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European Technical Assessment

ETA-14/0480
of 16/01/2015

General part

Technical Assessment Body issuing the ETA

Österreichisches Institut für Bautechnik

Trade name of the construction product

System KBS Kombischott INT
System KBS Mixed Penetration Seal INT

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products:
Penetration Seals

Manufacturer

BASF Personal Care and Nutrition GmbH
Robert-Hansen-Straße 1
89257 Illertissen
GERMANY

Manufacturing plant

BASF Personal Care and Nutrition GmbH
Robert-Hansen-Straße 1
89257 Illertissen
GERMANY

This European Technical Assessment contains

40 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

“System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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 “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT)	Characteristics
KBS Foamcoat	Intumescent fire stop coating – filled in buckets
KBS Foamcoat HS	Intumescent fire stop mastic – filled in buckets or cartridges
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 60 mm, a nominal apparent density of 159 kg/m ³ and a melting point ≥ 1000 °C according to DIN 4102-17
KBS Pipe Seal SN	Pipe collar according to Annex B of the ETA with coated sheet steel housing and an inlay made of intumescent material

Insulations (additional components)	Characteristics
Rockwool 800	Pipe section according to EN 14303 made from stone wool with classification A2 _L -s1,d0 according to EN 13501-1, a nominal apparent density of 90 kg/m ³ to 115 kg/m ³ and a melting point ≥ 1000 °C according to DIN 4102-17, covered with reinforced aluminium foil with a self-adhesive tape (reinforced aluminium foil has to be removed – see Annex A-4 of the ETA) from manufacturer “DEUTSCHE ROCKWOOL Mineralwoll GmbH & Co. OHG”

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

2.1 Intended use

“System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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 120 mm (two layers of mineral wool boards according to clause 1 of the ETA with a nominal thickness of 60 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 60 mm and a gap width of 30 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 – 3,611 m/m², resp. 0,003611 mm/mm².

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

“System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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: ≥ 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 	1200 mm x 1200 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 	1200 mm x 1200 mm

Separating element	Construction	Maximum opening size of the penetration seal (width x height)
Rigid floors	<ul style="list-style-type: none"> > Aerated concrete, concrete > Minimum density 650 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

“System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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 “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) in flexible walls and rigid walls
Cables	<ul style="list-style-type: none"> > All types of sheathed cables¹ (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 80 mm > Tied bundles² 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 ≤ 15 mm
Conduits / tubes	<ul style="list-style-type: none"> > “Synflex 1300” from manufacturer “EATON Industries GmbH” or “SERTOflex 12 S” from manufacturer “SERTO GmbH” with a diameter of 12 mm and a wall thickness of 1,9 mm (without cables) > “PVC-Spezial-Pneumatikschlauch” from manufacturer “Riegler & Co. KG” with a diameter of 12 mm and a wall thickness of 1,3 mm (without cables)
Plastic pipes	<ul style="list-style-type: none"> > PVC-U pipes according to EN ISO 1452-1 and DIN 8061 / DIN 8062 with diameters and wall thicknesses as defined in Annex D-3 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-2 of the ETA. > PE-HD pipes according to EN 1519-1 and DIN 8074 / DIN 8075 with diameters and wall thicknesses as defined in Annex D-3 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-2 of the ETA.

¹ Single or multicore cable with individual insulation of the cores and an additional protective covering of the assembly

² Several cables running in the same direction, densely packed and bound tightly together by mechanical means

Penetrating element	Construction characteristics of the penetrating element in “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) in flexible walls and rigid walls
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 (945 °C for EI 60; 1006 °C for EI 90) and a thermal conductivity smaller or equal than copper with diameters and wall thicknesses as defined in Annex D-2 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-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 (945 °C for EI 60; 1006 °C for EI 90) and a thermal conductivity smaller or equal than steel with diameters and wall thicknesses as defined in Annex D-2 of the ETA. For interpolation between pipe diameters and wall thicknesses see Annex E-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

Penetrating element	Construction characteristics of the penetrating element in “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) in rigid floors
Cables	<ul style="list-style-type: none"> > All types of sheathed cables³ (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 80 mm > Tied bundles⁴ 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 ≤ 15 mm
Conduits / tubes	<ul style="list-style-type: none"> > “Synflex 1300” from manufacturer “EATON Industries GmbH” or “SERTOflex 12 S” from manufacturer “SERTO GmbH” with a diameter of 12 mm and a wall thickness of 1,9 mm (without cables) > “PVC-Spezial-Pneumatikschlauch” from manufacturer “Riegler & Co. KG” with a diameter of 12 mm and a wall thickness of 1,3 mm (without cables)
Plastic pipes	<ul style="list-style-type: none"> > PVC-U pipes according to EN ISO 1452-1 and DIN 8061 / DIN 8062 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-2 of the ETA. > PE-HD pipes according to EN 1519-1 and DIN 8074 / DIN 8075 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-2 of the ETA.

³ Single or multicore cable with individual insulation of the cores and an additional protective covering of the assembly

⁴ Several cables running in the same direction, densely packed and bound tightly together by mechanical means

Penetrating element	Construction characteristics of the penetrating element in “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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 (945 °C for EI 60; 1006 °C for EI 90) 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 (945 °C for EI 60; 1006 °C for EI 90) and a thermal conductivity smaller or equal than steel 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.
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

“System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) is intended for use in internal conditions with humidity lower than 85 % RH excluding temperatures below 0 °C, without exposure to rain or UV, and can therefore – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Z₂.

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 “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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.

2.4 General assumptions

2.4.1 It is assumed that

- > damages to the penetration seal are repaired accordingly,
- > the installation of the penetration seal does not effect the stability of the adjacent building element – even in case of fire,
- > the lintel or floor above the penetration seal is designed structurally and in terms of fire protection such that no additional mechanical load (other than its own weight) is imposed on the penetration seal,
- > the aperture lining within a flexible wall is supported by the studs (transoms and mullions) in such a way that the mechanical load imposed to the aperture lining by the penetration seal does not affect the stability of the aperture lining and the flexible wall,
- > the thermal movement in the pipe work will be accommodated in such way that it does not impose a load on the penetration seal,
- > the installations are fixed to the adjacent building element in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed to the penetration seal,
- > the support of the installations is maintained for the required period of fire resistance and
- > pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire.

2.4.2 This European Technical Assessment does not address any risks associated with the emission of dangerous liquids or gases caused by failure of the pipe(s) in case of fire nor does it prove the prevention of the transmission of fire through heat transfer via the medium in the pipes.

2.4.3 This European Technical Assessment does not verify the prevention of destruction of adjacent building elements with fire separating function or of the pipes themselves due to distortion forces caused by extreme temperatures. These risks shall be accounted for by taking appropriate measures when designing or installing the pipe work.

The mounting or hanging of the pipes or the layout of the pipe work shall be implemented in such a way that the pipes and the fire resistant building elements shall remain functional within a period of time which corresponds to the fire resistance period required.

2.4.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this European Technical Assessment (see EN 1366-3:2009, clause 1).

2.4.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through the pipe walls.

2.4.6 The assessment does not cover the avoidance of destruction of the penetration seal or of the adjacent building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

2.5 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with the Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to the Österreichisches Institut für Bautechnik before the changes are introduced.

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-3 and Annex G-1 to G-3 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 "System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) 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
KBS Foamcoat	E
KBS Foamcoat HS	E
Hardrock 040 / Hardrock II	A1
KBS Pipe Seal SN	E

The sheet steel housing of "KBS Pipe Seal SN" is classified Class A1 according to Commission Decision 96/603/EC⁵.

