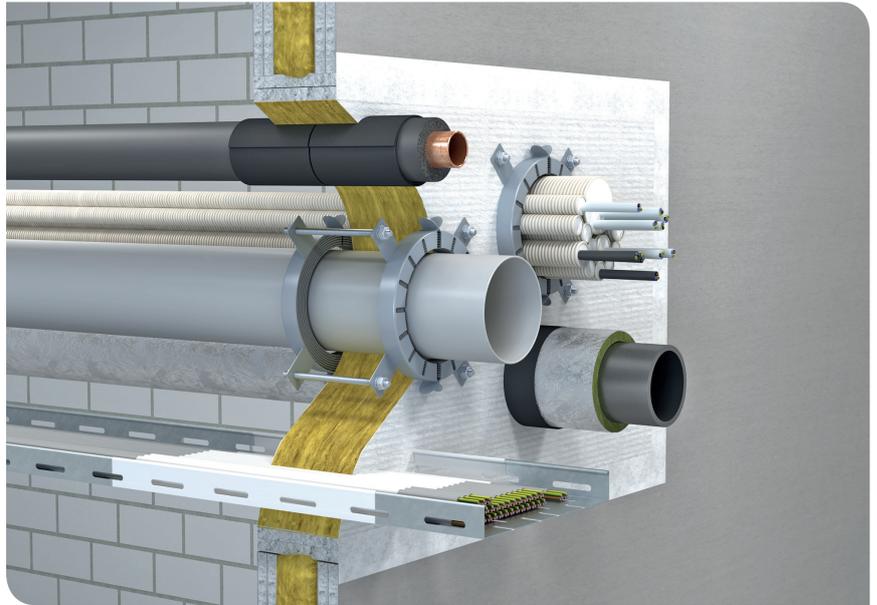


Technical information BIS Pacifyre® MP Weichschott



European Technical Assessment
ETA-15/0014

Walraven GmbH

Postfach 125128
95425 Bayreuth (DE)
Tel. +49 (0)921 75 60 0
Fax +49 (0)921 75 60 111
info@walraven.de

Walraven Group

Mijdrecht (NL) · Tienen (BE) · Bayreuth (DE)
Grenoble (FR) · Banbury (GB) · Madrid (ES)
Barcelona (ES) · Mladá Boleslav (CZ)
Kraków (PL) · Kyiv (UA) · Moscow (RU)
Detroit (US) · Shanghai (CN)



Austrian Institute of Construction Engineering
 Schenkenstrasse 4 | T+43 1 533 65 50
 1010 Vienna | Austria | F+43 1 533 64 23
 www.oib.or.at | mail@oib.or.at



European Technical Assessment

ETA-15/0014
 of 28/01/2015

General part

Technical Assessment Body issuing the ETA

Österreichisches Institut für Bautechnik

Trade name of the construction product

ROKU® System MFS

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products:
 Penetration Seals

Manufacturer

Rolf Kuhn GmbH
 Jägersgrund 10
 57339 Erndtebrück
 GERMANY

Manufacturing plant

Rolf Kuhn GmbH
 Jägersgrund 10
 57339 Erndtebrück
 GERMANY

This European Technical Assessment contains

53 pages including Annexes A-1 to H-2 which form an integral part of this assessment

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

Guideline for European technical approval for "Fire Stopping and Fire Sealing Products", ETAG 026 Part 2: "Penetration Seals", edition August 2011, used as European Assessment Document (EAD)

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Specific part

1 Technical description of the product

“ROKU® System MFS” is a kit to be used as cable- and/or pipe penetration seal (mixed penetration seal) based on the following components and additional insulations.

Components of “ROKU® System MFS”	Characteristics
ROKU® MFC 100 airless	Ablative fire stop coating – filled in buckets
ROKU® MFC 100 tv	Ablative fire stop mastic – filled in buckets, cartridges or bags
ROKU® Strip	Flexible intumescent strip (can be provided with a self-adhesive device) with a nominal thickness of 1,5 mm and a width of 100 mm
ROKU® MFP	Mineral wool board “Hardrock 040” / “Hardrock II” pre-coated with 0,5 mm (dry layer thickness) “ROKU® MFC 100 airless” on the visible surface
Hardrock 040 / Hardrock II	Mineral wool board from manufacturer “Deutsche Rockwool Mineralwoll GmbH & Co. OHG” according to EN 13162 with classification A1 according to EN 13501-1 with a nominal thickness of 50 mm, a minimum apparent density of 150 kg/m ³ and a melting point ≥ 1000 °C according to DIN 4102-17
ROKU® AWM II	Pipe collar according to Annex B-1 of the ETA with sheet steel housing and an inlay made of intumescent material (ROKU® Strip)

Insulations (additional components)	Characteristics
Mineral wool insulation	Lamella mats or prefabricated pipe shells (can be covered with reinforced aluminium foil) according to EN 14303 made from glass wool or stone wool with classification A2-s1,d0 or A1 resp. A2 _L -s1,d0 or A1 _L according to EN 13501-1 and a minimum density of 23 kg/m ³ (e.g. “Lamellenmatte ML 3” from manufacturer „Saint-Gobain Isover G+H AG“)
AF/Armaflex	Closed cell, flexible elastomeric foam (FEF) insulation in form of (slotted) tubes (can be provided with a self-adhesive device) with classification B _L -s3,d0 – including “Armaflex Kleber 520” (Armaflex Adhesive 520) – according to EN 13501-1 from manufacturer “Armacell GmbH” (see Annex B-2 of the ETA)

Insulations (additional components)	Characteristics
AF/Armaflex Band selbstklebend (AF/Armaflex self-adhesive tape)	Closed cell, flexible elastomeric foam (FEF) insulation in form of tapes with a self-adhesive device with classification B-s3,d0 according to EN 13501-1 from manufacturer "Armacell GmbH"
Armaflex Kleber 520 (Armaflex Adhesive 520)	Polychlorene-based adhesive, free from aromatic compounds (special adhesive for processing of all flexible Armaflex insulating material – except "HT/Armaflex") from manufacturer "Armacell GmbH"

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

2.1 Intended use

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

The thickness of the penetration seal in flexible walls or rigid walls has to be minimum 100 mm (two layers of mineral wool boards according to clause 1 of the ETA with a nominal thickness of 50 mm and a gap width of 0 mm between the two layers of boards).

The thickness of the penetration seal in rigid floors has to be minimum 150 mm (two layers of mineral wool boards according to clause 1 of the ETA with a nominal thickness of 50 mm and a gap width of 50 mm between the two layers of boards).

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

The minimum perimeter length to seal area ratio of the penetration seal in rigid floors is – according to clause 13.5.2 of EN 1366-3:2009 – 2,769 m/m², resp. 0,002769 mm/mm².

The installation of a blank penetration seal with a maximum opening size as specified in the following table is allowed.

"ROKU® System MFS" can be installed only in the types of separating elements as specified in the following table.

Separating element	Construction	Maximum opening size of the penetration seal (width x height)
Flexible walls	<ul style="list-style-type: none"> > Steel studs or timber studs lined on both faces with minimum 2 layer of boards (minimum thickness 12,5 mm) with classification A2-s1,d0 or A1 according to EN 13501-1 > For timber stud walls there shall be a minimum distance of 100 mm of the penetration seal to any timber stud. The cavity between the penetration seal and the timber stud has to be closed with minimum 100 mm of insulation with classification A1 or A2 according to EN 13501-1 > Minimum thickness 94 mm > Classification according to EN 13501-2: \geq EI 90 > The aperture lining shall be made from steel studs with a thickness of minimum 0,6 mm and boards of the same specification as those used in the wall in practice > This European Technical Assessment does not cover sandwich panel constructions and flexible walls where the lining does not cover studs on both sides. Penetrations in such constructions shall be tested on a case by case basis 	1100 mm x 2200 mm
Rigid walls	<ul style="list-style-type: none"> > Aerated concrete, concrete, masonry > Minimum thickness 100 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period 	1100 mm x 2200 mm
Rigid floors	<ul style="list-style-type: none"> > Aerated concrete, concrete > Minimum density 550 kg/m³ > Minimum thickness 150 mm > The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period 	see Annex F-2 of the ETA

“ROKU® System MFS” can only be configured as specified in the following tables. Other parts or service support constructions shall not penetrate the penetration seal.

Penetrating element	Construction characteristics of the penetrating element in “ROKU® System MFS” in rigid floors
Metal pipes	<ul style="list-style-type: none"> > Metal pipes of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater or equal than copper (1006 °C for EI 90; 1049 °C for EI 120) and a thermal conductivity smaller or equal than copper with diameters and wall thicknesses as defined in Annex G-2 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex H-1 of the ETA. > Metal pipes of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater or equal than steel (1006 °C for EI 90; 1049 °C for EI 120) and a thermal conductivity smaller or equal than steel with diameters and wall thicknesses as defined in Annex G-3 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex H-1 of the ETA.
Cable support constructions	<ul style="list-style-type: none"> > Steel cable trays (perforated or non-perforated) > Steel ladders > Steel cable trays (perforated or non-perforated) and steel ladders with organic coatings shall at least be classified A2 according to EN 13501-1

2.2 Use category

“ROKU® System MFS” is intended for use at temperatures below 0 °C, but with no exposure to rain nor UV, and can therefore – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Y₂. Since the requirements for Type Y₂ are met, also the requirements for Type Z₁ and Z₂ are fulfilled.

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

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of “ROKU® System MFS” of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

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

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

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

2.6 Installation

The product shall be installed and used as described in this European Technical Assessment.

Additional marking of the penetration seal shall be done in case of national requirements.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 1	None	Not relevant	
BWR 2	Reaction to fire	EN 13501-1	Clause 3.2.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009	Annex D-1 to D-5 and Annex G-1 to G-5 of the ETA
BWR 3	Air permeability (material property)	No Performance Determined (NPD)	
	Water permeability (material property)	No Performance Determined (NPD)	
	Content and/or release of dangerous substances	European Council Directive 67/548/EEC- Dangerous Substances Directive and Regulation (EC) No 1272/2008 as well as EOTA TR 034, edition March 2012	Declaration of conformity by the manufacturer
BWR 4	Mechanical resistance and stability	No Performance Determined (NPD)	
	Resistance to impact / movement	No Performance Determined (NPD)	
	Adhesion	No Performance Determined (NPD)	
BWR 5	Airborne sound insulation	No Performance Determined (NPD)	
BWR 6	Thermal properties	No Performance Determined (NPD)	
	Water vapour permeability	No Performance Determined (NPD)	
BWR 7	No Performance Determined (NPD)		

3.1 Mechanical resistance and stability (BWR 1)

Not relevant.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

The components of "ROKU® System MFS" were assessed according to ETAG 026-Part 2 clause 2.4.1 and classified according to EN 13501-1.

Component	Class according to EN 13501-1
ROKU® MFC 100 airless	E
ROKU® MFC 100 tv	E
ROKU® Strip	E
ROKU® MFP	F
Hardrock 040 / Hardrock II	A1
ROKU® AWM II	E

The sheet steel housing of "ROKU® AWM II" is classified Class A1 according to Commission Decision 96/603/EC⁷.

3.2.2 Resistance to fire

"ROKU® System MFS" was tested according to ETAG 026-Part 2 clause 2.4.2, prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 in conjunction with EN 1363-1:1999.

Based upon the gained test results and the field of application specified within prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 the cable- and/or pipe penetration seal (mixed penetration seal) "ROKU® System MFS" has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex D-1 to D-5 and Annex G-1 to G-5 of the ETA.

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

The resistance to fire classification listed in Annex D-1 to D-5 and Annex G-1 to G-5 of the ETA is only valid if "ROKU® System MFS" is installed according to Annex A-1 to A-8 of the ETA.

3.3 Hygiene, health and environment (BWR 3)

3.3.1 Air permeability

No Performance Determined.

3.3.2 Water permeability

No Performance Determined.

⁷ Official Journal of the European Communities no. L 267, 19.10.1996, p. 23

3.3.3 Release of dangerous substances

According to the manufacturer's declaration the components of "ROKU® System MFS" do not contain dangerous substances detailed in Council Directive 67/548/EEC and Regulation (EC) no 1272/2008 as well as EOTA TR 034 (General ER 3 Checklist for ETAGs/CUAPs/ETAs-Content and/or release of dangerous substances in products/kits), edition March 2012.

A written declaration in this respect was submitted by the ETA-holder.

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.

3.4 Safety in use (BWR 4)

3.4.1 Mechanical resistance and stability

No Performance Determined.

3.4.2 Resistance to impact / movement

No Performance Determined.

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

3.4.3 Adhesion

No Performance Determined.

3.5 Protection against noise (BWR 5)

3.5.1 Airborne sound insulation

No Performance Determined.

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Thermal properties

No Performance Determined

3.6.2 Water vapour permeability

No Performance Determined

3.7 General aspects relating to fitness for use

All components of "ROKU® System MFS" fulfil the requirements for the intended use category.

"ROKU® System MFS" is therefore appropriate for use at temperatures below 0 °C, but with no exposure to rain nor UV, and can therefore – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Y₂. Since the requirements for Type Y₂ are met, also the requirements for Type Z₁ and Z₂ are fulfilled.

It is assumed that the sheet steel housing of "ROKU® AWM II" is sufficiently protected against corrosion by the used type of powder coating.

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

4.1 AVCP system

According to the Decision 1999/454/EC⁸, amended by Decision 2001/596/EC⁹ of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

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

5 Technical details necessary for the implementation of the AVCP system, as provided for the applicable European Assessment Document

5.1 Tasks of the manufacturer

5.1.1 Factory production control

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

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation¹⁰ of this European Technical Assessment.

For the components which the ETA-holder does not manufacture by himself, he shall make sure that factory production control carried out by the other manufacturers gives the guaranty of the components compliance with the European Technical Assessment.

The factory production control and the provisions taken by the ETA-holder for components not produced by himself shall be in accordance with the control plan¹¹ relating to this European Technical Assessment, which is part of the technical documentation of this European Technical Assessment.

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

5.1.2 Further testing of samples taken at the factory

Testing of samples taken at the factory by the manufacturer shall be performed according to the control plan referred to in clause 5.1.1 of the European Technical Assessment.

⁸ Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

⁹ Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

¹⁰ The technical documentation of this European Technical Assessment has been deposited at the Österreichisches Institut für Bautechnik and, as far as relevant for the tasks of the notified product certification body involved in the assessment and verification of constancy of performance, is handed over only to the notified product certification body.

¹¹ The control plan has been deposited at Österreichisches Institut für Bautechnik and is handed over only to the notified product certification body involved in the assessment and verification of constancy of performance.

5.1.3 Other tasks of the manufacturer

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

- > Technical data sheet:
 - a) Field of application:
 - 1) Building elements for which the penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and – in case of lightweight constructions – the construction requirements
 - 2) Services which may pass through the penetration seal, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays)
 - 3) Limits in size, minimum thickness etc. of the penetration seal
 - 4) Environmental conditions covered by this European Technical Assessment
 - b) Construction of the penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific
- > Installation instruction:
 - a) Steps to be followed
 - b) Stipulations on maintenance, repair and replacement

In the accompanying document and/or on the packaging the manufacturer shall give information as to transport and storage (minimum and maximum storing temperature, maximum duration of storage)

The packaging of the product shall contain the trade name or trademark or other symbol identifying the product and the date of manufacture (day, month, year or coded information).

