><td>1,8</td><td>-</td><td>-</td></tr>
</table>
Pipe end configurations: U/C</td></tr>
<tr><td>Empty seal</td><td>Empty 0,6 m^2 aperture seal. Sealing via FLAMRO BSB-K Fire Stop Blocks.</td></tr>
</table>

The classification:

Electrical installation and empty penetration seal	Classification depending on orientation of the installation	
	Wall	Floor
All jacketed cables Ø max ≤ 14,4 mm	E 120/EI 120	E 180/EI 180
All jacketed cables Ø max ≤ 21 mm (CG 1, in accordance with EN 1366-3:2009)	E 120/EI 120	E 180 /EI 90
All jacketed cables Ø max ≤ 50 mm (cable penetration seals)(CG 2, in accordance with EN 1366-3:2009)	E 120/EI 120	E 180 /EI 90
All jacketed cables Ø max ≤ 50 mm (combi penetration seals)	E 120/EI 90	E 120/EI 90
All jacketed cables Ø max ≤ 80 mm (cable penetration seals)(CG 3, in accordance with EN 1366-3:2009)	E 120/EI 90	E 180/EI 90
All jacketed cables Ø max ≤ 80 mm (combi penetration seals)(CG 3, in accordance with EN 1366-3:2009)	E 120/EI 90	E 180/EI 120
Bundled cables Ø max ≤ 100 mm(CG 4, in accordance with EN 1366-3:2009)	E 120/EI 120	E 180/EI 120
Cables without jacket Ø max ≤ 24 mm (CG 5, in accordance with EN 1366-3:2009)	E 120/EI 120	E 180/EI 120
Conduits made of plastic, pipe end configuration C/C, Ø max ≤ 25 mm(CG 6, in accordance with EN 1366-3:2009)	E 120/EI 120	E 180/EI 180
Conduits made of steel end configuration C/C, Ø max ≤ 25 mm	E 120/EI 120	E 180/EI 180
Empty seal	E 120/EI 120	E 180/EI 180

The classification is declared under the following conditions:

<table>
<tr><td>Field of application (Chapter 4 classification report)</td><td>The above classification is applicable to the FLAMRO BSB-K Combi Seal EN only to the orientation for which the penetration seals were tested, i.e. wall or floor.</td></tr>
<tr><td>Pipe configurations</td><td>Plastic pipes: Testing with pipe configuration U/C also cover pipe end configurations C/C

Metal pipes: Testing with pipe configuration C/U also cover pipe and configurations C/C</td></tr>
<tr><td>Supporting structure:</td><td>Solid construction floor. The floor must be ≥ 150 mm thick and have a density ≥ 500 kg/m^3. Brick and concrete floors are thus covered.

Drywall construction the wall must be ≥ 100 mm thick and must be built with timber or metal studs covered on both sides with at least 2 layers of 12,5 mm thick fire protection boards. All jambs must be faced with double layer fire protection plasterboard.

Classification of the results for drywall partitioning may be applied for solid wall constructions with thicknesses equal to or greater than that of the tested construction.

The structural elements (supporting structures, walls and floors) must be classified for the required fire resistance duration as per EN 13501-2.</td></tr>
<tr><td>Layer thickness of coating</td><td>
<table>
<tr><th>Object</th><th colspan="2">Layer thickness (mm)</th><th>Length of coating</th></tr>
<tr><td>Cable groups 1-4</td><td>Wall: 3</td><td>Floor: 2</td><td rowspan="2">360 mm through out</td></tr>
<tr><td>Cable group 5</td><td colspan="2">4</td></tr>
<tr><td>Cable group 6 (made of plastic)</td><td colspan="2">2</td><td>Wall 100 mm both sides
Floor 100 mm both sides</td></tr>
<tr><td>Cable group 6 (made of steel)</td><td colspan="2">2</td><td>360 mm through out</td></tr>
<tr><td>Cable tray, cable ladders</td><td colspan="2">2</td><td>360 mm through out</td></tr>
</table>
</td></tr>
<tr><td>Suspension</td><td>Cables, cable bundles, cable ladders and cable trays must be supported on both sides of the wall penetration seals spaced ≤ 225 mm apart and spaced ≤ 500 mm for floor penetration seals, suspended from the upper side of the floor structure.

Filled or empty conduits, may be sealed off in bundles of 3pieces in zero distance to cable tray.</td></tr>
</table>