3.2.2 Resistance to fire

"System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) was tested according to ETAG 026-Part 2 clause 2.4.2 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 EN 1366-3:2009 the cable- and/or pipe penetration seal (mixed penetration seal) "System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex D-1 to D-3 and Annex G-1 to G-3 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-3 and Annex G-1 to G-3 of the ETA is only valid if "System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) is installed according to Annex A-1 to A-6 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.

⁵ 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 "System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) 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 above the acceptable limits.

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 "System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) fulfil the requirements for the intended use category.

"System KBS Kombischott INT" (System KBS Mixed Penetration Seal INT) is therefore appropriate for use in internal conditions with humidity lower than 85 % RH excluding temperatures below 0 °C, without exposure to rain or UV, and can – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Z₂.

It is assumed that the sheet steel housing of "KBS Pipe Seal SN" 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/EC⁶, amended by Decision 2001/596/EC⁷ 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 documentation⁸ 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 plan⁹ 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.

⁶ Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

⁷ Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

⁸ 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.

⁹ 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.

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by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

1 General

- > “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) 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 and Annex A-5 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.
- > Conduits / tubes were tested U/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 or 1006 °C for EI 90 (e.g. stainless steel or galvanized steel) according to the ETA-holder’s installation instructions.

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Details for installation -

ANNEX A-1

- > Steel cable trays (perforated or non-perforated) or steel ladders (thickness of the steel minimum 1,5 mm when passing through) can pass through or end at the surface of the penetration seal.
- > Lidded cable trays / trunkings must not pass through the penetration seal.
- > The length of the steel cable trays (perforated or non-perforated) or steel ladders has to be minimum 500 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 250 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 250 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.

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Details for installation -

ANNEX A-2

- > 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.

2
Details for installation of “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) (see Annex B to H-2 of the ETA)

- > “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) (including all additional precautions as described in Annex A-4 and Annex A-5 of the ETA) has to be installed according to the ETA-holder's installation instructions.
- > For the installation of “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) two layers of mineral wool boards according to clause 1 of the ETA (“Hardrock 040” / “Hardrock II”) with a nominal thickness of 60 mm have to be used.
- > In vertical separating elements with a thickness of 94 mm to 120 mm the two layers of mineral wool boards have to be installed centred within the separating element. In vertical separating elements with a thickness > 120 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 30 mm.
- > All edges of the mineral wool boards “Hardrock 040” / “Hardrock II” as well as the reveal of the aperture in the area of the mineral wool boards have to be coated with “KBS Foamcoat” with a thickness of minimum 1 mm (wet layer thickness).
- > All mineral wool boards “Hardrock 040” / “Hardrock II” have to be bonded with “KBS Foamcoat”.
- > Gaps and joints (maximum width 3 mm) between the mineral wool boards as well as the mineral wool boards and the separating element have to be completely filled with “KBS Foamcoat HS” on both sides of the penetration seal.
- > Gaps and joints (maximum width 15 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 mineral wool (stone wool with classification A1 according to EN 13501-1, a minimum compacted apparent density of 100 kg/m³ and a melting point ≥ 1000 °C according to DIN 4102-17) and “KBS Foamcoat HS” (minimum depth 5 mm) on both sides of the penetration seal. Additionally “KBS Foamcoat HS” has to be applied all around the penetrating elements so that a fillet with minimum dimension 5 mm x 5 mm (width x height) is formed.

<p>System KBS Kombischott INT</p> <p>(System KBS Mixed Penetration Seal INT)</p> <p>- Details for installation -</p>	<p>ANNEX A-3</p>
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- > For tied cable bundles the space between the cables need not be filled.
- > In vertical separating elements the mineral wool boards have to be coated single-sided on the visible surface with "KBS Foamcoat" 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 "KBS Foamcoat" 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 10 mm beyond the mineral wool boards.
- > In horizontal separating elements the mineral wool boards have to be coated single-sided on the visible surface with "KBS Foamcoat" with a thickness of minimum 0,8 mm (total dry layer thickness) on both sides of the penetration seal.
- > The transition area between mineral wool boards and the horizontal separating element has to be coated with "KBS Foamcoat" with a thickness of minimum 0,8 mm (total dry layer thickness) on both sides of the penetration seal so that the layer extends at least 10 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 and Annex A-5 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 have to be coated with "KBS Foamcoat" with a thickness of $\geq 1,5$ 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).

3.2 Metal pipes in vertical separating elements and horizontal separating elements

- > Metal pipes have to be insulated with "Rockwool 800" according to clause 1 of the ETA.
- > The reinforced aluminium foil has to be removed before installation.
- > "Rockwool 800" has to be continuous along the required minimum insulation length (see Annex D-2 and Annex G-2 of the ETA).
- > The thickness of "Rockwool 800" has to be 30 mm.
- > "Rockwool 800" has to be fixed along the required minimum insulation length by a winding wire (steel wire with diameter $\geq 0,7$ mm; first winding at a distance of 20 mm to 30 mm – measured from the surface of the penetration seal; last winding at a distance of 20 mm to 30 mm – measured from the edge of the pipe insulation; windings in between shall be equally distributed whereas the distance between these windings has to be maximum 100 mm) in place.

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Details for installation -

ANNEX A-4

- > Branches or elbows also have to be equipped with “Rockwool 800” along the required minimum insulation length on both sides of the penetration seal. The butt joint between the insulation of the pipe and the branch or elbow has to be fully bonded with “KBS Foamcoat” with a thickness of minimum 1 mm (wet layer thickness) and covered with a self-adhesive aluminium tape with a width of 50 mm.
- > “Rockwool 800” can to be coated with “KBS Foamcoat” with a thickness of $\geq 0,6$ mm (total dry layer thickness) along the required minimum insulation length on both sides of the penetration seal (measured from the surface of the penetration seal).
- > For further details see technical literature of the manufacturer.

3.3 Plastic pipes in vertical separating elements and horizontal separating elements

- > Plastic pipes have to be equipped with “KBS Pipe Seal SN”.
- > The smallest pipe collar corresponding to the relevant outer diameter of the pipe to be sealed off has to be used (see Annex B, Annex D-2 and Annex G-3 of the ETA).
- > 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 SN 50 to SN 75 or thread size M8 for type SN 90 to SN 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 pipe collars have to be closed by hexagonal steel bolts (thread size M6, length 20 mm) and nuts (corresponding to the outer diameter of the hexagonal steel bolts).
- > The number of fixing lugs shall not be reduced.

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Details for installation -

ANNEX A-5

4 Minimum working clearances

- > The minimum working clearances are defined in Annex C-1 and F-1 of the ETA.
- > The minimum distance to other penetration seals is 200 mm.

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 "Hardrock 040" / "Hardrock II" (nominal thickness 60 mm) on both sides of the penetration seal according to the ETA-holder's installation instructions. Gaps and joints (maximum width 3 mm) between the adjusted piece of "Hardrock 040" / "Hardrock II" and the mineral wool boards have to be completely filled with "KBS Foamcoat HS" on both sides of the penetration seal. The fitted piece of "Hardrock 040" / "Hardrock II" has to be coated on the visible surface with "KBS Foamcoat" with a thickness of minimum 1 mm (for vertical separating elements) or minimum 0,8 mm (for horizontal separating elements) (total dry layer thickness) on both sides of the penetration seal.