The product shall be packaged for delivery in compliance with the usual delivery conditions and providing sufficient protection against the effects of normal handling.

The manufacturer shall, on the basis of a contract, involve a notified product certification body which is notified for the tasks referred to in clause 5.2 of the ETA in the field of penetration seals in order to undertake the actions laid down in clause 5.2 of the ETA. For this purpose, the control plan referred to in clause 5.1 and 5.2 of the ETA shall be handed over by the manufacturer to the notified product certification body involved.

The manufacturer shall make a declaration of performance, stating that the construction product is in conformity with the provisions of this European Technical Assessment.

5.2 Tasks of the notified product certification body

The Notified body shall retain the essential points of its actions referred to clause 5.2.1 to 5.2.3 of the ETA, state the results obtained and conclusions drawn in written report.

These tasks shall be performed in accordance with the provisions laid down in the control plan of this European Technical Assessment.

5.2.1 Determination of the product type

Notified bodies undertaking tasks under System 1 shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Notified bodies shall therefore not undertake the tasks referred to in point 1.2 (b)(i), in Annex V of Regulation (EU) No 305/2011, unless there are changes in the manufacture or manufacturing plant. In such cases, the necessary initial type testing has to be agreed between the Österreichisches Institut für Bautechnik and the notified product certification body involved.

5.2.2 Initial inspection of the manufacturing plant and of factory production control

The notified product certification body shall ascertain that, in accordance with the control plan, the manufacturing plant, in particular personnel and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the product according to the specifications given in this European Technical Assessment.

5.2.3 Continuous surveillance, assessment and evaluation of factory production control

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

It has to be verified that the system of factory production control and the specified manufacturing process are maintained taking into account the control plan.

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The results of continuous surveillance shall be made available on demand by the notified product certification body or the Österreichisches Institut für Bautechnik. In cases where the provisions of the European Technical Assessment and the control plan are no longer fulfilled, the certificate of constancy of performance shall be withdrawn.

Issued in Vienna on 28.01.2015
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

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1 General

- > “ROKU® System MFS” can be used in apertures in walls (vertical separating element) and floors (horizontal separating element) according to clause 2.1 of the ETA.
- > The penetration of cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions according to clause 2.1 of the ETA is allowed.
- > The total cross section of the installations (including insulation and cable support constructions) must not be more than 60 % of the opening size of the penetration seal.
- > Each metal pipe or plastic pipe which is to be sealed off has to be protected separately by the appropriate additional precaution as described in Annex A-4 to Annex A-7 of the ETA.

1.1 Pipe end configuration

- > For plastic pipes classified with pipe end configuration U/U the pipe end configuration can be U/U, C/U, U/C, C/C.
- > For metal pipes classified with pipe end configuration C/U the pipe end configuration can be C/U and C/C.
- > Plastic conduits were tested U/C.
- > Steel conduits / tubes were tested C/U.

1.2 Orientation of the penetrating elements

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

1.3 Service support constructions

- > All types of cables, conduits / tubes, metal pipes and plastic pipes – in flexible walls and rigid walls – have to be supported on both side of the separating element by steel cable trays (perforated or non-perforated), steel ladders or alternative service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 945 °C for EI 60 or 1006 °C for EI 90 (e.g. stainless steel or galvanized steel) according to the ETA-holder’s installation instructions.
- > All types of cables, conduits / tubes, metal pipes and plastic pipes – in rigid floors – have to be supported at least on the top side of the separating element by steel cable trays (perforated or non-perforated), steel ladders or alternative service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 945 °C for EI 60, 1006 °C for EI 90 or 1049 °C for EI 120 (e.g. stainless steel or galvanized steel) according to the ETA-holder’s installation instructions.
- > Steel cable trays (perforated or non-perforated) or steel ladders can pass through or end at the surface of the penetration seal.
- > Lidded cable trays / trunkings must not pass through the penetration seal.

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- > The length of the steel cable trays (perforated or non-perforated) or steel ladders has to be minimum 575 mm on both sides of the penetration seal (measured from the surface of the penetration seal).
- > The first support (service support construction) for cables, conduits / tubes, metal pipes and plastic pipes in flexible walls and rigid walls has to be at maximum 500 mm (measured from the surface of the penetration seal).
- > The first support (service support construction) for cables, conduits / tubes, metal pipes and plastic pipes in rigid floors has to be at maximum 420 mm (measured from the surface of the penetration seal).
- > All types of cables, conduits / tubes, metal pipes and plastic pipes have to be fixed according to the ETA-holder's installation instructions to the service support construction.

1.4 Aperture lining

- > For flexible walls according to clause 2.1 of the ETA the aperture lining shall be made from steel studs and boards of the same specification as those used in the wall in practice.
- > The reveal of the aperture has to be delimited with an all-around trimming made from steel studs (sheet steel profiles) with a thickness of minimum 0,6 mm which are connected to each other and force-fitted at the vertical steel studs (mullions).
- > The reveal of the aperture has to be lined with minimum two layers of boards (minimum thickness 12,5 mm) with classification A2-s1,d0 or A1 according to EN 13501-1 and a width of minimum 100 mm. For flexible walls with a thickness of 94 mm the boards have to be installed centred within the reveal of the aperture so that they protrude the flexible wall by ≥ 3 mm on both sides of the flexible wall. The boards have to be fixed to the all-around trimming (sheet steel profiles) with steel drywall screws with a distance of maximum 200 mm between the steel drywall screws.
- > The flexible wall around the reveal of the aperture has to be lined with minimum two layers of boards (minimum thickness 12,5 mm) with classification A2-s1,d0 or A1 according to EN 13501-1. Each layer has to be fixed separately to the all-around trimming (sheet steel profiles) with steel drywall screws with a distance of maximum 300 mm between the steel drywall screws. The length of the steel drywall screws has to be sufficient so that they project at least 10 mm into the all-around trimming (sheet steel profiles) resp. the flexible wall.
- > Joints between the aperture lining and the flexible wall have to be filled with gypsum joint filler (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder's installation instructions.

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2 Details for installation of “ROKU® System MFS” (see Annex B-1 to H-2 of the ETA)

- > “ROKU® System MFS” (including all additional precautions as described in Annex A-4 to Annex A-7 of the ETA) has to be installed according to the ETA-holder’s installation instructions.
- > For the installation of “ROKU® System MFS” two layers of mineral wool boards according to clause 1 of the ETA (“Hardrock 040” / “Hardrock II”) with a nominal thickness of 50 mm have to be used.
- > In vertical separating elements with a thickness of 94 mm to 100 mm the two layers of mineral wool boards have to be installed centred within the separating element. In vertical separating elements with a thickness > 100 mm the two layers of mineral wool boards can be installed flushed to the surface of the separating element, centred within the separating element or in all positions in between.
- > In horizontal separating elements with a thickness of 150 mm the two layers of mineral wool boards have to be installed flushed to the surface of the separating element. In horizontal separating elements with a thickness > 150 mm the two layers of mineral wool boards have to be installed flushed to the top side of the separating element.
- > The gap between the two layers of mineral wool boards in vertical separating elements has to be 0 mm.
- > The gap between the two layers of mineral wool boards in horizontal separating elements has to be 50 mm.
- > For penetration seals with fire resistance classification EI 90 and EI 120 in vertical and horizontal separating elements with blank areas of size > 0,32 m² within the penetration seal, the two layers of mineral wool boards of these blank area have to be additionally connected to each other with threaded steel bolts with thread size ≥ M6 (minimum 4 threaded steel bolts / m²) and fixed with washers (outer diameter ≥ 25 mm; inner diameter corresponding to the outer diameter of the threaded steel rods) on both sides and nuts (corresponding to the outer diameter of the threaded steel rods).
- > For blank penetration seals and blank areas within the penetration seal in horizontal separating elements splices between the mineral wool boards within the height are not allowed.
- > All edges of the mineral wool boards “ROKU® MPF” or “Hardrock 040” / “Hardrock II” or the reveal of the aperture in the area of the mineral wool boards have to be coated with “ROKU® MFC 100 airless” or “ROKU® MFC 100 tv” with a thickness of minimum 1 mm (total dry layer thickness).
- > All mineral wool boards “ROKU® MPF” or “Hardrock 040” / “Hardrock II” have to be bonded with “ROKU® MFC 100 airless” or “ROKU® MFC 100 tv”.
- > Gaps and joints (maximum width 5 mm) between the mineral wool boards as well as the mineral wool boards and the separating element have to be completely filled with “ROKU® MFC 100 airless” or “ROKU® MFC 100 tv” on both sides of the penetration seal.

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- Details for installation -

ANNEX A-3

- > Gaps and joints (maximum width 10 mm) between the mineral wool boards and the penetrating elements (cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions) have to be completely filled with "ROKU® MFC 100 tv" on both sides of the penetration seal. Gaps and joints (maximum width 10 mm) between the mineral wool boards and the penetrating elements (cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions) can alternatively be completely filled with mineral wool (stone wool with classification A1 according to EN 13501-1, a minimum compacted apparent density of 50 kg/m³ and a melting point ≥ 1000 °C according to DIN 4102-17) which is impregnated with "ROKU® MFC 100 airless" or "ROKU® MFC 100 tv", and afterwards coated with "ROKU® MFC 100 airless" or "ROKU® MFC 100 tv" with a thickness of minimum 1 mm (total dry layer thickness) on both sides of the penetration seal.
- > For tied cable bundles the space between the cables need not be filled.
- > The mineral wool boards have to be coated single-sided on the visible surface with "ROKU® MFC 100 airless" with a thickness of minimum 1 mm (total dry layer thickness) on both sides of the penetration seal.
- > The transition area between mineral wool boards and the vertical separating element has to be coated with "ROKU® MFC 100 airless" with a thickness of minimum 1 mm (total dry layer thickness) on both sides of the penetration seal so that the layer extends at least 20 mm beyond the mineral wool boards.
- > All penetrating elements (cables, conduits / tubes, metal pipes, plastic pipes, cable support constructions) have to be protected by the appropriate additional precautions as described in Annex A-4 to Annex A-7 of the ETA.

3 Additional precautions

3.1 Cables, conduits / tubes, cable support constructions in vertical separating elements and in horizontal separating elements

- > All cable trays / cable ladders (plate and flanges), cables and conduits / tubes (except conduit bundles) have to be coated with "ROKU® MFC 100 airless" with a thickness of ≥ 1 mm (total dry layer thickness) at a length of ≥ 150 mm on both sides of the penetration seal (measured from the surface of the penetration seal) and at the penetration area (area below and in between the two layers of mineral wool boards) with a thickness of ≥ 1 mm (total dry layer thickness).
- > All conduits / tubes (including conduit bundles) resp. the annular gap between the cable(s) and the conduit / tube has to be filled to a depth of minimum 10 mm on at least one side of the penetration seal (depending on the tested pipe end configuration, see Annex A-1, clause 1.1 of the ETA) with "ROKU® MFC 100 tv". Empty conduits / tubes (including conduit bundles) have to be filled to a depth of minimum 10 mm with "ROKU® MFC 100 tv" or mineral wool (stone wool with classification A1 according to EN 13501-1, a minimum compacted apparent density of 50 kg/m³ and a melting point ≥ 1000 °C according to DIN 4102-17) and additionally "ROKU® MFC 100 tv" with a thickness of ≥ 1 mm (total dry layer thickness).
- > For conduit bundles see Annex A-7, clause 3.3 of the ETA.

ROKU® System MFS
- Details for installation -

ANNEX A-4

3.2 Metal pipes in vertical separating elements and horizontal separating elements

- > Metal pipes have to be insulated (local-sustained or continued-sustained) with “AF/Armaflex” or mineral wool insulation (e.g. “Lamellenmatte ML 3”) according to clause 1 of the ETA and protected with “ROKU® Strip”.

3.2.1 Installation of „AF/Armaflex“

- > The tube of “AF/Armaflex” has to be installed centred in the opening of the penetration seal so that it protrudes the penetration seal on both sides by ≥ 550 mm (measured from the surface of the penetration seal) and that it is continuous along the required minimum insulation length.
- > The thickness of the tube of “AF/Armaflex” has to be chosen from Annex D-2 and Annex G-2 (as well as Annex B-2) of the ETA in accordance with the outer diameter of the pipe to be sealed off and the corresponding inner diameter of “AF/Armaflex” (e.g. for pipes with an outer diameter of 10 mm the nominal insulation thickness has to be 11 mm).
- > When installing “AF/Armaflex” all butt joints and longitudinal joints (except for “AF/Armaflex” with self-adhesive device) have to be glued with “Armaflex Kleber 520” (Armaflex Adhesive 520) and can be covered with “AF/Armaflex Band selbstklebend” (AF/Armaflex self-adhesive tape).
- > The amount of “Armaflex Kleber 520” (Armaflex Adhesive 520) shall not be more than 300 g/m^2 .
- > The strip of “AF/Armaflex Band selbstklebend” (AF/Armaflex self-adhesive tape) has to be $50 \text{ mm} \times 3 \text{ mm}$ (width x thickness).
- > The tube of “AF/Armaflex” can be either pushed onto the pipe or slotted and glued at the longitudinal joint.
- > Branches or elbows also have to be equipped with “AF/Armaflex” along the required minimum insulation length (≥ 550 mm – measured from the surface of the penetration seal) on both sides of the penetration seal.
- > For further details see technical literature of the manufacturer.

3.2.2 Installation of mineral wool insulation (e.g. “Lamellenmatte ML 3”)

- > The mineral wool insulation (e.g. “Lamellenmatte ML 3”) has to be wrapped around the pipe to be sealed off so that it protrudes the penetration seal on both sides by ≥ 550 mm (measured from the surface of the penetration seal) and that it is continuous along the required minimum insulation length.
- > The thickness of the insulation has to be – depending on the relevant pipe to be sealed off – 20 mm, 30 mm or 50 mm (for details see Annex D-3, Annex D-4 and Annex G-3 of the ETA).

ROKU® System MFS
- Details for installation -

ANNEX A-5

- > The mineral wool insulation (e.g. "Lamellenmatte ML 3") has to be fixed along the required minimum insulation length by a winding wire (steel wire with diameter $\geq 0,8$ mm; 5 windings per meter, e.g. at a distance of 200 mm, 400 mm etc. – measured from the surface of the penetration seal) in place.
- > Branches or elbows also have to be insulated with mineral wool insulation (e.g. "Lamellenmatte ML 3") along the required insulation length (≥ 550 mm – measured from the surface of the penetration seal) on both sides of the penetration seal.
- > For further details see technical literature of the manufacturer.

3.2.3 Installation of „ROKU® Strip“ in vertical separating elements

- > Two strips of "ROKU® Strip" (thickness 1,5 mm, width 100 mm) have to be used.
- > For pipes insulated with "AF/Armaflex" two layers of "ROKU® Strip" (for an overall thickness of 3 mm) have to be used.
- > For pipes insulated with mineral wool insulation (e.g. "Lamellenmatte ML 3") one layer of "ROKU® Strip" (for an overall thickness of 1,5 mm) has to be used.
- > The two strips of "ROKU® Strip" have to be wrapped around the insulation of the pipe to be sealed off so that they protrude the penetration seal on both sides by 50 mm (measured from the surface of the penetration seal) and if needed additionally fixed by adhesive tape.
- > For details see Annex C-3 and Annex C-4 of the ETA.