<table>
<tr><th>Type of installation</th><th>Description</th></tr>
<tr><td></td><td>The below applies to seals tested in wall construction, drywall light weight partition structures 100 mm double leaf with ≥12,5 mm plasterboard in accordance with EN 520, cavity filled with 40 mm mineral wool in accordance with Euroclass A1 (Density 100 CG/m^3).</td></tr>
<tr><td>Cables</td><td>Combi module seal:
Apertures 0,36m^2 with fill according to EN 1366-3:2009: Version A (including a cable tray). Sealing with FLAMRO BSB-K Fire Stop Blocks. Coating of the penetrating cables, cable bundles, cable trays and cable ladders with FLAMRO-KL, length 360 symmetrical to the supporting structure.
Cable ladders and trays, coating thickness: 2 mm
Cable group 1-4, coating thickness: 3 mm
Cable group 5, coating thickness: 4 mm
Cable group 6, coating thickness: 2 mm
Steel conduits are coated over a length of 360 mm continuous.
Plastic conduits are coated for 100 mm on both sides of the penetration seal only
Non-flammable copper pipes with diameters 54 mm and 18 mm diameters were insulated with type RS800 Rockwool pipe sections over a length of 1160 mm respectively of 30 and 20 mm thickness- The sectional insulation was additionally secured with spirally wound winding wire 50 mm pitch</td></tr>
<tr><td>Flammable pipes

Non-flammable pipes</td><td>Plastic pipe penetration seal
Apertures 0,36m^2 with the following flammable pipes.
Flammable pipes
<table>
<tr><th>Plastic type</th><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Fire protection tape</th><th>Number of layers</th></tr>
<tr><td>PVC</td><td>75</td><td>5,6</td><td>FLAMRO UBB</td><td>2</td></tr>
<tr><td>PE</td><td>75</td><td>2,3</td><td>FLAMRO UBB</td><td>2</td></tr>
</table>
Pipe end configurations: U/C

Non-flammable pipes
<table>
<tr><th>Plastic type</th><th>Pipe Ø, mm</th><th>Wall thickness, mm</th><th>Sectional insulation</th><th>Length mm</th><th>Thickness mm</th></tr>
<tr><td>Cu</td><td>54</td><td>2,0</td><td>RS800</td><td>1160</td><td>30</td></tr>
<tr><td>Cu</td><td>18</td><td>1,0</td><td>RS800</td><td>1160</td><td>20</td></tr>
</table>
Pipe end configurations: C/U</td></tr>
<tr><td></td><td>Description</td></tr>
<tr><td></td><td>The below applies to seals tested aerated lightweight concrete floor structure thickness 150 mm, density ≥ 500 kg/m^3</td></tr>
<tr><td>Cables</td><td>Combi module seal:
Apertures 0,6 m^2 with cable fill as per EN 1366-3:2009: Version A (including a cable tray). Sealing via inserted FLAMRO BSB-K Fire Stop Blocks. Coating of the penetrating cables, cables bundles, cable trays and cable ladders with FLAMRO-KL, length 360 symmetrical to the supporting structure.
Cable ladders and trays, coating thickness: 2 mm
Cable group 1-4, coating thickness: 2 mm
Cable group 5, coating thickness: 4 mm
Cable group 6, coating thickness: 2 mm
Steel conduits are coated over a length of 360 mm continuous.
Plastic conduits are coated for 100 mm above the penetration seal only</td></tr>
</table>

<table>
<tr><td></td><td>

- Non-flammable copper pipes with diameters 54 mm and 18 mm diameters were insulated with type RS800 Rockwool pipe sections over a length of 1160 mm respectively of 30 and 20 mm thickness- The sectional insulation was additionally secured with spirally wound winding wire 50 mm pitch.

</td></tr>
<tr><td>Flammable pipes

Non-flammable pipes</td><td>

Plastic pipe penetration seal
Apertures 0,6 m^2 with the following flammable pipes.
Flammable pipes

Plastic type	Pipe Ø, mm	Wall thickness, mm	Fire protection tape	Number of layers
PVC	75	5,6	FLAMRO UBB	2
PE	75	2,3	FLAMRO UBB	2

Pipe end configurations: U/C

Non-flammable pipes

Plastic type	Pipe Ø, mm	Wall thickness, mm	Sectional insulation	Length mm	Thickness mm
Cu	54	2,0	RS800	1160	30
Cu	18	1,0	RS800	1160	20

Pipe end configurations: C/U

</td></tr>
</table>

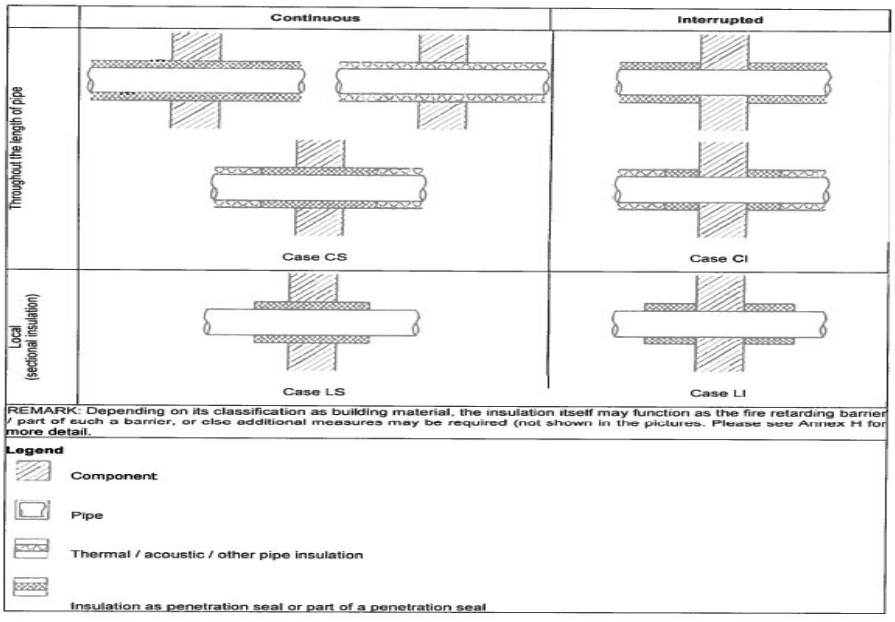
The classification:

Non-flammable pipe material with non-flammable, class A2 / $A2_L$ or higher sectional insulation. Classification of copper pipes and their substitutes insulation thickness ≥20 mm to ≤ 30 mm overall length of sectional insulation ≤ 1160 mm.		
Non-flammable pipe	Classification depending on orientation of the installation in BSB-K fire stop Block penetration seal	
	Wall	Floor
Copper pipe, outer diameter, OD, in mm	> 18 ≤ 54	> 18 ≤ 54
Copper pipe, wall thickness, s, in mm	1,0 ≤ 14,2	1,0 ≤ 14,2
Classification	EI 90 / E 120 - C/U	EI 120 / E 180 - C/U
Copper pipe, outer diameter, OD, in mm	≤ 18	≤ 18
Copper pipe, wall thickness, s, in mm	1,0 ≤ 14,2	1,0 ≤ 14,2
Classification	EI 90 / E 120 - C/U	EI 120 / E 180 - C/U

Flammable pipe material without insulation, with or without intumescent strips					
Designation	Dimensional range Ø diameter s wall thickness	Fire protection tape	No. Of layers	Direction D=floor, W=wall	Classification
PVC pipe	Ø ≤ 75 / s 1,8 -5,6	Roku Strip/ FLAMRO UBB	2	W	EI 90/ E 180* U/C
PVC pipe	Ø ≤ 75 / s 1,8 -5,6	Roku Strip/ FLAMRO UBB	2	D	EI 180 U/C
PVC pipe	Ø ≤ 50 / s 1,8 -5,6			W	EI 90/ E180* U/C
PVC pipe	Ø ≤ 50 / s 1,8 -5,6			D	EI 180 U/C
PE pipe	Ø ≤ 75 / s 2,3 -4,5	Roku Strip/ FLAMRO UBB	2	W	EI 90/ E 180* U/C
PE pipe	Ø ≤ 75 / s 2,3 -4,5	Roku Strip/ FLAMRO UBB	2	D	EI 180 U/C
PE pipe	Ø ≤ 50 / s 3,0 -4,6			W	EI 90/ E 180* U/C
PE pipe	Ø ≤ 50 / s 3,0 -4,6			D	EI 180 U/C

E180* … with steel grid strips.

The classification is declared under the following conditions:

Field of application (Chapter 4 classification report)	The above classification is applicable to the FLAMRO BSB-K Combi Seal EN only to the orientation for which the penetration seals were tested, i.e. wall or floor.
Pipes	Plastic pipes tested with pipe configuration U/C also cover pipe end configurations C/C Metal Pipes tested with pipe configuration C/U also cover pipe and configurations C/C Results for copper pipes may be applied to steel pipes but not vice versa, for pipes with $\lambda \leq$ 380 W/mK and melting point $\geq$ 1083°C
Supporting structure:	Solid construction floor. The floor must be $\geq$ 150 mm thick and have a density $\geq$ 500 kg/m^3. Brick and concrete floors are thus covered. Drywall construction the wall must be $\geq$ 100 mm thick and must be built with timber or metal studs covered on both sides with at least 2 layers of 12,5 mm thick fire protection boards. All jambs must be faced with double layer fire protection plasterboard. Classification of the results for drywall partitioning may be applied for solid wall constructions with thicknesses equal to or greater than that of the tested construction. The structural elements (supporting structures, walls and floors) must be classified for the required fire resistance duration as per EN 13501-2.
	For use with non-flammable pipe material, mineral wool (melting point$\geq$ 1000°C, A2 / A2$_L$ as per EN 13501-1) sectional insulation may be used. The required lengths and thicknesses are shown below. Sectional insulation configuration in LS, LI, CS or CI as per EN1366-3.  The insulation (configuration LS) is arranged centred on the supporting structure or the BSB-K Fire stop Block penetration seal; insulation fixed in place using wire or the like. With the other configurations, the total insulation length must comply with the tested length at the least. • Fire proof suspension must be used with C/U tested metal pipes • Insulation thickness between tested dimensions may be applied to all insulation arrangements. • Asymmetrical local insulation may be thicker and longer for floors • Local insulation lengths may be increased but not reduced

	• Insulation density may be increased but not reduced • All angels between 90°C and 45°C are covered if a single pipe vertical to the supporting structure has been tested.
Suspension	The pipes must be supported on both sides of the walls spaced ≤ 450 mm or suspended from the upper side of the floor structure spaced ≤ 500