6 Transport and storage

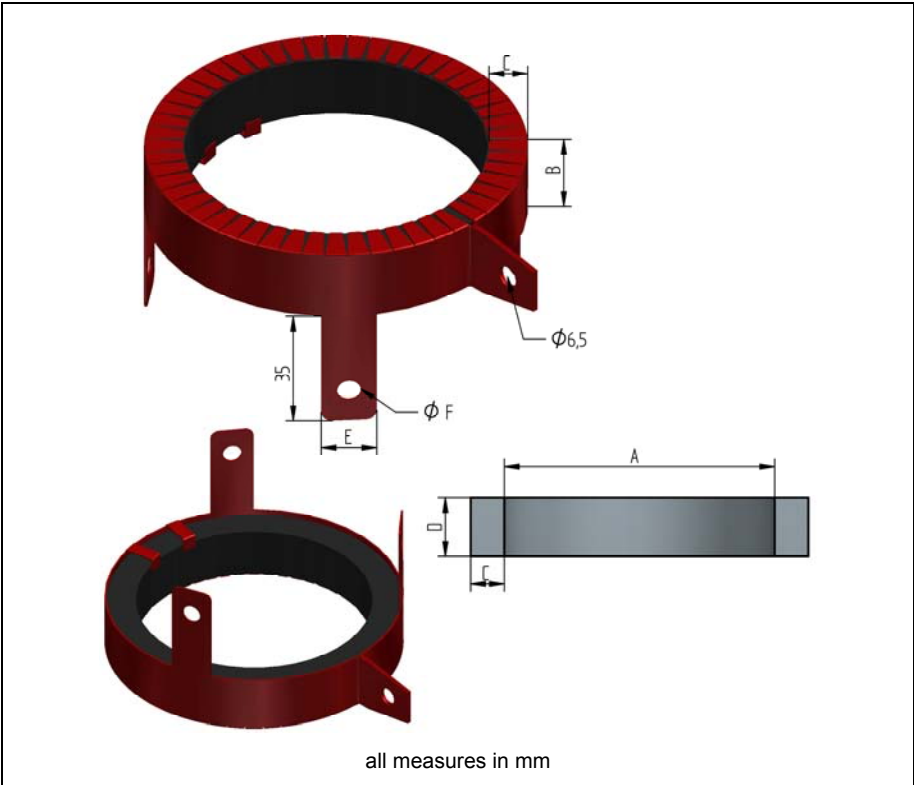
- > The indications of the manufacturer regarding transport and storage (minimum and maximum storing temperature, maximum duration of storage) have to be followed.

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.

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Details for installation -

ANNEX A-6



thickness of sheet steel 0,63 mm

collar			active component		fixing lugs		
type (---)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	P (pcs)	F (mm)
SN 32	40	20	10	18	15	3	6,5
SN 40	48	20	10	18	15	3	6,5
SN 50	58	20	10	18	15	3	6,5
SN 63	71	20	10	18	15	3	6,5
SN 75	83	20	10	18	15	3	6,5
SN 90	98	30	15	28	20	3	8,5
SN 110	118	30	15	28	20	3	8,5
SN 125	133	60	20	58	20	4	8,5
SN 140	148	60	20	58	20	4	8,5
SN 160	168	60	20	58	20	4	8,5

A...inner diameter of collar
B...height of collar
C...thickness of active component (nominal thickness)
D...height of active component
E...width of fixing lugs
F...diameter of bores
P...number of fixing lugs

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Description of “KBS Pipe Seal SN” -

ANNEX B

System KBS Kombischott INT (System Mixed Penetration Seal INT) in flexible walls and rigid walls according to clause 2.1 of the ETA – Minimum working clearances

Penetrating element acc. to clause 2.1 of the ETA	Horizontal distance between				
	Cable support construction	Cable / conduit / tube	Plastic pipe *	Metal pipe **	Reveal of the aperture
Cable support construction	0	0	100	40	0
Cable / conduit / tube	0	see table below	100	100	0
Plastic pipe*	100	100	0	0	50
Metal pipe**	40	100	0	0	0

* measured from the surface of the pipe collar

** measured from the surface of the pipe insulation

Penetrating element acc. to clause 2.1 of the ETA	Horizontal distance* between		
	Sheathed cable $\varnothing \leq 80$ mm	Cable bundle $\varnothing \leq 100$ mm	Conduit / tube
Sheathed cable $\varnothing \leq 80$ mm	0	100	0
Cable bundle $\varnothing \leq 100$ mm	100	100	0
Conduit / tube	0	0	0

* also valid for cables / conduits / tubes on cable support constructions

Penetrating element acc. to clause 2.1 of the ETA	Vertical distance between					
	Cable support construction	Cable / conduit / tube	Plastic pipe **	Metal pipe ***	Upper reveal of the aperture	Lower reveal of the aperture
Cable support construction	120* 60 ²	40* ¹	100* ¹	100* ¹	120* 60 ²	0*
Cable / conduit / tube	40* ¹	40	100	100	40	0
Plastic pipe**	100* ¹	100	100	100	50	50
Metal pipe***	100* ¹	100	100	100	0	0

* measured from the bottom side of the cable support construction

** measured from the surface of the pipe collar

*** measured from the surface of the pipe insulation

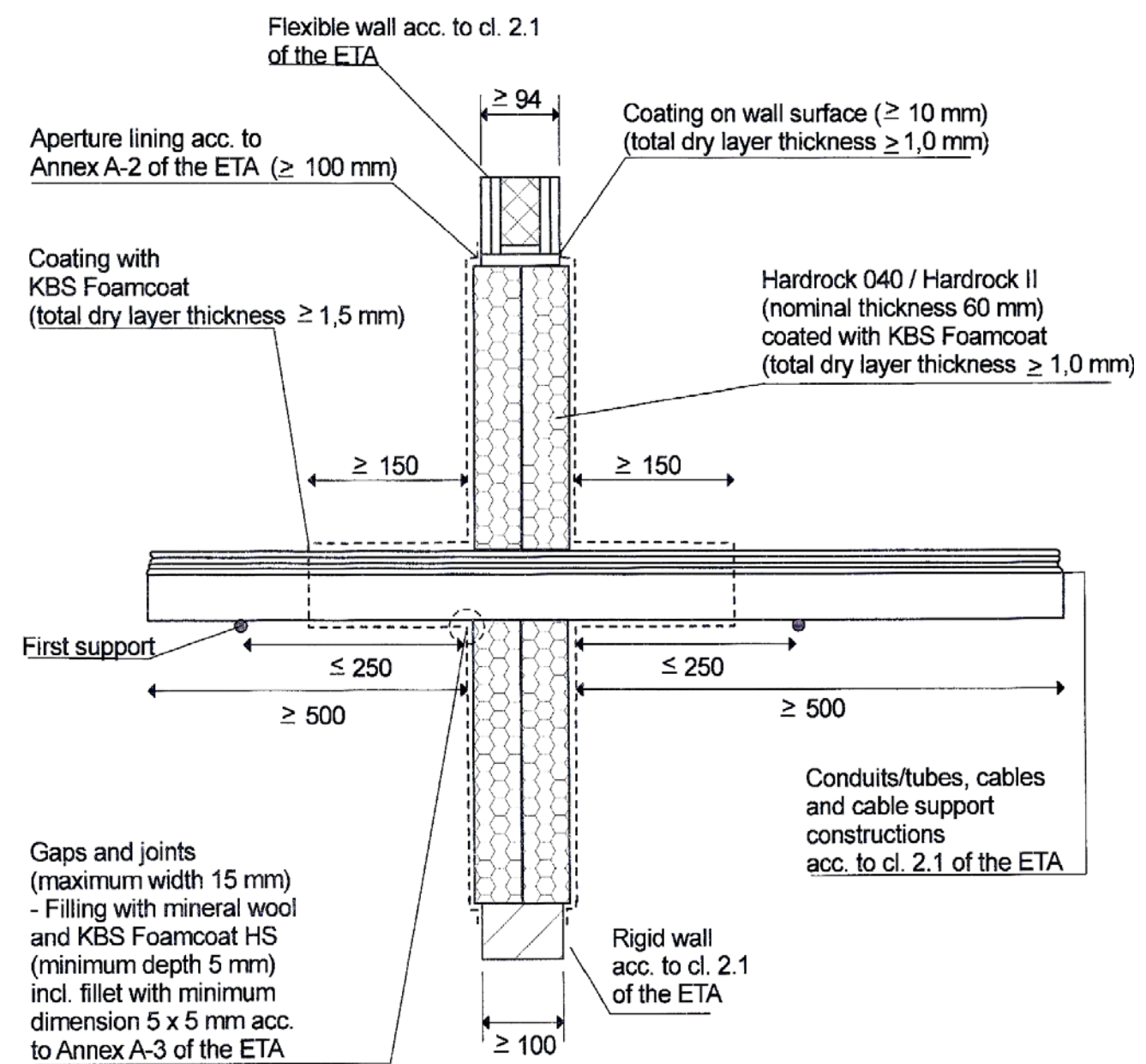
¹ measured from the surface of the cable / conduit / tube on the cable support construction