3.2.4 Installation of „ROKU® Strip“ in horizontal separating elements

- > One strip of "ROKU® Strip" (thickness 1,5 mm, width 100 mm) has to be used.
- > The strip of "ROKU® Strip" has only to be installed at the bottom side of the penetration seal (bottom side of the floor).
- > For pipes insulated with "AF/Armaflex" two layers of "ROKU® Strip" (for an overall thickness of 3 mm) have to be used.
- > For pipes insulated with mineral wool insulation (e.g. "Lamellenmatte ML 3") one layer of "ROKU® Strip" (for an overall thickness of 1,5 mm) has to be used.
- > The strip of "ROKU® Strip" has to be wrapped around the insulation of the pipe to be sealed off so that it protrudes the penetration seal on the bottom side of the floor by 25 mm (measured from the surface of the penetration seal) and if needed additionally fixed by adhesive tape.
- > For details see Annex F-4 and Annex F-5 of the ETA.

ROKU® System MFS
- Details for installation -

ANNEX A-6

3.3 Plastic pipes and conduit bundles (including single penetrations) in vertical separating elements and horizontal separating elements

- > Plastic pipes and conduit bundles have to be equipped with “ROKU® AWM II”.
- > The smallest pipe collar corresponding to the relevant outer diameter of the pipe or conduit bundle to be sealed off has to be used (see Annex B-1, Annex D-1, Annex D-5, Annex G-1, Annex G-4 and Annex G-5 of the ETA).
- > For conduit bundles the annular gap between the conduit bundle and the active component (ROKU® Strip) of the pipe collar has to be maximum 15 mm (see Annex C-6 and Annex F-7 of the ETA).
- > Conduit bundles (minimum length on both sides of the penetration seal 200 mm; measured from the surface of the penetration seal) have to be fixed (bound together) on both sides of the penetration seal with at least one winding of e.g. self adhesive tape or plastic wire at maximum 100 mm (measured from the surface of the penetration seal).
- > In vertical separating elements the pipe collars have to be installed on both sides of the penetration seal.
- > In horizontal separating elements the pipe collars have to be installed at the bottom side of the penetration seal.
- > The pipe collars have to be fixed by threaded steel bolts (thread size M6 for type DN 32 to DN 75 or thread size M8 for type DN 90 to DN 160, corresponding to the diameter of the bores within the fixing lugs; length \geq thickness of the penetration seal) and on both sides of the penetration seal with washers and nuts (corresponding to the outer diameter of the threaded steel bolts).
- > The number of fixing lugs shall not be reduced.

4 Minimum working clearances

- > The minimum working clearances are defined in Annex C-1 and F-1 of the ETA.

ROKU® System MFS
- Details for installation -

ANNEX A-7

5 Subsequent addition (retrofitting) and removal

- > Subsequent addition (retrofitting) and removal of cables, conduits / tubes, pipes and cable support constructions according to the ETA holder's installation instructions is allowed.
- > Retrofitting shall be done according to the ETA holder's installation instructions and the regulations of Annex A-3, clause 2 of the ETA.
- > If cables, conduits / tubes, pipes and cable support constructions are removed the remaining opening (hole) has to be completely closed with a fitting piece of "ROKU® MFP" or "Hardrock 040" / "Hardrock II" (nominal thickness 50 mm) on both sides of the penetration seal according to the ETA-holder's installation instructions. Gaps and joints (maximum width 5 mm) between the adjusted piece of "ROKU® MFP" or "Hardrock 040" / "Hardrock II" and the mineral wool boards have to be completely filled with "ROKU® MFC 100 airless" or "ROKU® MFC 100 tv" on both sides of the penetration seal. The fitted piece of "ROKU® MFP" or "Hardrock 040" / "Hardrock II" has to be coated on the visible surface with "ROKU® MFC 100 airless" with a thickness of minimum 1 mm (total dry layer thickness) on both sides of the penetration seal. Remaining openings (holes) with a maximum diameter of 10 mm can alternatively be completely filled with "ROKU® MFC 100 tv" or mineral wool (stone wool with classification A1 according to EN 13501-1, a minimum compacted apparent density of 50 kg/m³ and a melting point ≥ 1000 °C according to DIN 4102-17) which is impregnated with "ROKU® MFC 100 airless" or "ROKU® MFC 100 tv", and afterwards coated with "ROKU® MFC 100 airless" with a thickness of minimum 1 mm (total dry layer thickness) on both sides of the penetration seal.

6 Transport and storage

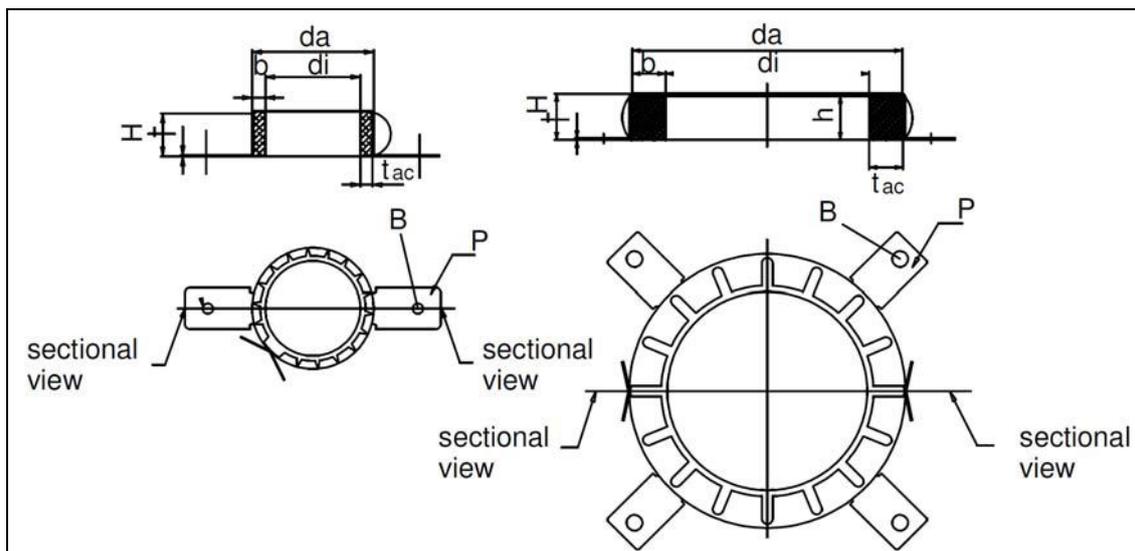
- > The indications of the manufacturer regarding transport and storage (minimum and maximum storing temperature, maximum duration of storage) have to be followed.

7 Use, maintenance and repair

- > The fire resistance of the penetration seal shall not be negatively affected by future changes to buildings or building elements.
- > The assessment of the fitness for use is based on the assumption that necessary maintenance and repair if required is carried out in accordance with the manufacturer's instructions during the assumed intended working life.

ROKU® System MFS
- Details for installation -

ANNEX A-8



type (DN)	collar					active component		fixing lugs	
	di (mm)	da (mm)	H (mm)	t (mm)	b (mm)	t _{ac} (mm)	h (mm)	P (pcs)	B (mm)
32	36	50	26,0	0,6	7,0	6,4 ± 0,5	25,4	2	6,0
40	44	58	26,0	0,6	7,0	6,4 ± 0,5	25,4	2	6,0
50	54	68	26,0	0,6	7,0	6,4 ± 0,5	25,4	2	6,0
63	67	94	26,0	0,6	13,5	12,8 ± 1,0	25,4	4	6,0
75	79	106	26,0	0,6	13,5	12,8 ± 1,0	25,4	4	6,0
90	94	132	26,6	1,1	18,3	19,2 ± 1,0	25,4	4	9,0
110	114	155	26,6	1,1	20,5	19,2 ± 1,5	25,4	4	9,0
125	129	172	40,0	1,1	20,5	25,6 -0/+2,0	38,1	4	9,0
140	144	200	40,0	1,1	28,0	25,6 -0/+2,0	38,1	6	9,0
160	164	220	40,0	1,1	28,0	25,6 -0/+2,0	38,1	6	9,0

di...inner diameter of collar
da...outer diameter of collar
H...height of collar
t...thickness of sheet steel
b...width of sheet steel
t_{ac}...thickness of active component
h...height of active component
P...number of fixing lugs
B...diameter of bores
dimensions of fixing lugs 35 mm x 20 mm (length x width)

ROKU® System MFS
- Description of "ROKU® AWM II" -

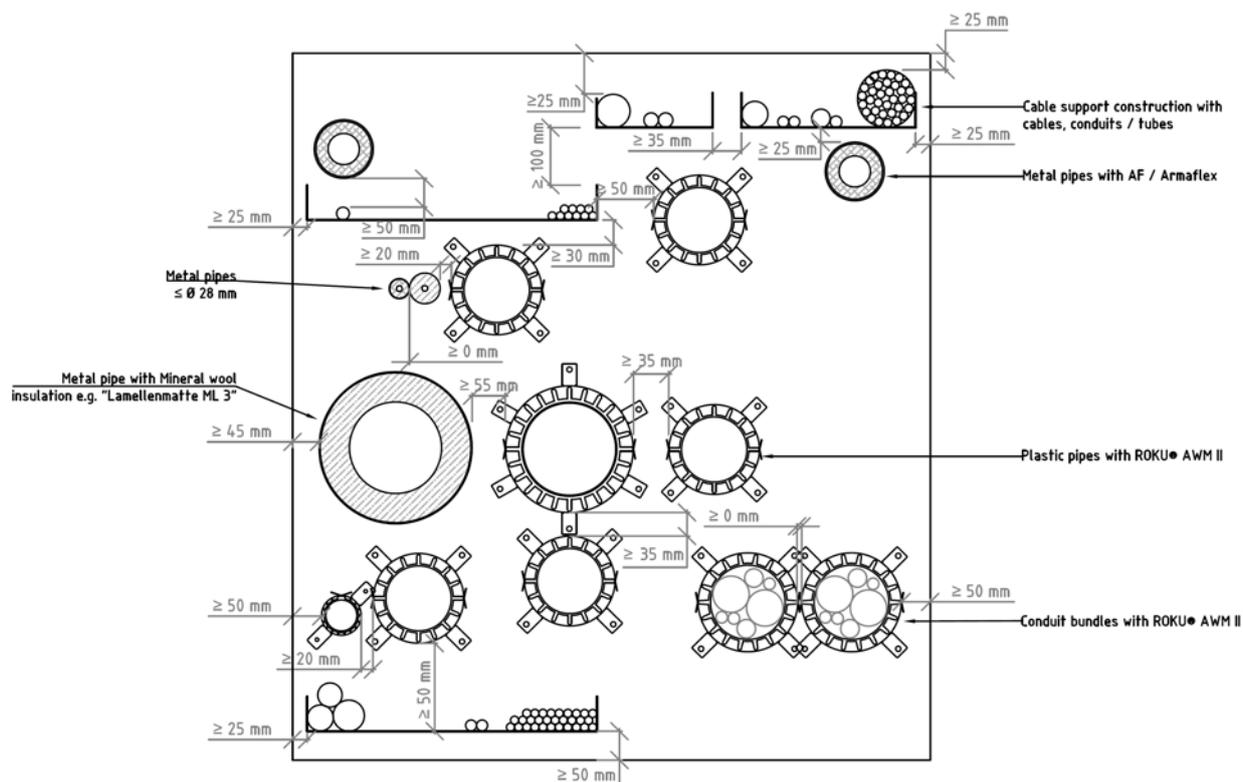
ANNEX B-1

Pipe max. outer diameter (mm)	AF/Armaflex (tubes)			
	Inner diameter (mm)	Insulation thickness \pm tolerance (mm)	Type	Designation
10	11,0 - 12,5	11,0 \pm 1,0	AF-2	AF-2-010
12	13,0 - 14,5	11,0 \pm 1,0		AF-2-012
15	16,0 - 17,5	11,5 \pm 1,0		AF-2-015
18	19,0 - 20,5	11,5 \pm 1,0		AF-2-018
20	21,0 - 22,5	12,0 \pm 1,0		AF-2-020
22	23,0 - 24,5	12,0 \pm 1,0		AF-2-022
25	26,0 - 27,5	12,5 \pm 1,0		AF-2-025
28	29,0 - 30,5	12,5 \pm 1,0		AF-2-028
30	31,0 - 33,0	19,0 \pm 1,5		AF-4
32	33,0 - 35,0	19,5 \pm 1,5	AF-4-032	
35	36,0 - 38,0	19,5 \pm 1,5	AF-4-035	
40	41,0 - 42,5	20,5 \pm 1,5	AF-4-040	
42	43,5 - 45,5	20,5 \pm 1,5	AF-4-042	
45	46,0 - 47,5	20,5 \pm 1,5	AF-4-045	
48	49,5 - 51,5	21,0 \pm 1,5	AF-4-048	
50	51,0 - 52,5	21,0 \pm 1,5	AF-4-050	
54	55,0 - 57,0	21,0 \pm 1,5	AF-4-054	
57	58,0 - 60,0	38,5 \pm 3,0	AF-6	AF-6-057
60	61,5 - 63,5	39,0 \pm 3,0		AF-6-060
64	65,0 - 67,5	39,5 \pm 3,0		AF-6-064
70	71,0 - 73,5	40,0 \pm 3,0		AF-6-070
76	77,0 - 79,5	40,5 \pm 3,0		AF-6-076
80	81,0 - 84,0	41,0 \pm 3,0		AF-6-080
89	90,5 - 93,5	41,5 \pm 3,0		AF-6-089

ROKU® System MFS
- Description of "AF/Armaflex" -

ANNEX B-2

**ROKU® System MFS in flexible walls and rigid walls according to clause 2.1 of the ETA –
Minimum working clearances / Installation drawing – top view**

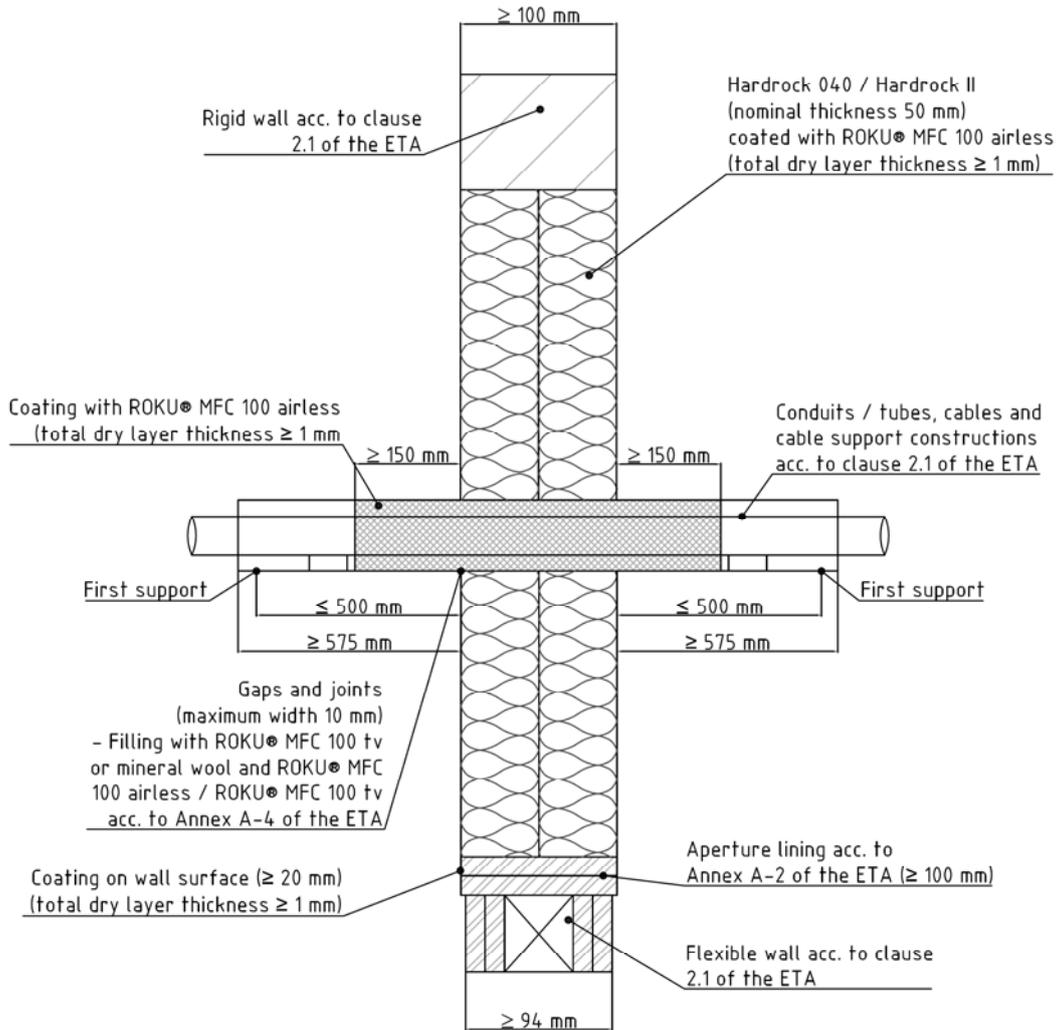


Horizontal and vertical distances / minimum working clearances – regarding penetrating elements – not given in the installation drawing have to be ≥ 100 mm in practice.

ROKU® System MFS
- Installation in flexible wall and rigid wall -

ANNEX C-1

ROKU® System MFS in flexible walls and rigid walls according to clause 2.1 of the ETA – penetrated by cables and conduits / tubes according to clause 2.1 of the ETA – Installation drawing – sectional view

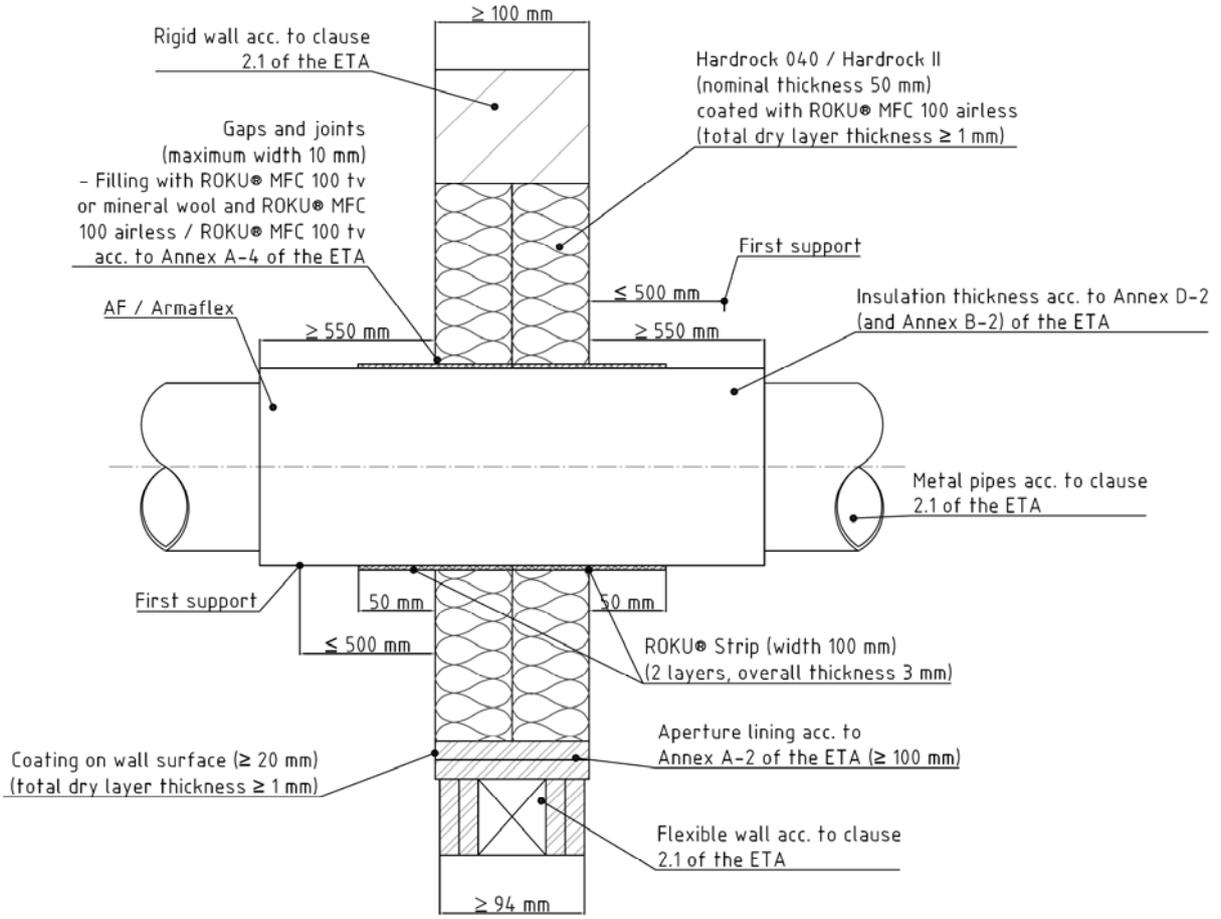


ROKU® System MFS
- Installation in flexible wall and rigid wall -

ANNEX C-2

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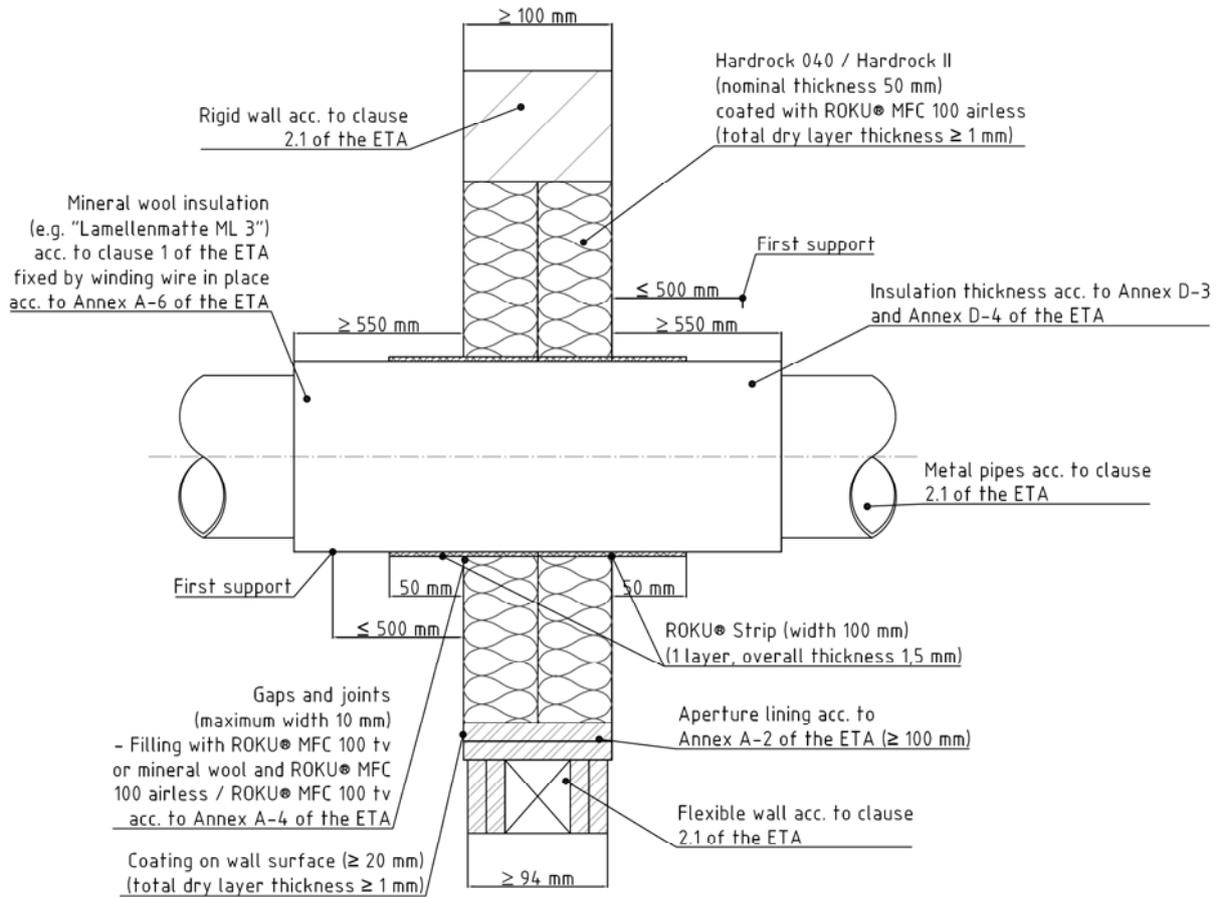
ROKU® System MFS in flexible walls and rigid walls according to clause 2.1 of the ETA – penetrated by metal pipes according to clause 2.1 of the ETA insulated with “AF/Armaflex” and wrapped with “ROKU® Strip” – Installation drawing – sectional view



ROKU® System MFS
- Installation in flexible wall and rigid wall -

ANNEX C-3

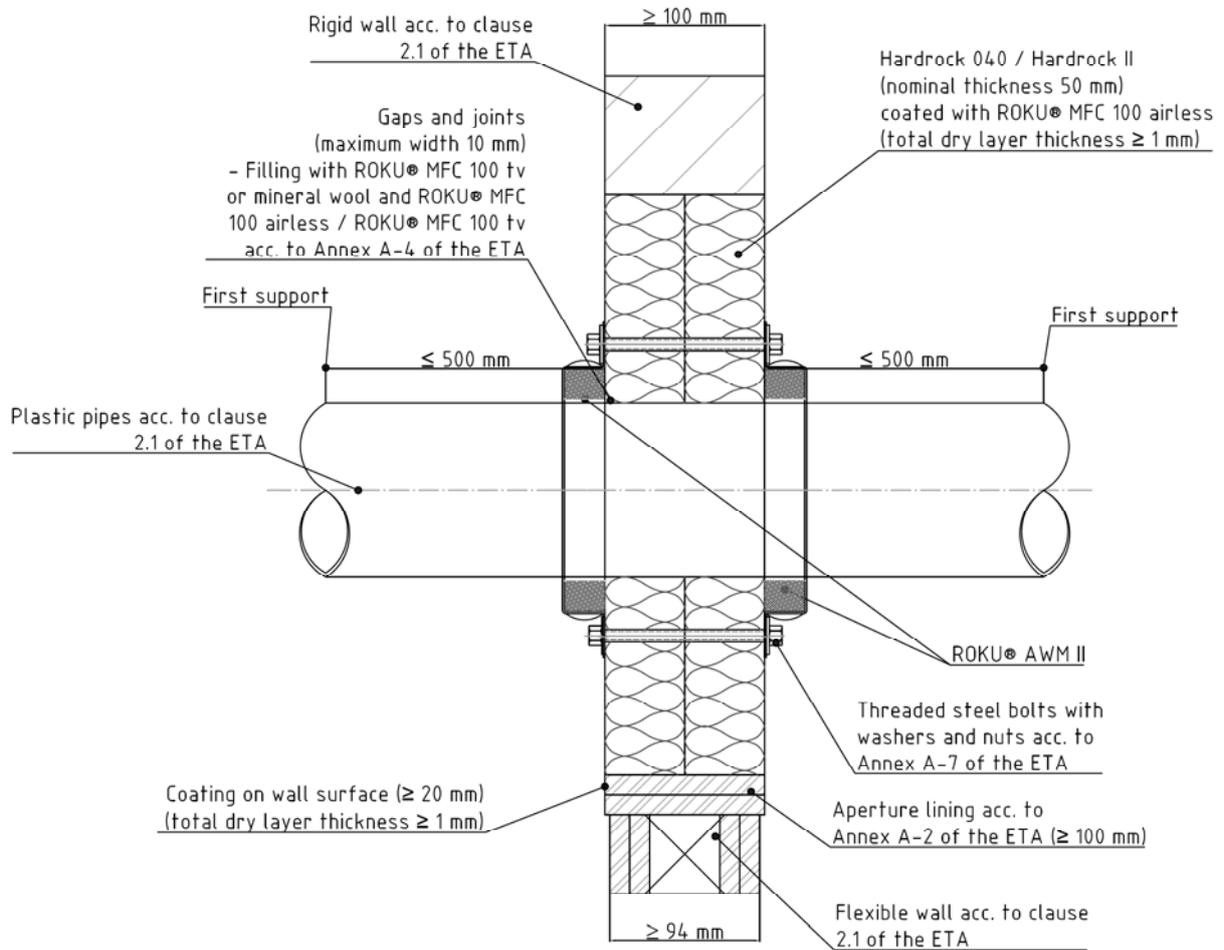
ROKU® System MFS in flexible walls and rigid walls according to clause 2.1 of the ETA – penetrated by metal pipes according to clause 2.1 of the ETA insulated with mineral wool (e.g. “Lamellenmatte ML 3”) according to clause 1 of the ETA and wrapped with “ROKU® Strip” – Installation drawing – sectional view