² measured from the surface of the ladder stringer

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in flexible wall and rigid wall -

ANNEX C-1

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) 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

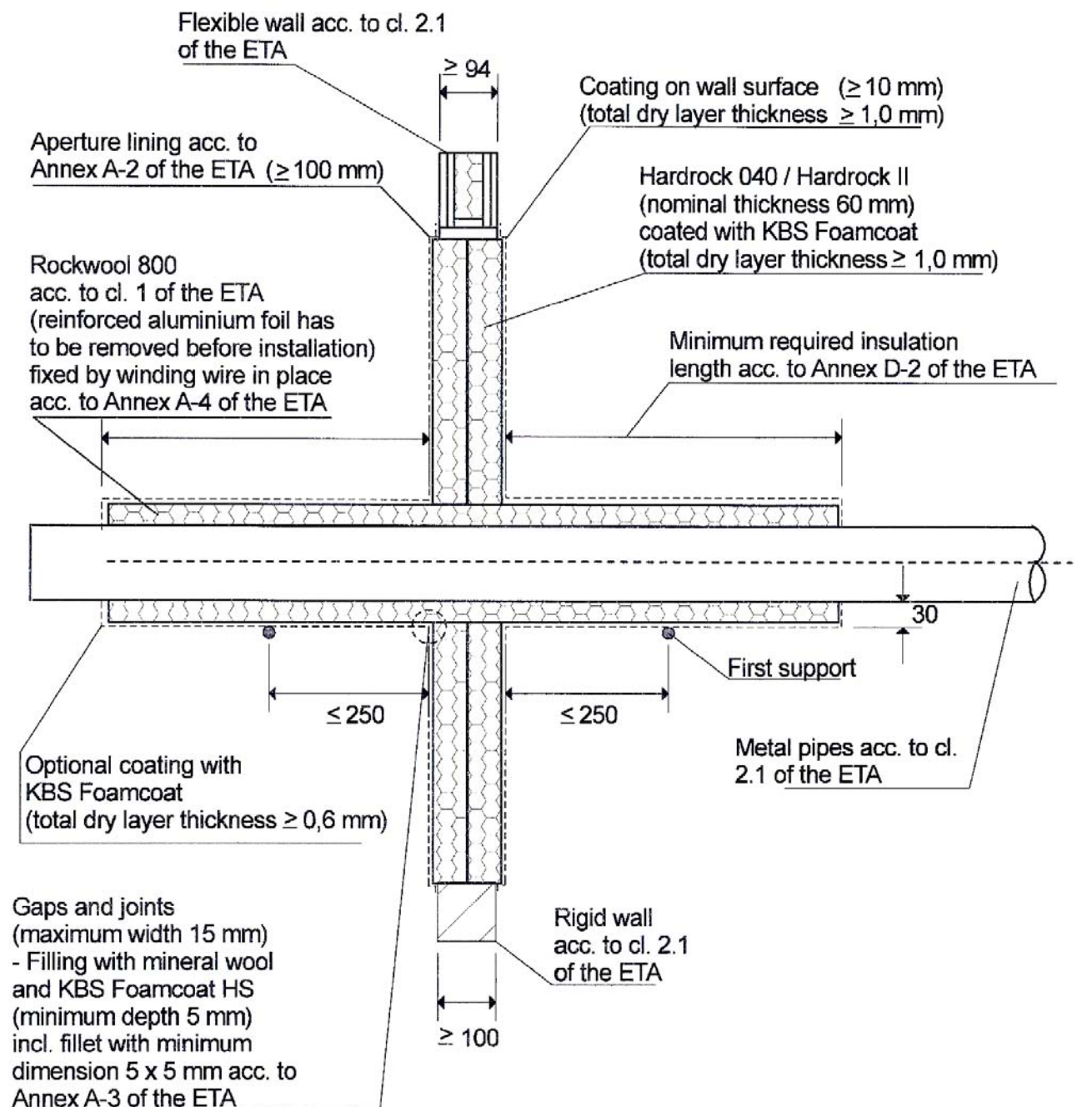


all measures in mm

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in flexible wall and rigid wall -

ANNEX C-2

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) 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 “Rockwool 800” – Installation drawing – sectional view