ROKU® System MFS
- Installation in flexible wall and rigid wall -

ANNEX C-4

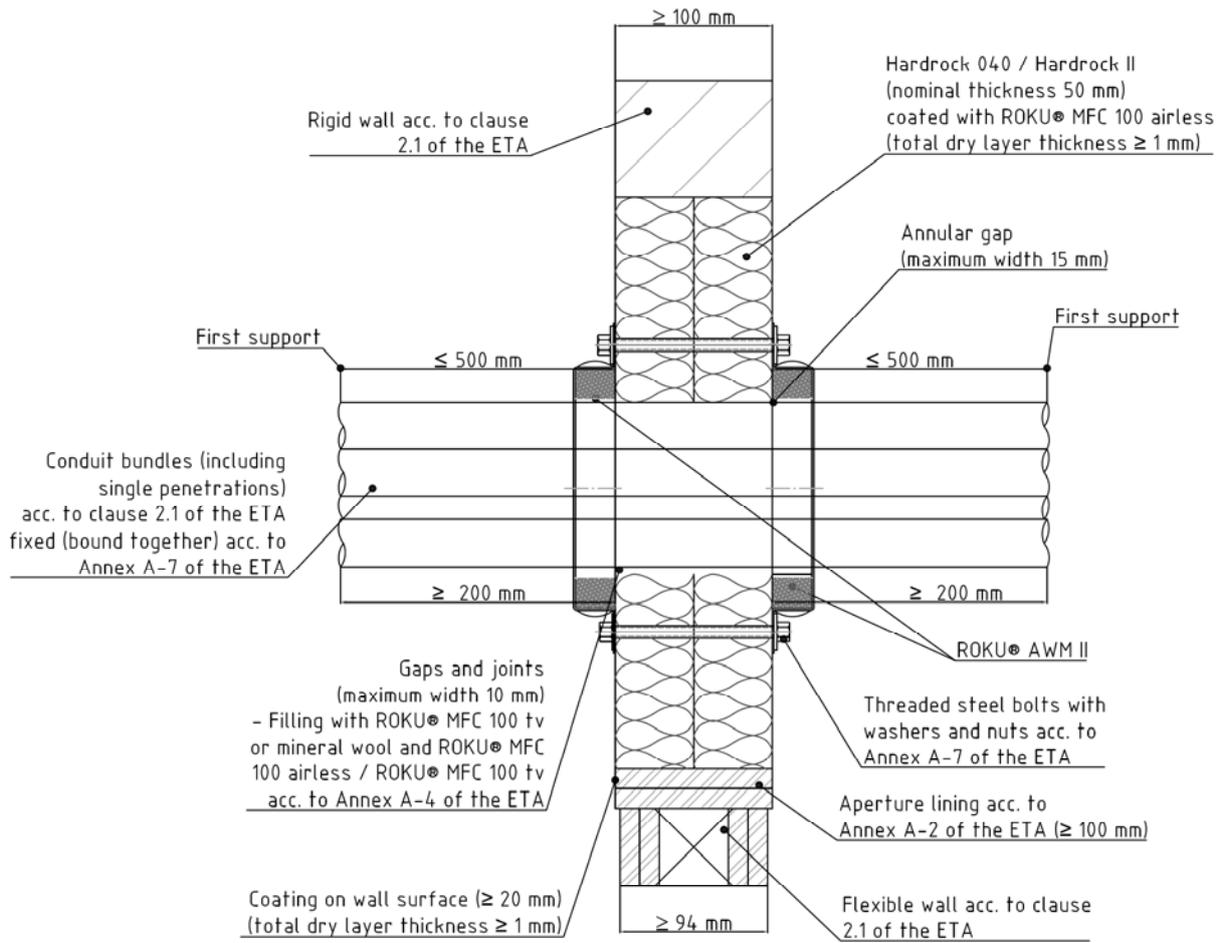
**ROKU® System MFS in flexible walls and rigid walls according to clause 2.1 of the ETA –
penetrated by plastic pipes according to clause 2.1 of the ETA equipped with “ROKU® AWM II”
– Installation drawing – sectional view**



ROKU® System MFS
- Installation in flexible wall and rigid wall -

ANNEX C-5

ROKU® System MFS in flexible walls and rigid walls according to clause 2.1 of the ETA – penetrated by conduit bundles (including single penetrations) according to clause 2.1 of the ETA equipped with “ROKU® AWM II” – Installation drawing – sectional view



ROKU® System MFS
- Installation in flexible wall and rigid wall -

ANNEX C-6

ROKU® System MFS penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with “AF/Armaflex” (local-sustained LS or continued-sustained CS) and wrapped with “ROKU® Strip” (two strips; width 100 mm – on both sides of the penetration seal; two layers – overall thickness 3,0 mm) – installed in flexible walls and rigid walls acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: “AF/Armaflex” and “ROKU® Strip”	Fire resistance classification
Copper pipes:		
Outer diameter 10 mm Wall thickness 1,0 mm to 14,2 mm	AF/Armaflex – AF-2 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 11,0 mm	EI 90-C/U E 90-C/U
Outer diameter > 10 mm to 28 mm Wall thickness 1,0 mm to 14,2 mm	AF/Armaflex – AF-2 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 11,0 mm to 12,5 mm	EI 90-C/U E 90-C/U
Outer diameter > 28 mm to 54 mm Wall thickness 1,5 mm to 14,2 mm	AF/Armaflex – AF-4 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 19,0 mm to 21,0 mm	EI 90-C/U E 90-C/U
Outer diameter > 54 mm to 89 mm Wall thickness 2,0 mm to 14,2 mm	AF/Armaflex – AF-6 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 38,5 mm to 41,5 mm	EI 90-C/U E 90-C/U

* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex E-1 of the ETA are allowed.

** required minimum insulation length (measured from the surface of the penetration seal)

ROKU® System MFS
- Fire resistance classification -

ANNEX D-2

ROKU® System MFS penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with mineral wool (e.g. “Lamellenmatte ML 3”) acc. to cl. 1 of the ETA (local-sustained LS) and wrapped with “ROKU® Strip” (two strips; width 100 mm – on both sides of the penetration seal; one layer – overall thickness 1,5 mm) – installed in flexible walls and rigid walls acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: Mineral wool (e.g. “Lamellenmatte ML 3”) acc. to cl. 1 of the ETA and “ROKU® Strip”	Fire resistance classification
Steel pipes:		
Outer diameter 10 mm Wall thickness 1,0 mm to 14,2 mm	Mineral wool: Length ≥ 550 mm**, on both sides of the penetration seal Thickness 20 mm	EI 90-C/U E 90-C/U
Outer diameter > 10 mm to 76 mm Wall thickness 2,6 mm to 14,2 mm	Mineral wool: Length ≥ 550 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Outer diameter > 76 mm to 160 mm Wall thickness 2,0 mm to < 4,0 mm	Mineral wool: Length ≥ 550 mm**, on both sides of the penetration seal Thickness 50 mm	EI 60-C/U E 90-C/U
Outer diameter > 76 mm to 160 mm Wall thickness 4,0 mm to 14,2 mm	Mineral wool: Length ≥ 550 mm**, on both sides of the penetration seal Thickness 50 mm	EI 90-C/U E 90-C/U
Note: The fire resistance class of “ROKU® System MFS” - when penetrated by steel pipes with classification EI 60-C/U / E 90-C/U - is EI 60 / E 90		
* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex E-2 of the ETA are allowed. ** required minimum insulation length (measured from the surface of the penetration seal)		
ROKU® System MFS - Fire resistance classification -		ANNEX D-3

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ROKU® System MFS penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with mineral wool (e.g. “Lamellenmatte ML 3”) acc. to cl. 1 of the ETA (continued-sustained CS) and wrapped with “ROKU® Strip” (two strips; width 100 mm – on both sides of the penetration seal; one layer – overall thickness 1,5 mm) – installed in flexible walls and rigid walls acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: Mineral wool (e.g. “Lamellenmatte ML 3”) acc. to cl. 1 of the ETA and “ROKU® Strip”	Fire resistance classification
Steel pipes:		
Outer diameter 10 mm Wall thickness 1,0 mm to 14,2 mm	Mineral wool: Length \geq 550 mm**, on both sides of the penetration seal Thickness 20 mm	EI 90-C/U E 90-C/U
Outer diameter > 10 mm to 76 mm Wall thickness 2,6 mm to 14,2 mm	Mineral wool: Length \geq 550 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Outer diameter > 76 mm to 160 mm Wall thickness 2,0 mm to 14,2 mm	Mineral wool: Length \geq 550 mm**, on both sides of the penetration seal Thickness 50 mm	EI 90-C/U E 90-C/U

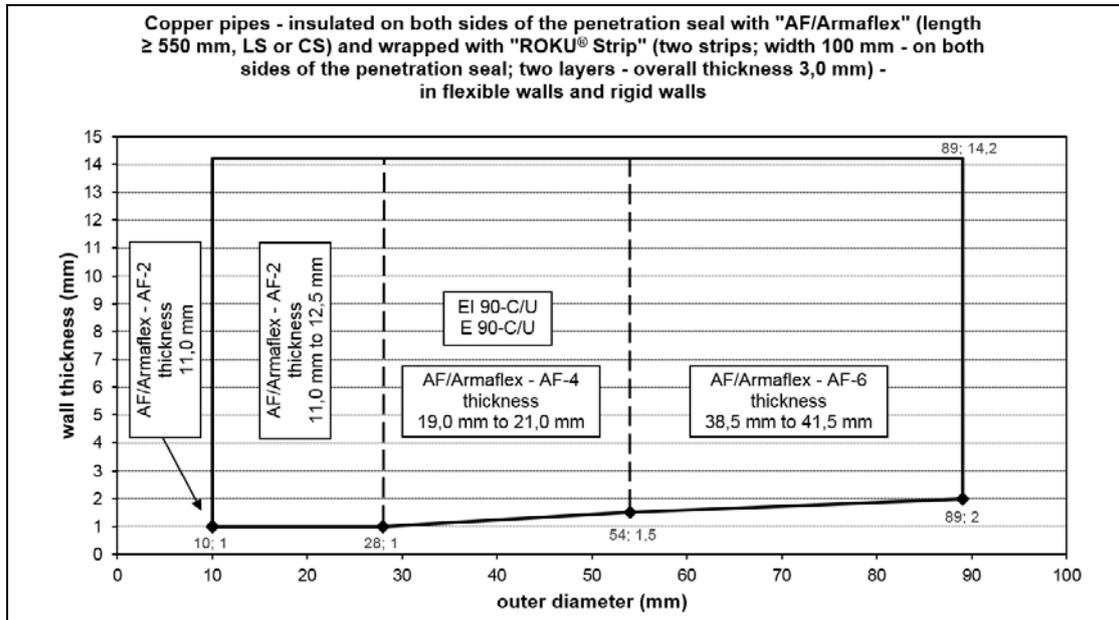
* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex E-2 of the ETA are allowed.
** required minimum insulation length (measured from the surface of the penetration seal)

ROKU® System MFS - Fire resistance classification -	ANNEX D-4
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ROKU® System MFS penetrated by plastic pipes acc. to cl. 2.1 of the ETA equipped on both sides of the penetration seal with “ROKU® AWM II” – installed in flexible walls and rigid walls acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: “ROKU® AWM II” <small>[dimensions of intumescent inlay [thickness (t_{ac}) x height (h)]]</small>	Fire resistance classification
PVC-U pipes:		
Outer diameter 32 mm to 50 mm Wall thickness 1,8 mm to 5,6 mm	6,4 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 1,8 mm to 12,3 mm	12,8 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 1,8 mm to 12,3 mm	19,2 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 2,5 mm to 11,4 mm	19,2 mm x 38,1 mm	EI 90-U/U E 90-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 3,2 mm to 11,9 mm	25,6 mm x 38,1 mm	EI 90-U/U E 90-U/U
Penetrating elements*	Additional precaution: “ROKU® AWM II” <small>[dimensions of intumescent inlay [thickness (t_{ac}) x height (h)]]</small>	Fire resistance classification
PE-HD pipes:		
Outer diameter 32 mm to 50 mm Wall thickness 1,8 mm to 4,6 mm	6,4 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 1,9 mm to 10,0 mm	12,8 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 2,7 mm to 10,0 mm	19,2 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 3,1 mm to 11,4 mm	19,2 mm x 38,1 mm	EI 90-U/U E 90-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 4,0 mm to 14,6 mm	25,6 mm x 38,1 mm	EI 90-U/U E 90-U/U
Penetrating elements*	Additional precaution: “ROKU® AWM II” <small>[dimensions of intumescent inlay [thickness (t_{ac}) x height (h)]]</small>	Fire resistance classification
PP pipes:		
Outer diameter 32 mm to 50 mm Wall thickness 1,8 mm to 4,6 mm	6,4 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 1,9 mm to 10,0 mm	12,8 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 2,7 mm to 10,0 mm	19,2 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 3,1 mm to 11,4 mm	19,2 mm x 38,1 mm	EI 90-U/U E 90-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 4,0 mm to 14,6 mm	25,6 mm x 38,1 mm	EI 90-U/U E 90-U/U

* Pipe diameters (outer diameters) and wall thicknesses as defined in Annex E-3 of the ETA are allowed.

ROKU® System MFS - Fire resistance classification -	ANNEX D-5
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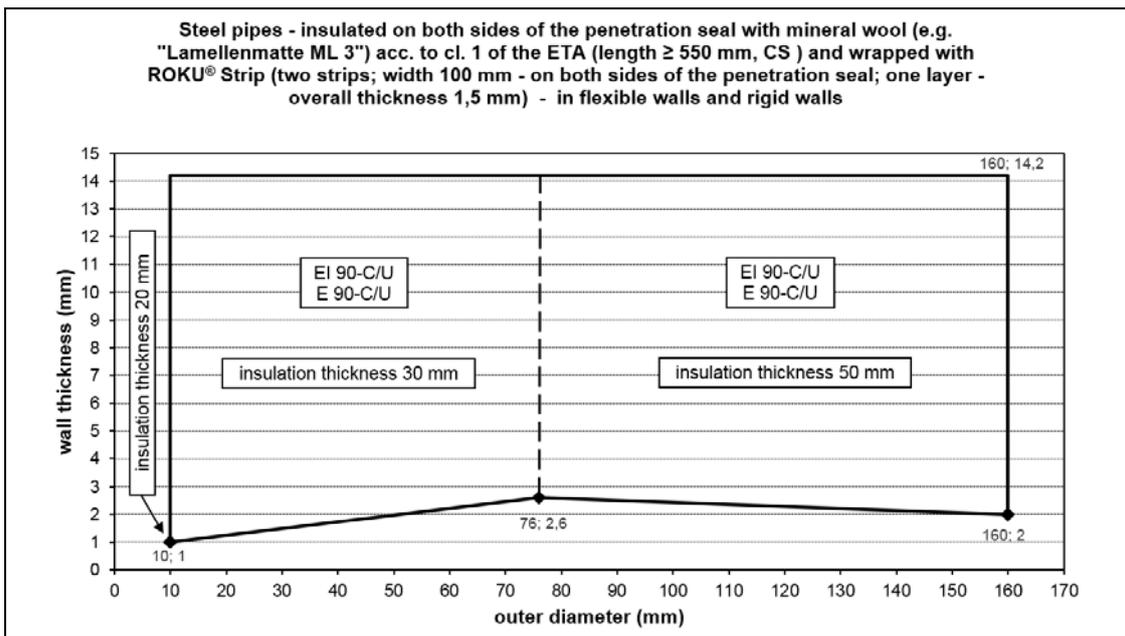
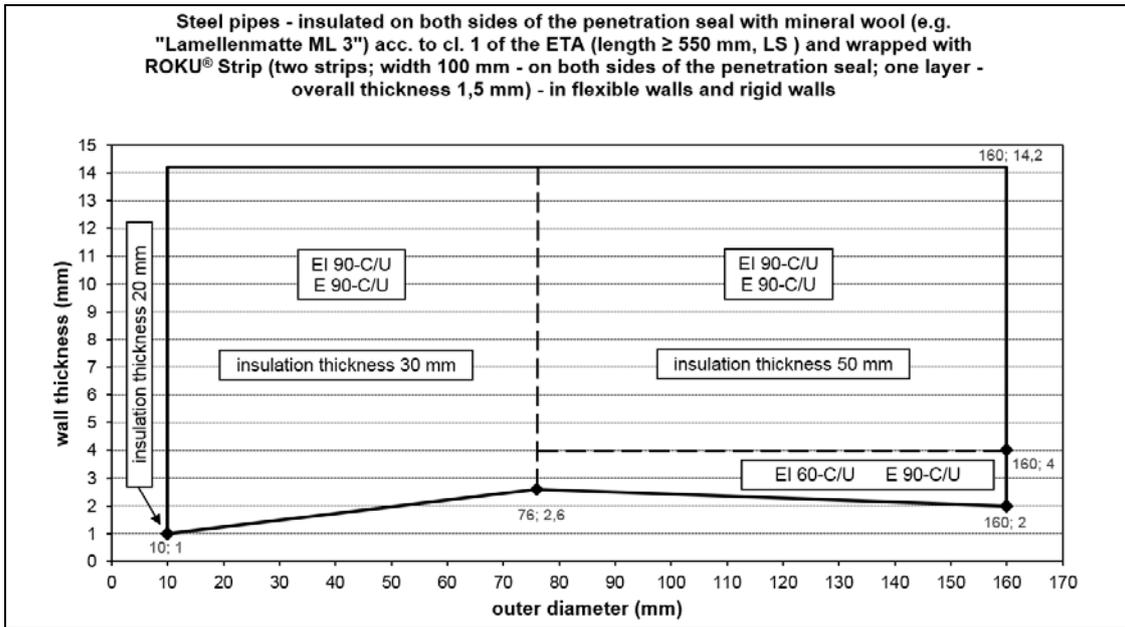
Note: The given graphs and therein enclosed fire resistance classes according to EN 13501-2:2007+A1:2009 are only valid for metal pipes according to clause 2.1 of the ETA.