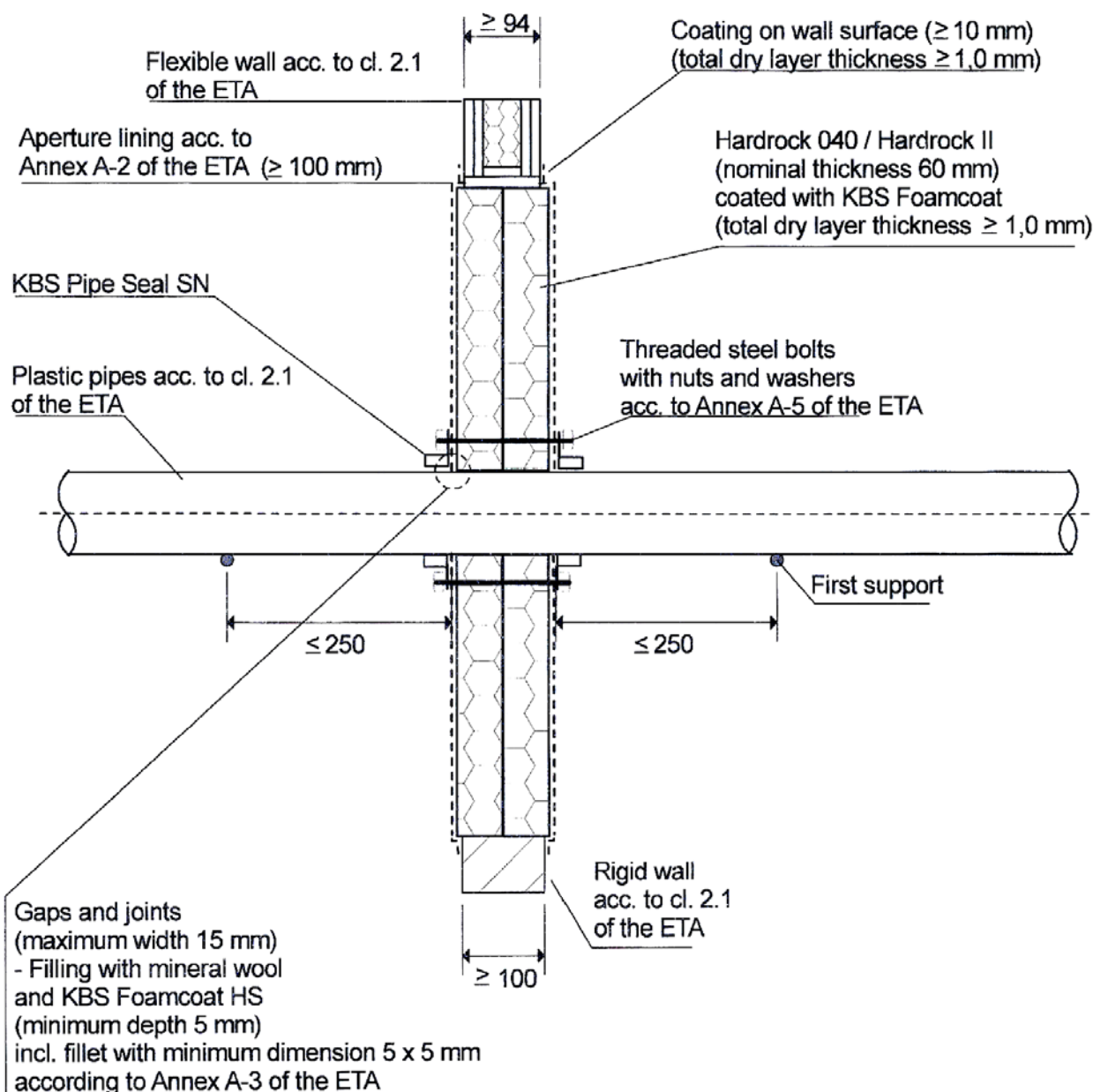


all measures in mm

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in flexible wall and rigid wall -

ANNEX C-3

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) 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 “KBS Pipe Seal SN” – Installation drawing – sectional view



all measures in mm

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in flexible wall and rigid wall -

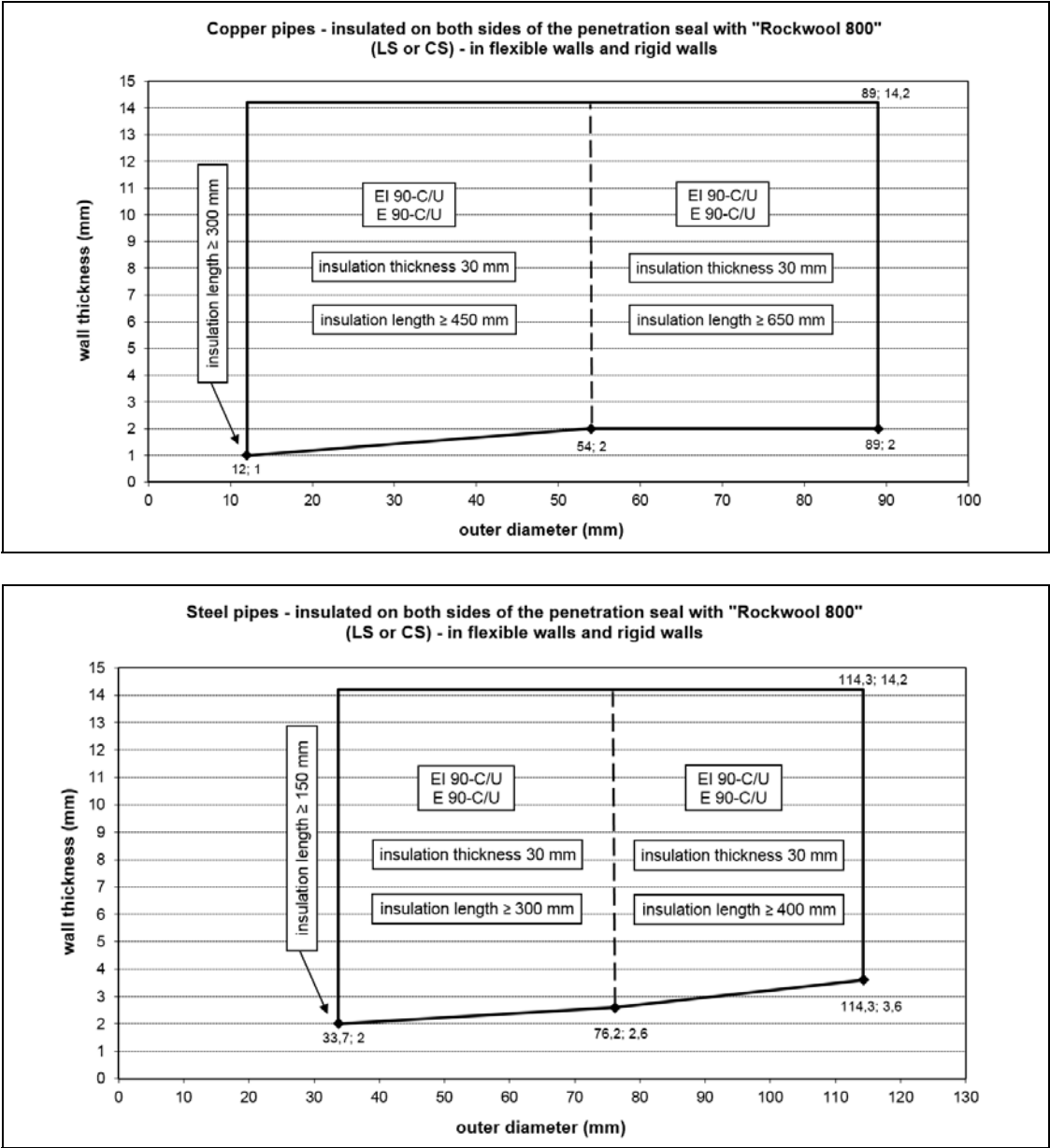
ANNEX C-4

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) penetrated by cables and / or conduits / tubes acc. to cl. 2.1 of the ETA – installed in flexible walls and rigid walls 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 ≤ 21 mm	EI 90 E 90
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 > 21 mm to 80 mm	EI 60 E 90
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 ≤ 15 mm	EI 90 E 90
“Synflex 1300” from manufacturer “EATON Industries GmbH” or “SERTOflex 12 S” from manufacturer “SERTO GmbH” with a diameter of 12 mm and a wall thickness of 1,9 mm (without cables)	
“PVC-Spezial-Pneumatikschlauch” from manufacturer “Riegler & Co. KG” with a diameter of 12 mm and a wall thickness of 1,3 mm (without cables)	
Note: The fire resistance class of “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) - when penetrated by sheathed cables with classification EI 60 / E 90 - is EI 60 / E 90	

<p>System KBS Kombischott INT</p> <p>(System KBS Mixed Penetration Seal INT)</p> <p>- Fire resistance classification -</p>	<p>ANNEX D-1</p>
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System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with "Rockwool 800" (local-sustained LS or continued-sustained CS) – installed in flexible walls and rigid walls acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: "Rockwool 800"	Fire resistance classification
Copper pipes:		
Outer diameter 12 mm Wall thickness 1,0 mm to 14,2 mm	Length ≥ 300 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Outer diameter > 12 mm to 54 mm Wall thickness 2,0 mm to 14,2 mm	Length ≥ 450 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Outer diameter > 54 mm to 89,0 mm Wall thickness 2,0 mm to 14,2 mm	Length ≥ 650 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Penetrating elements*	Additional precaution: "Rockwool 800"	Fire resistance classification
Steel pipes:		
Outer diameter 33,7 mm Wall thickness 2,0 mm to 14,2 mm	Length ≥ 150 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Outer diameter > 33,7 mm to 76,2 mm Wall thickness 2,6 mm to 14,2 mm	Length ≥ 300 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
Outer diameter > 76,2 mm to 114,3 mm Wall thickness 3,6 mm to 14,2 mm	Length ≥ 400 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 90-C/U
<p>* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex E-1 of the ETA are allowed.</p> <p>** required minimum insulation length (measured from the surface of the penetration seal)</p>		
<p>System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) - Fire resistance classification -</p>		ANNEX D-2

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) penetrated by plastic pipes acc. to cl. 2.1 of the ETA equipped on both sides of the penetration seal with "KBS Pipe Seal SN" – installed in flexible walls and rigid walls acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: "KBS Pipe Seal SN" [dimensions of intumescent inlay [thickness (C) x height (D)]]	Fire resistance classification
PVC-U pipes:		
Outer diameter 32 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 32)	EI 60-U/U E 60-U/U
Outer diameter 40 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 40)	EI 60-U/U E 60-U/U
Outer diameter 50 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 50)	EI 60-U/U E 60-U/U
Outer diameter 63 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 63)	EI 60-U/U E 60-U/U
Outer diameter 75 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 75)	EI 60-U/U E 60-U/U
Outer diameter 90 mm Wall thickness 1,8 mm to 4,3 mm	15 mm x 28 mm (type SN 90)	EI 60-U/U E 60-U/U
Outer diameter 110 mm Wall thickness 1,8 mm to 5,3 mm	15 mm x 28 mm (type SN 110)	EI 60-U/U E 60-U/U
Penetrating elements*	Additional precaution: "KBS Pipe Seal SN"	Fire resistance classification
PE-HD pipes:	[dimensions of intumescent inlay [thickness (C) x height (D)]]	
Outer diameter 32 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 32)	EI 90-U/U E 90-U/U
Outer diameter 40 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 40)	EI 90-U/U E 90-U/U
Outer diameter 50 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 50)	EI 90-U/U E 90-U/U
Outer diameter 63 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 63)	EI 90-U/U E 90-U/U
Outer diameter 75 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 75)	EI 90-U/U E 90-U/U
Outer diameter 90 mm Wall thickness 2,2 mm to 5,1 mm	15 mm x 28 mm (type SN 90)	EI 90-U/U E 90-U/U
Outer diameter 110 mm Wall thickness 2,7 mm to 6,3 mm	15 mm x 28 mm (type SN 110)	EI 90-U/U E 90-U/U
Outer diameter 160 mm Wall thickness 9,1 mm	20 mm x 58 mm (type SN 160)	EI 90-U/U E 90-U/U
* Pipe diameters (outer diameters) and wall thicknesses as defined in Annex E-2 of the ETA are allowed.		
System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) - Fire resistance classification -		ANNEX D-3

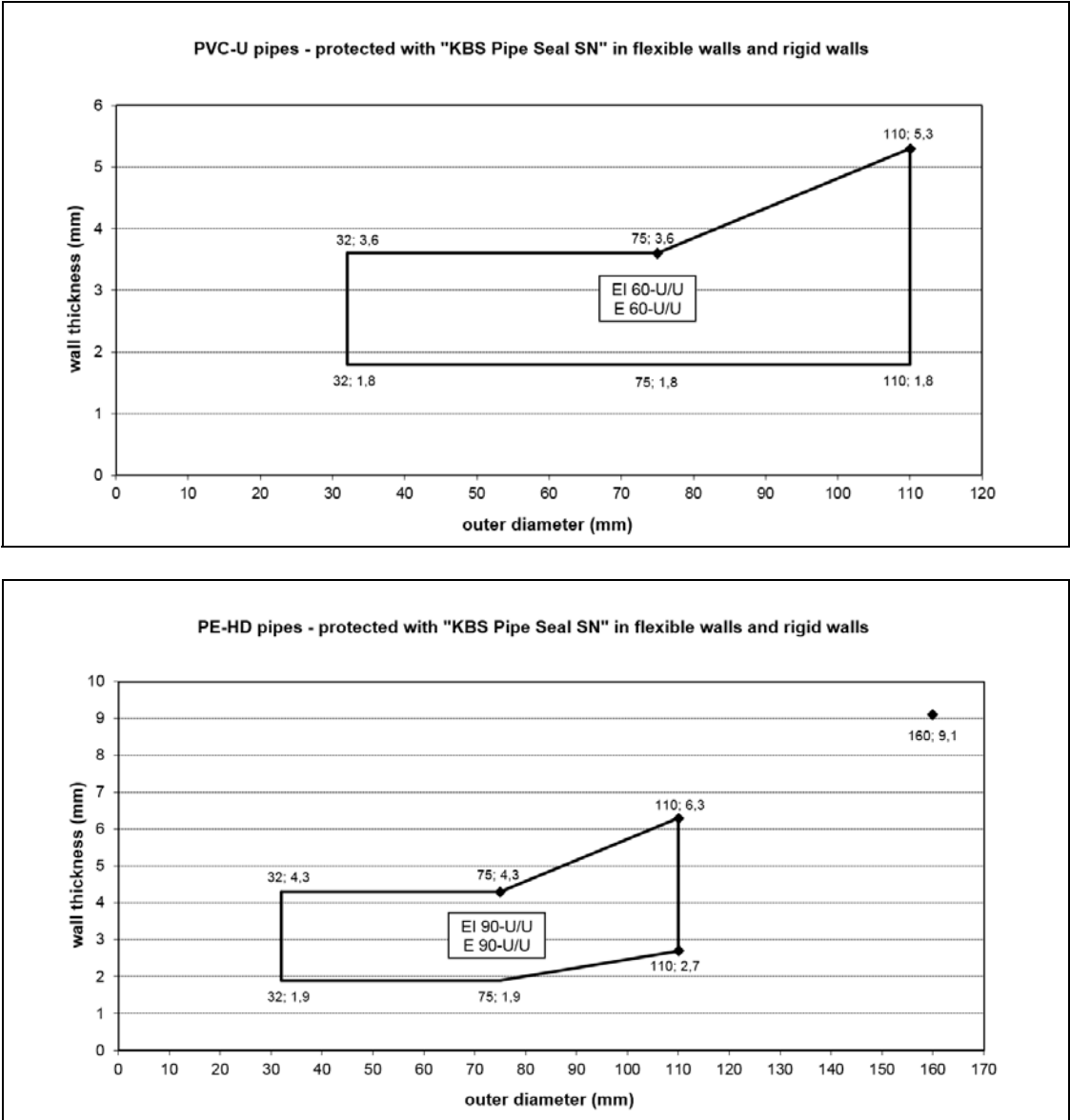


Note: The given graphs and therein enclosed fire resistance classes according to EN 13501-2:2007+A1:2009 are only valid for metal pipes according to clause 2.1 of the ETA.