Note: The dashed vertical lines mark the upper limits of the required insulation thickness.

Note: The dimensions of the graphs are not true to scale.

Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls and rigid walls

ANNEX E-1



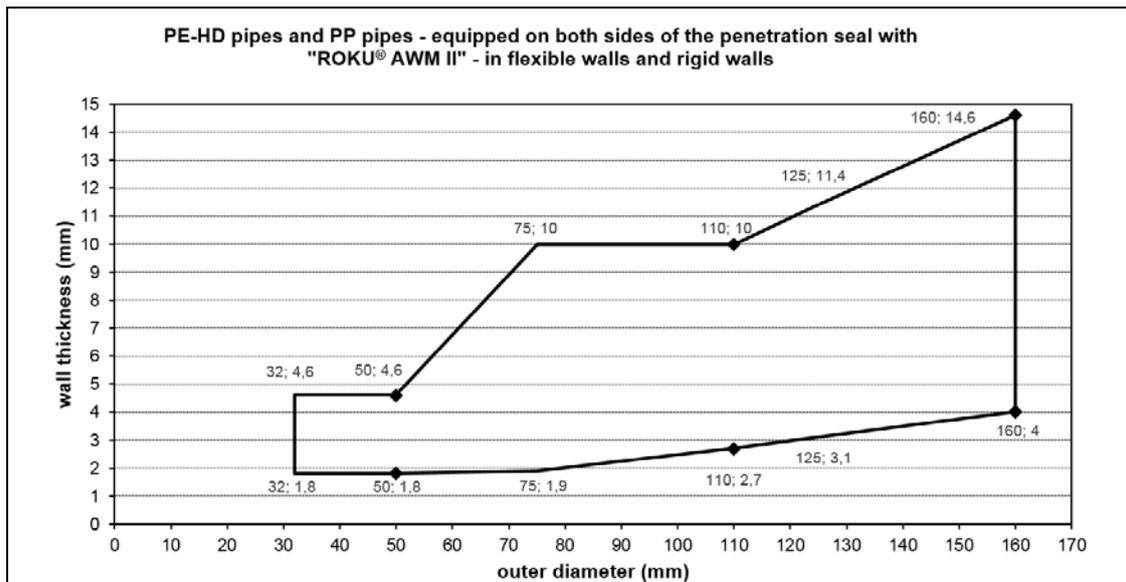
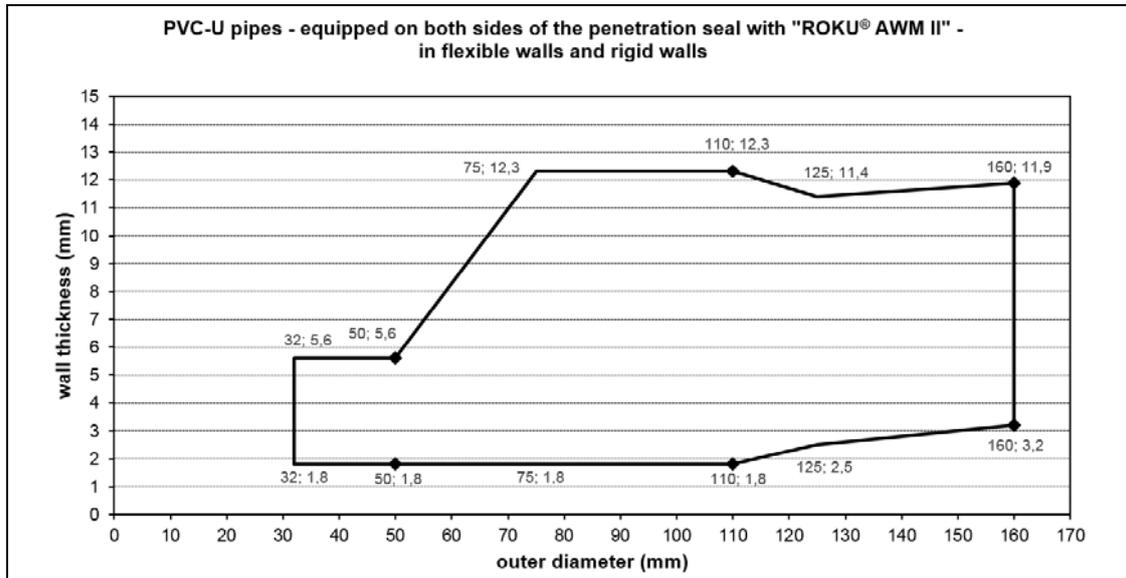
Note: The given graphs and therein enclosed fire resistance classes according to EN 13501-2:2007+A1:2009 are only valid for metal pipes according to clause 2.1 of the ETA.

Note: The dashed vertical lines mark the upper limits of the required insulation thickness. The dashed horizontal line marks the limit of the fire resistance classes.

Note: The dimensions of the graphs are not true to scale.

Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls and rigid walls

ANNEX E-2



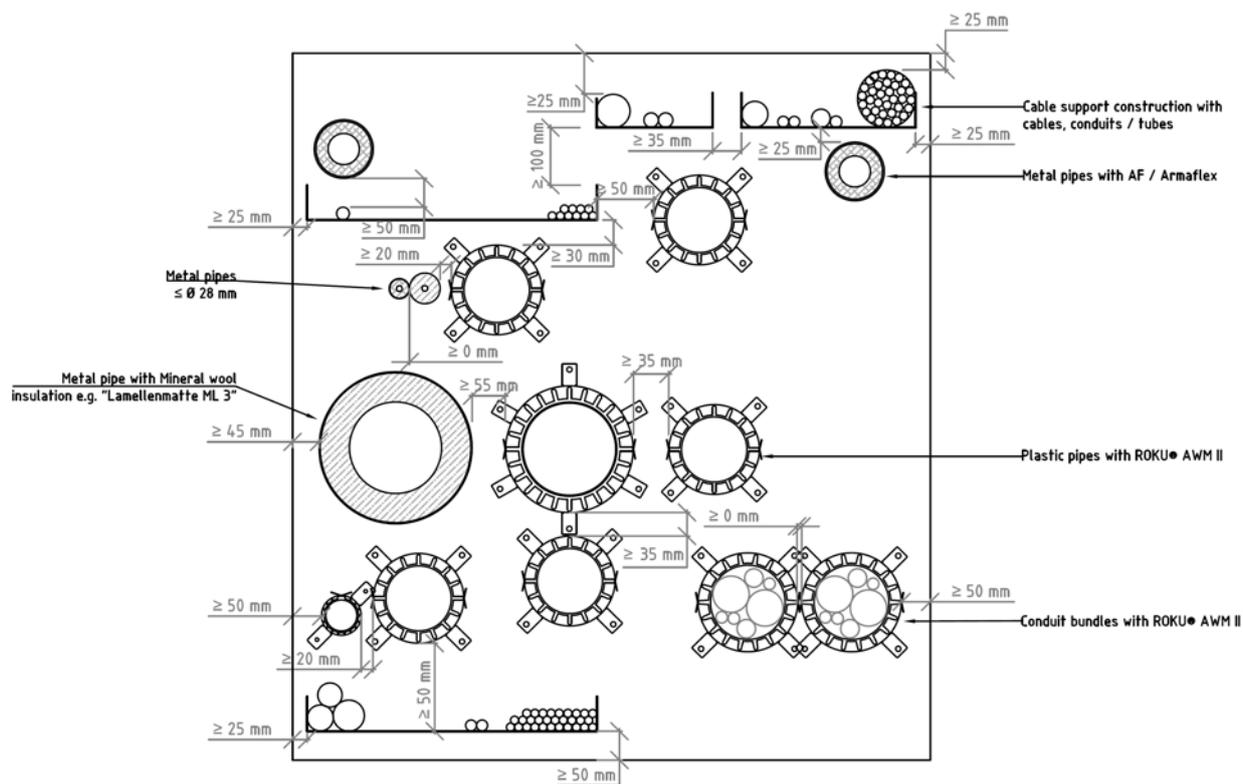
Note: The given graphs are only valid for plastic pipes according to clause 2.1 of the ETA.

Note: The dimensions of the graphs are not true to scale.

Interpolation between pipe diameters and wall thicknesses for plastic pipes according to clause 2.1 of the ETA in flexible walls and rigid walls

ANNEX E-3

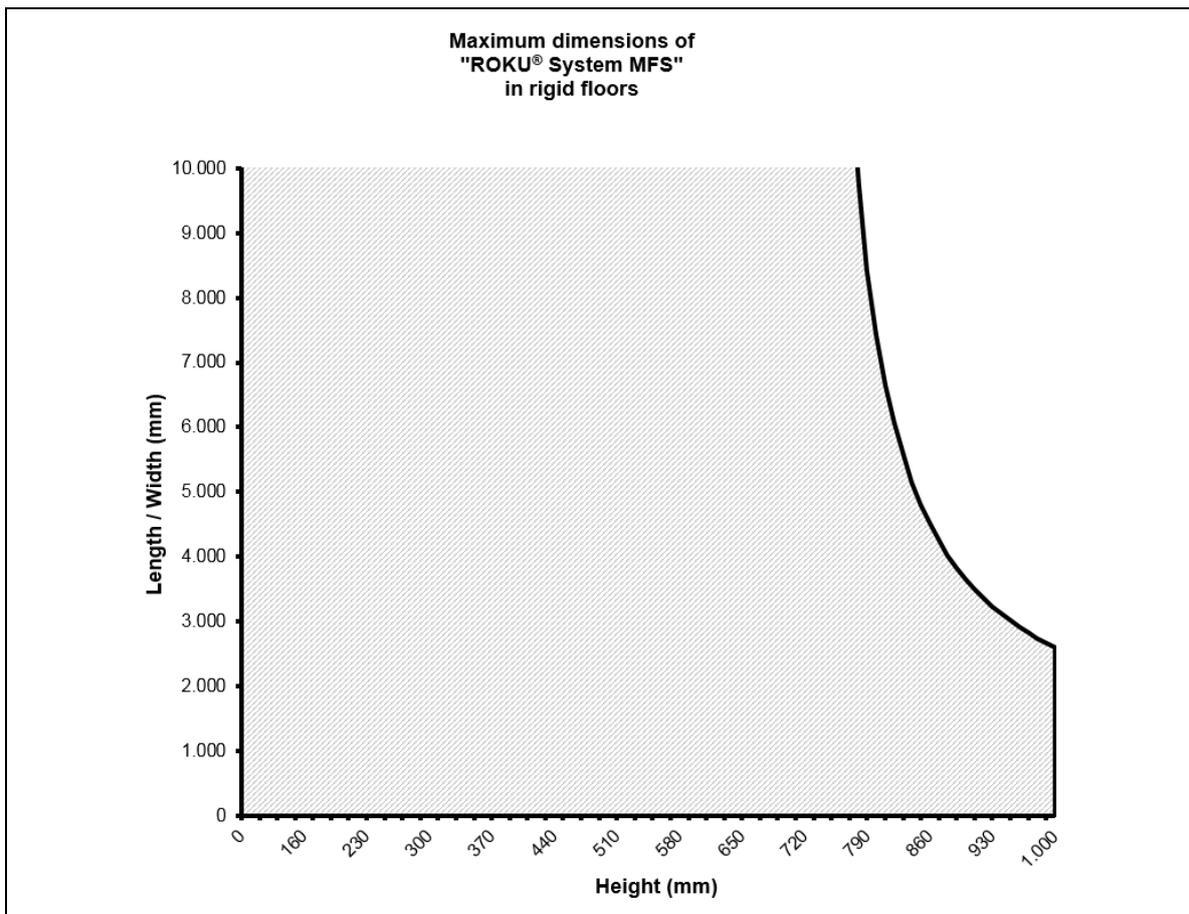
ROKU® System MFS in rigid floors according to clause 2.1 of the ETA – Minimum working clearances / Installation drawing – top view



Horizontal and vertical distances / minimum working clearances – regarding penetrating elements – not given in the installation drawing have to be ≥ 100 mm in practice.

ROKU® System MFS
- Installation in rigid floor -

ANNEX F-1



The maximum height of the penetration seal in rigid floors is 1000 mm.

The maximum length (width) of the penetration seal in rigid floors has to be calculated as follows:

$$Length \ (Width) = \frac{Height}{((c_{tested} / 2) * Height) - 1)}$$

$$c_{tested} = \frac{Perimeter \ length_{tested}}{Seal \ area_{tested}} = 2,769 \ m / m^2; \ resp. \ 0,002769 \ mm / mm^2$$

The minimum perimeter length to seal area ratio of the penetration seal in rigid floors is 2,769 m/m², resp. 0,002769 mm/mm².

c_{tested} was calculated from the dimensions of the tested penetration seal (2600 mm x 1000 mm).

The area on the left side of the graph gives an overview of all possible combinations of length (width) and height where the minimum perimeter length to seal area ratio is ≥ c_{tested}.

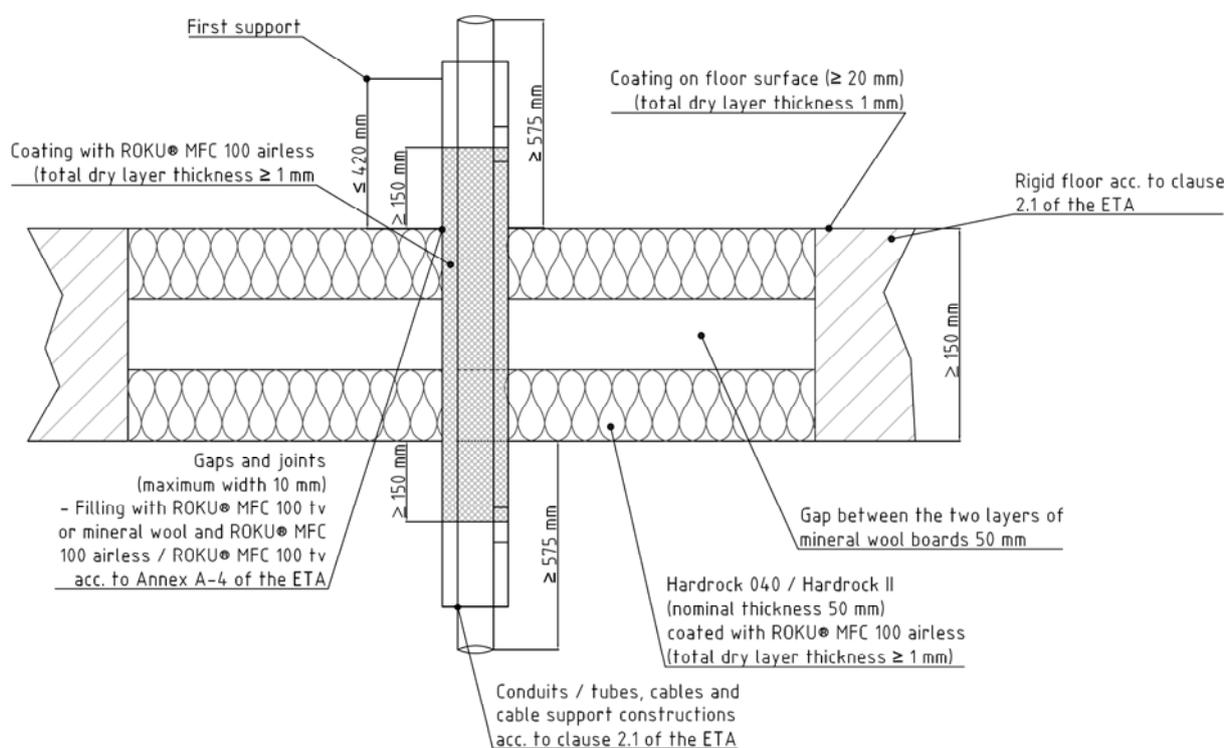
For a length (width) of e.g. 2600 mm the allowed height is 1000 mm; for a length (width) of e.g. 3500 mm the allowed height is 910 mm.

For a height smaller than 724 mm no limitation of length (width) is required.

Note: The dimensions of the graph are not true to scale.

<p>ROKU® System MFS</p> <p>- Installation in rigid floor – perimeter length to seal area ratio -</p>	<p>ANNEX F-2</p>
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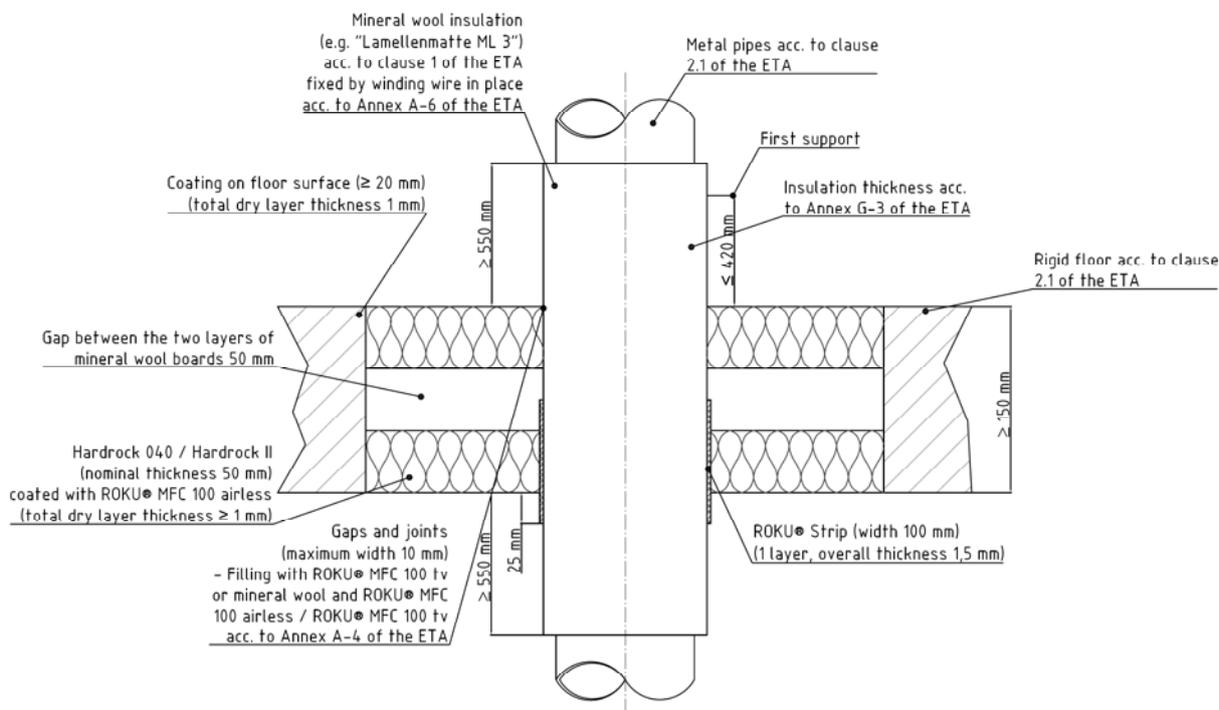
ROKU® System MFS in rigid floors according to clause 2.1 of the ETA – penetrated by cables and conduits / tubes according to clause 2.1 of the ETA – Installation drawing – sectional view



ROKU® System MFS
- Installation in rigid floor -

ANNEX F-3

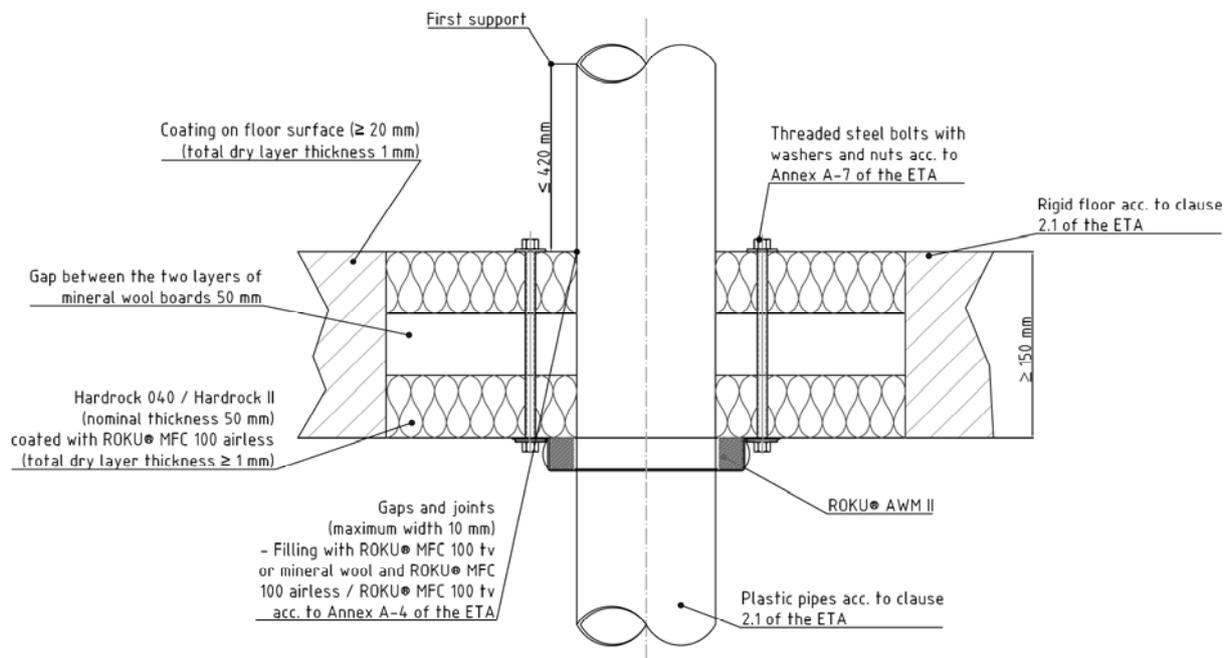
ROKU® System MFS in rigid floors according to clause 2.1 of the ETA – penetrated by metal pipes according to clause 2.1 of the ETA insulated with mineral wool (e.g. “Lamellenmatte ML 3”) according to clause 1 of the ETA and wrapped with “ROKU® Strip” – Installation drawing – sectional view



ROKU® System MFS
- Installation in rigid floor -

ANNEX F-5

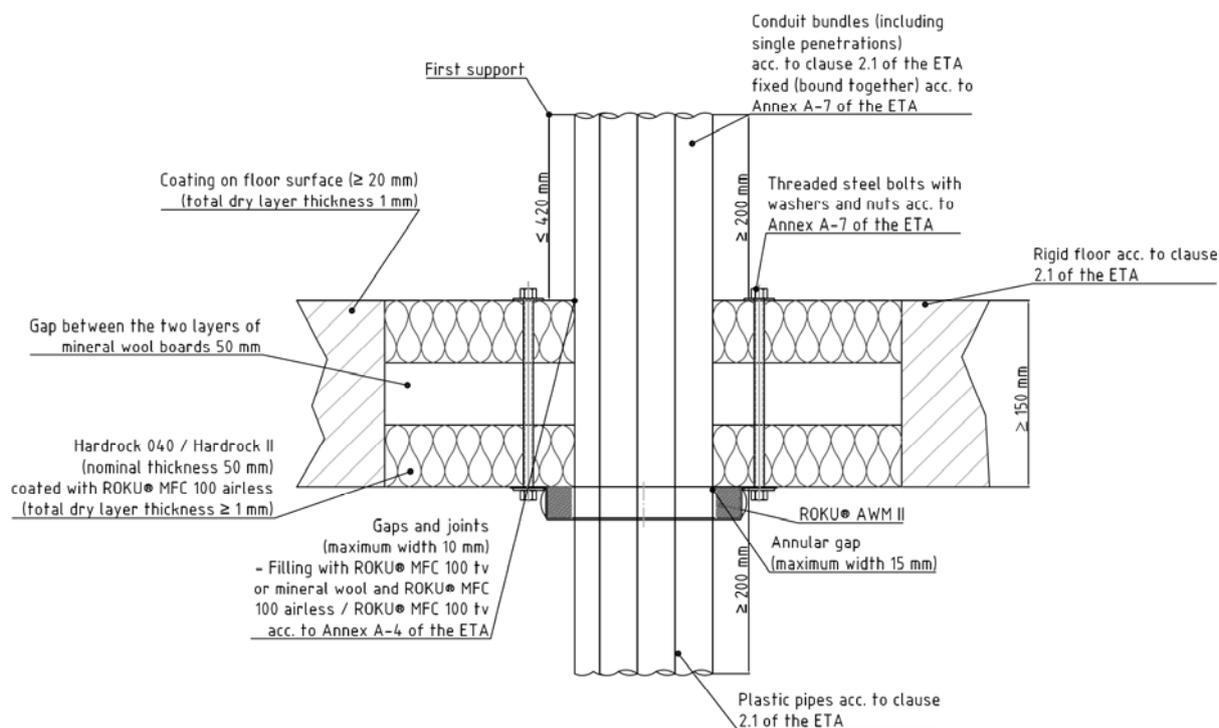
ROKU® System MFS in rigid floors according to clause 2.1 of the ETA – penetrated by plastic pipes according to clause 2.1 of the ETA equipped with “ROKU® AWM II” – Installation drawing – sectional view



ROKU® System MFS
- Installation in rigid floor -

ANNEX F-6

ROKU® System MFS in rigid floors according to clause 2.1 of the ETA – penetrated by conduit bundles (including single penetrations) according to clause 2.1 of the ETA equipped with “ROKU® AWM II” – Installation drawing – sectional view



ROKU® System MFS
- Installation in rigid floor -

ANNEX F-7

ROKU® System MFS penetrated by cables and / or conduits / tubes acc. to cl. 2.1 of the ETA – installed in rigid floors acc. to cl. 2.1 of the ETA	
Penetrating elements	Fire resistance classification
All types of sheathed cables (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 80 mm	EI 120 E 120
Tied bundles up to 100 mm overall diameter containing sheathed cables (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 21 mm	
Non-sheathed electrical cables with a diameter ≤ 24 mm	
Steel conduits / tubes, Ø ≤ 16 mm (without cables): steel conduits according to EN 61386-21 and / or EN 10305-4 or -6	
Plastic conduits, Ø ≤ 16 mm (without cables) according to EN 61386-21	
Plastic conduits, Ø ≤ 32 mm (with / without cables Ø ≤ 21 mm) according to EN 61386-22, wall thickness 0,3 mm to 0,8 mm (for polyolefine) or 0,3 mm to 0,6 mm (for PVC-U)	EI 90 E 90
Bundles of plastic conduits* (with / without cables Ø ≤ 21 mm) with a maximum outer diameter ≤ 115 mm: conduits acc. to EN 61386-22 with Ø 16 mm to 63 mm, wall thickness 0,3 mm to 0,8 mm (for polyolefine) or 0,3 mm to 0,6 mm (for PVC-U)	
Note: The fire resistance class of “ROKU® System MFS” - when penetrated by plastic conduits or conduit bundles with classification EI 90 / E 90 - is EI 90 / E 90	
* equipped at the bottom side of the penetration seal with “ROKU® AWM II”	
ROKU® System MFS - Fire resistance classification -	
ANNEX G-1	

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ROKU® System MFS penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with “AF/Armaflex” (local-sustained LS or continued-sustained CS) and wrapped with “ROKU® Strip” (one strip; width 100 mm – at the bottom side of the penetration seal; two layers – overall thickness 3,0 mm) – installed in rigid floors acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: “AF/Armaflex” and “ROKU® Strip”	Fire resistance classification
Copper pipes:		
Outer diameter 10 mm Wall thickness 1,0 mm to 14,2 mm	AF/Armaflex – AF-2 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 11,0 mm	EI 120-C/U E 120-C/U
Outer diameter > 10 mm to 28 mm Wall thickness 1,0 mm to 14,2 mm	AF/Armaflex – AF-2 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 11,0 mm to 12,5 mm	EI 120-C/U E 120-C/U
Outer diameter > 28 mm to 54 mm Wall thickness 1,5 mm to 14,2 mm	AF/Armaflex – AF-4 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 19,0 mm to 21,0 mm	EI 120-C/U E 120-C/U
Outer diameter > 54 mm to 89 mm Wall thickness 2,0 mm to 14,2 mm	AF/Armaflex – AF-6 (tube): Length ≥ 550 mm**, on both sides of the penetration seal Thickness 38,5 mm to 41,5 mm	EI 120-C/U E 120-C/U