Note: The dashed vertical lines mark the upper limit of the required insulation length.

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

<p>Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls and rigid walls</p>	<p>ANNEX E-1</p>
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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 plastic pipes according to clause 2.1 of the ETA.

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

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) in rigid floors according to clause 2.1 of the ETA – Minimum working clearances

Penetrating element acc. to clause 2.1 of the ETA	Horizontal distance between				
	Cable support construction	Cable / conduit / tube	Plastic pipe *	Metal pipe **	Reveal of the aperture
Cable support construction	0	0	100	100	0
Cable / conduit / tube	0	see table below	100	100	0
Plastic pipe*	100	100	0	0	50
Metal pipe**	100	100	0	0	0

* measured from the surface of the pipe collar

** measured from the surface of the pipe insulation

Penetrating element acc. to clause 2.1 of the ETA	Horizontal distance* between		
	Sheathed cable $\varnothing \leq 80$ mm	Cable bundle $\varnothing \leq 100$ mm	Conduit / tube
Sheathed cable $\varnothing \leq 80$ mm	0	100	0
Cable bundle $\varnothing \leq 100$ mm	100	100	0
Conduit / tube	0	0	0

* also valid for cables / conduits / tubes on cable support constructions

Penetrating element acc. to clause 2.1 of the ETA	Vertical distance between					
	Cable support construction	Cable / conduit / tube	Plastic pipe **	Metal pipe ***	Upper reveal of the aperture	Lower reveal of the aperture
Cable support construction	130* 70 ²	50* ¹	100* ¹	100* ¹	120* 60 ²	0*
Cable / conduit / tube	50* ¹	50	100	100	40	0
Plastic pipe**	100* ¹	100	100	100	50	50
Metal pipe***	100* ¹	100	100	100	0	0

* measured from the bottom side of the cable support construction

** measured from the surface of the pipe collar

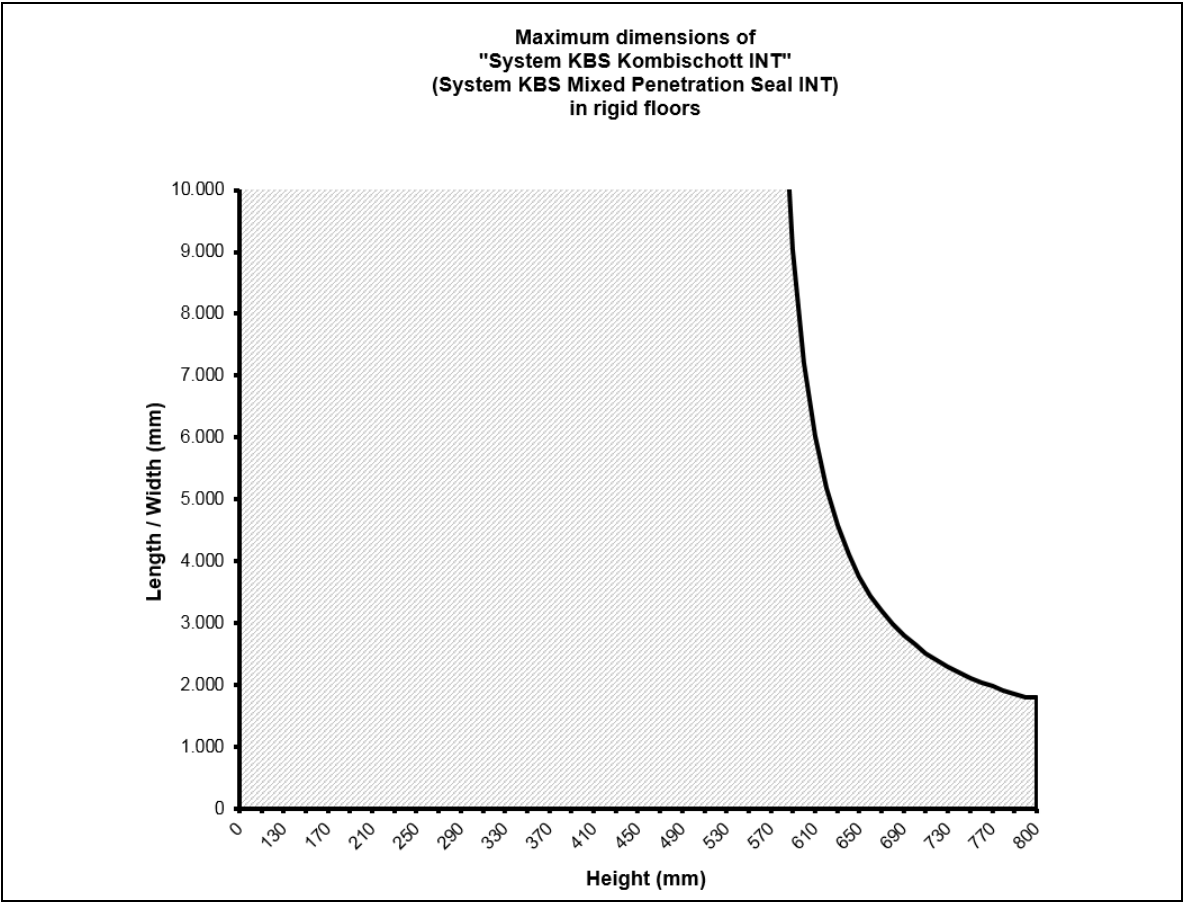
*** measured from the surface of the pipe insulation

¹ measured from the surface of the cable / conduit / tube on the cable support construction

² measured from the surface of the ladder stringer

System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in rigid floor -

ANNEX F-1



The maximum height of the penetration seal in rigid floors is 800 mm.

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

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

$$c_{tested} = \frac{Perimeter\ length_{tested}}{Seal\ area_{tested}} = 3,611\ m/m^2; resp.\ 0,003611\ mm/mm^2$$

The minimum perimeter length to seal area ratio of the penetration seal in rigid floors is 3,611 m/m², resp. 0,003611 mm/mm².

C_{tested} was calculated from the dimensions of the tested penetration seal (1800 mm x 800 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. 1800 mm the allowed height is 800 mm; for a length (width) of e.g. 2650 mm the allowed height is 700 mm.

For a height smaller than 554 mm no limitation of length (width) is required.