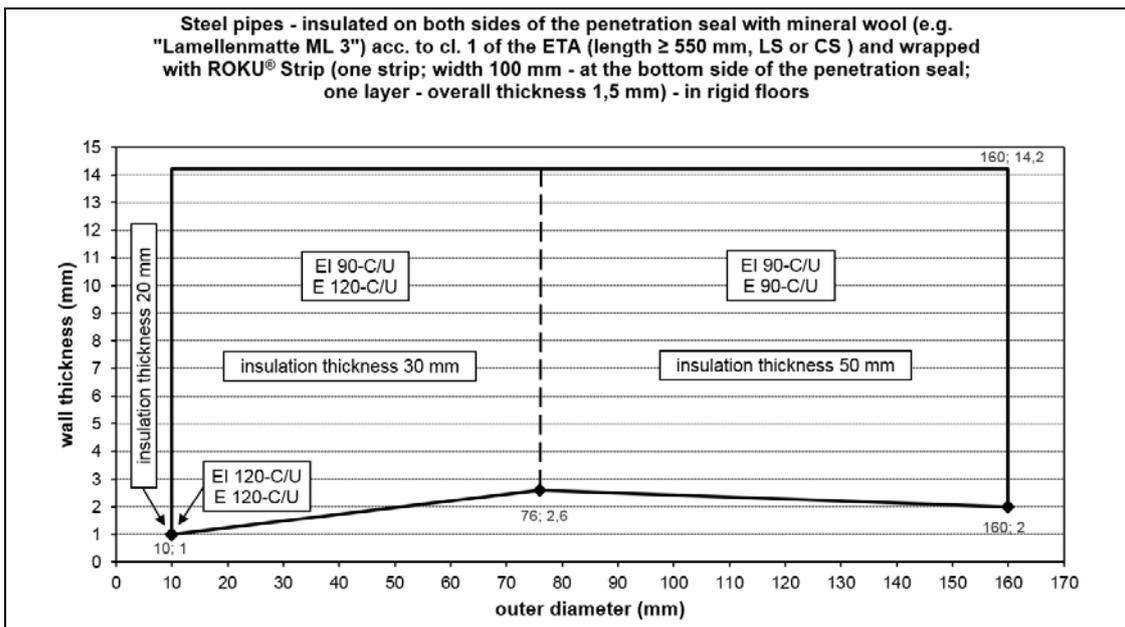
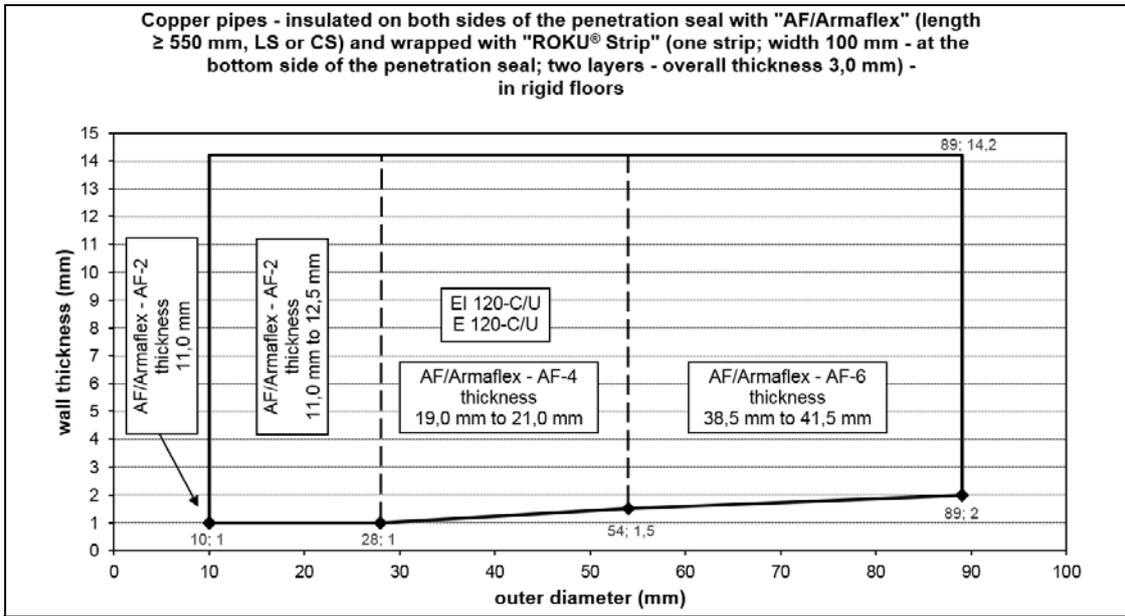
* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex H-1 of the ETA are allowed.
** required minimum insulation length (measured from the surface of the penetration seal)

ROKU® System MFS - Fire resistance classification -	ANNEX G-2
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ROKU® System MFS penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with mineral wool (e.g. “Lamellenmatte ML 3”) acc. to cl. 1 of the ETA (local-sustained LS or continued-sustained CS) and wrapped with “ROKU® Strip” (one strip; width 100 mm – at the bottom side of the penetration seal; one layer – overall thickness 1,5 mm) – installed in rigid floors acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: Mineral wool (e.g. “Lamellenmatte ML 3”) acc. to cl. 1 of the ETA and “ROKU® Strip”	Fire resistance classification
Steel pipes:		
Outer diameter 10 mm Wall thickness 1,0 mm to 14,2 mm	Mineral wool: Length \geq 550 mm**, on both sides of the penetration seal Thickness 20 mm	EI 120-C/U E 120-C/U
Outer diameter > 10 mm to 76 mm Wall thickness 2,6 mm to 14,2 mm	Mineral wool: Length \geq 550 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
Outer diameter > 76 mm to 160 mm Wall thickness 2,0 mm to < 4,0 mm	Mineral wool: Length \geq 550 mm**, on both sides of the penetration seal Thickness 50 mm	EI 90-C/U E 90-C/U
<p>Note: The fire resistance class “ROKU® System MFS” - when penetrated by steel pipes with classification EI 90-C/U / E 120-C/U - is EI 90 / E 120 The fire resistance class of “ROKU® System MFS” - when penetrated by steel pipes with classification EI 90-C/U / E 90-C/U - is EI 90 / E 90</p>		
<p>* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex H-1 of the ETA are allowed. ** required minimum insulation length (measured from the surface of the penetration seal)</p>		
<p>ROKU® System MFS - Fire resistance classification -</p>		<p>ANNEX G-3</p>

ROKU® System MFS penetrated by plastic pipes acc. to cl. 2.1 of the ETA equipped at the bottom side of the penetration seal with “ROKU® AWM II” – installed in rigid floors acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: “ROKU® AWM II” <small>[dimensions of intumescent inlay [thickness (t_{ac}) x height (h)]]</small>	Fire resistance classification
PVC-U pipes:		
Outer diameter 32 mm to 50 mm Wall thickness 1,8 mm to 5,6 mm	6,4 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 1,8 mm	12,8 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 50 mm to 75 mm Wall thickness > 1,8 mm to 12,3 mm	12,8 mm x 25,4 mm	EI 90-U/U E 120-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 1,8 mm	19,2 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 75 mm to 110 mm Wall thickness > 1,8 mm to 12,3 mm	19,2 mm x 25,4 mm	EI 90-U/U E 120-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 2,5 mm	19,2 mm x 38,1 mm	EI 120-U/U E 120-U/U
Outer diameter > 110 mm to 125 mm Wall thickness > 2,5 mm to 11,4 mm	19,2 mm x 38,1 mm	EI 90-U/U E 120-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 3,2 mm to 11,9 mm	25,6 mm x 38,1 mm	EI 120-U/U E 120-U/U
Penetrating elements*		
PE-HD pipes:		
<small>[dimensions of intumescent inlay [thickness (t_{ac}) x height (h)]]</small>		
Outer diameter 32 mm to 50 mm Wall thickness 1,8 mm to 4,6 mm	6,4 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 1,9 mm to 10,0 mm	12,8 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 2,7 mm to 10,0 mm	19,2 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 3,1 mm to < 11,4 mm	19,2 mm x 38,1 mm	EI 90-U/U E 90-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 11,4 mm	19,2 mm x 38,1 mm	EI 120-U/U E 120-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 4,0 mm to < 14,6 mm	25,6 mm x 38,1 mm	EI 90-U/U E 90-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 14,6 mm	25,6 mm x 38,1 mm	EI 120-U/U E 120-U/U
Note: The fire resistance class of “ROKU® System MFS” - when penetrated by PVC-U pipes with classification EI 90-U/U / E 120-U/U - is EI 90 / E 120 The fire resistance class of “ROKU® System MFS” - when penetrated by PE-HD pipes with classification EI 90-U/U / E 90-U/U - is EI 90 / E 90		
* Pipe diameters (outer diameters) and wall thicknesses as defined in Annex H-2 of the ETA are allowed.		
ROKU® System MFS - Fire resistance classification -		ANNEX G-4

ROKU® System MFS penetrated by plastic pipes acc. to cl. 2.1 of the ETA equipped at the bottom side of the penetration seal with “ROKU® AWM II” – installed in rigid floors acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: “ROKU® AWM II” <small>[dimensions of intumescent inlay [thickness (t_{ac}) x height (h)]</small>	Fire resistance classification
PP pipes:		
Outer diameter 32 mm to 50 mm Wall thickness 1,8 mm to < 4,6 mm	6,4 mm x 25,4 mm	EI 60-U/U E 120-U/U
Outer diameter 32 mm to 50 mm Wall thickness 4,6 mm	6,4 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 1,9 mm to < 10,0 mm	12,8 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 50 mm to 75 mm Wall thickness 10,0 mm	12,8 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 2,7 mm to < 10,0 mm	19,2 mm x 25,4 mm	EI 90-U/U E 90-U/U
Outer diameter > 75 mm to 110 mm Wall thickness 10,0 mm	19,2 mm x 25,4 mm	EI 120-U/U E 120-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 3,1 mm to < 11,4 mm	19,2 mm x 38,1 mm	EI 90-U/U E 90-U/U
Outer diameter > 110 mm to 125 mm Wall thickness 11,4 mm	19,2 mm x 38,1 mm	EI 120-U/U E 120-U/U
Outer diameter > 125 mm to 160 mm Wall thickness 4,0 mm to 14,6 mm	25,6 mm x 38,1 mm	EI 120-U/U E 120-U/U
<p>Note: The fire resistance class of “ROKU® System MFS” - when penetrated by PP pipes with classification EI 60-U/U / E 120-U/U - is EI 60 / E 120 The fire resistance class of “ROKU® System MFS” - when penetrated by PP pipes with classification EI 90-U/U / E 90-U/U - is EI 90 / E 90</p>		
* Pipe diameters (outer diameters) and wall thicknesses as defined in Annex H-2 of the ETA are allowed.		
ROKU® System MFS - Fire resistance classification -		ANNEX G-5



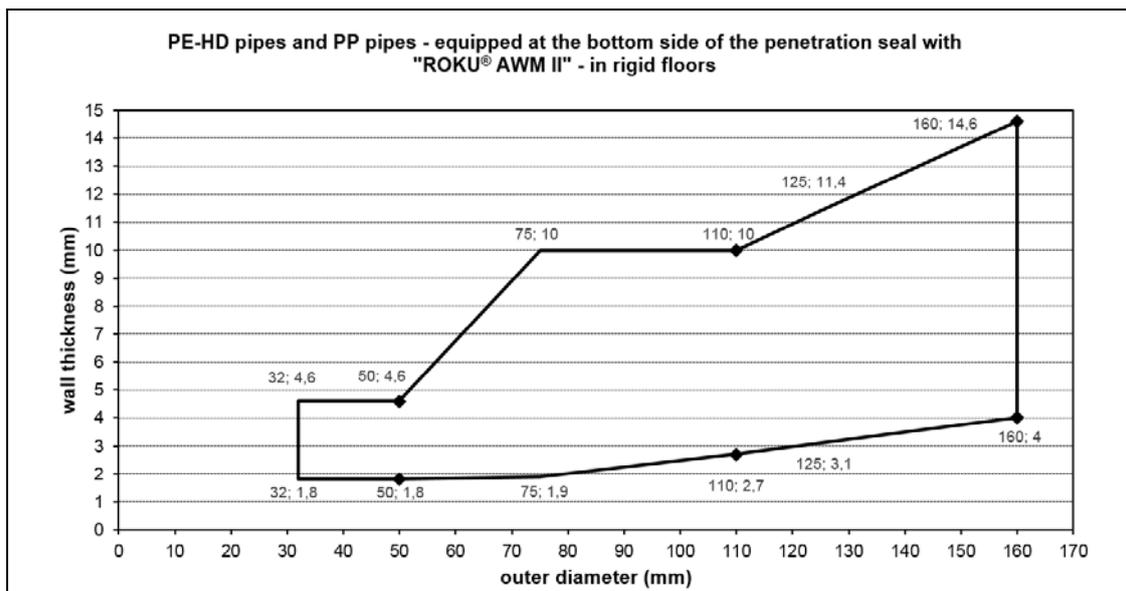
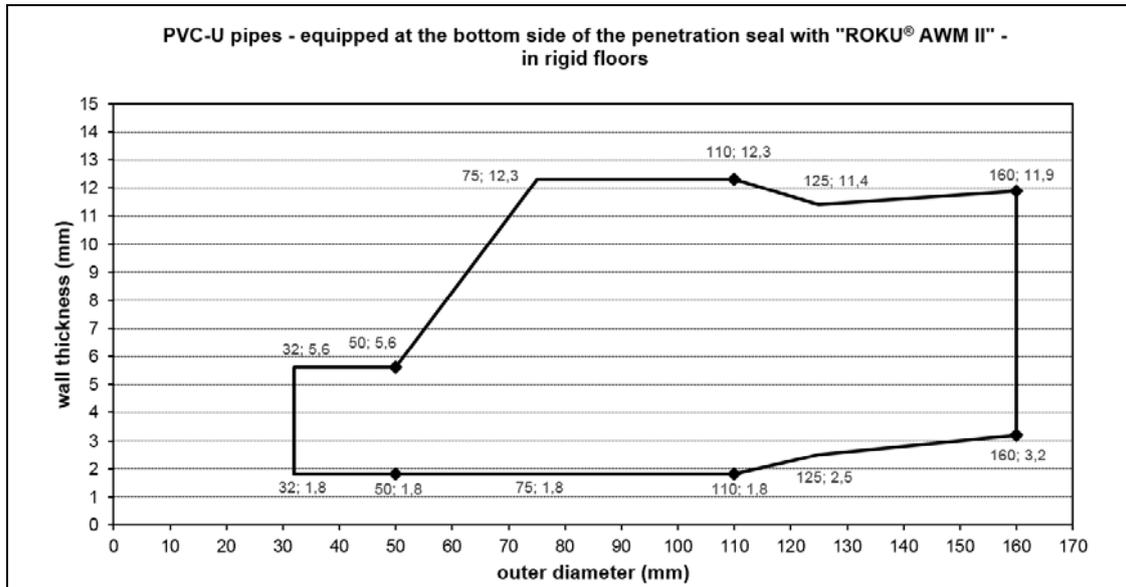
Note: The given graphs and therein enclosed fire resistance classes according to EN 13501-2:2007+A1:2009 are only valid for metal pipes according to clause 2.1 of the ETA.

Note: The dashed vertical lines mark the upper limits of the required insulation thickness as well as the limit of the fire resistance classes.

Note: The dimensions of the graphs are not true to scale.

Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in rigid floors

ANNEX H-1



Note: The given graphs are only valid for plastic pipes according to clause 2.1 of the ETA.

Note: The dimensions of the graphs are not true to scale.

Interpolation between pipe diameters and wall thicknesses for plastic pipes according to clause 2.1 of the ETA in rigid floors

ANNEX H-2

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