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

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) - Installation in rigid floor – perimeter length to seal area ratio -	ANNEX F-2
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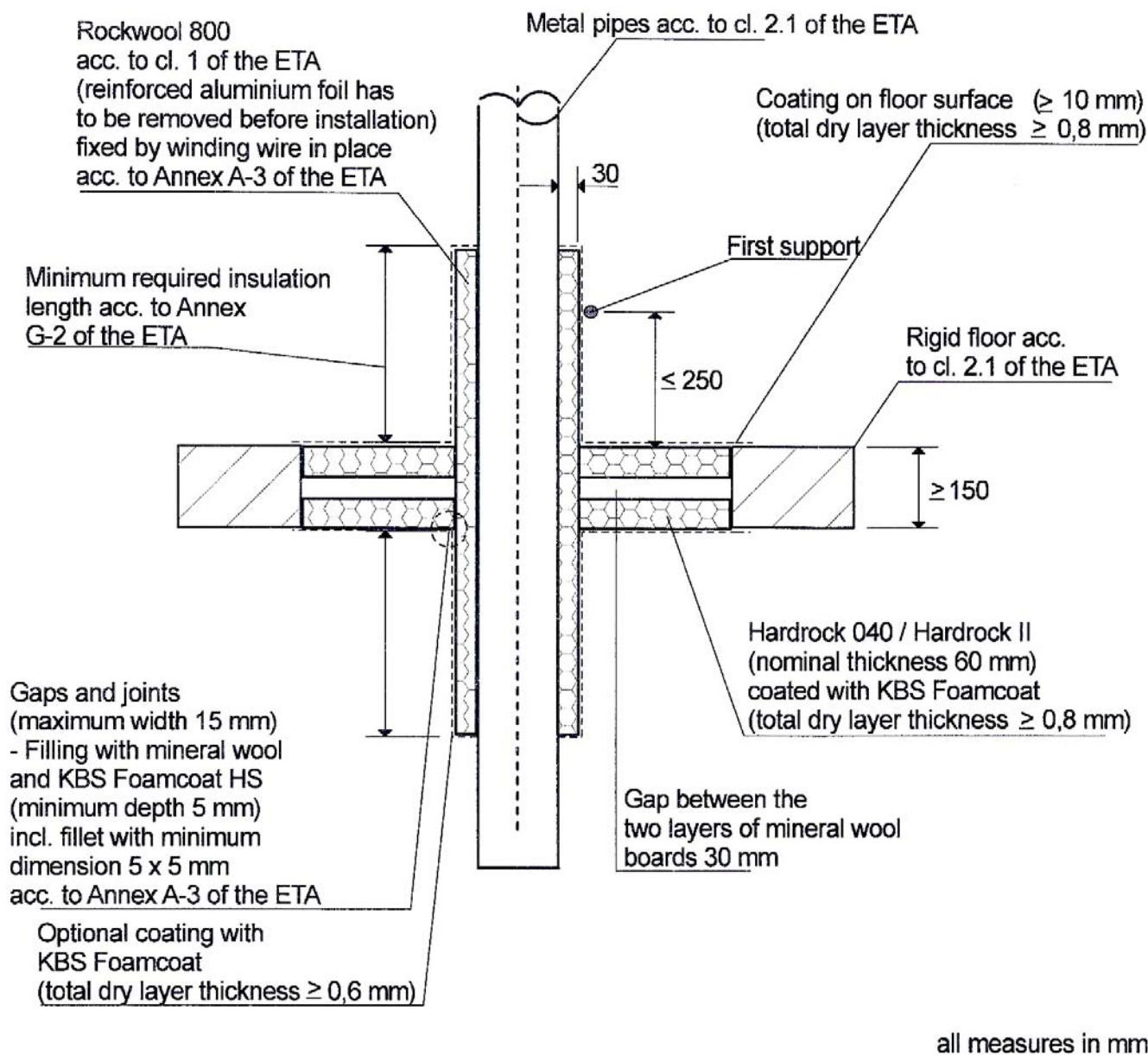
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all measures in mm

ANNEX F-3

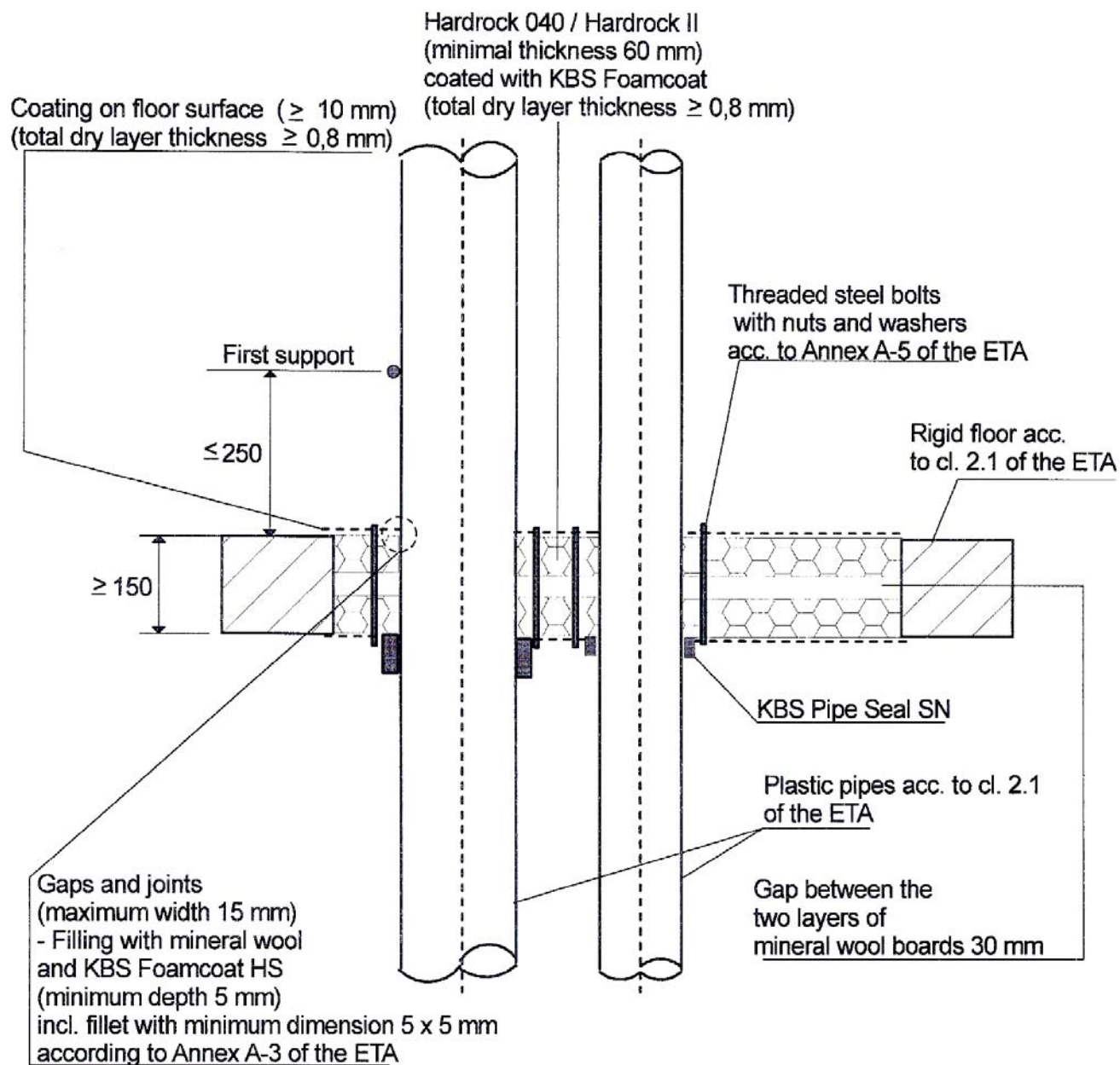
**System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) in rigid floors
according to clause 2.1 of the ETA – penetrated by metal pipes according to clause 2.1 of the
ETA insulated with “Rockwool 800” – Installation drawing – sectional view**



System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in rigid floor -

ANNEX F-4

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) 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 “KBS Pipe Seal SN” – Installation drawing – sectional view



all measures in mm

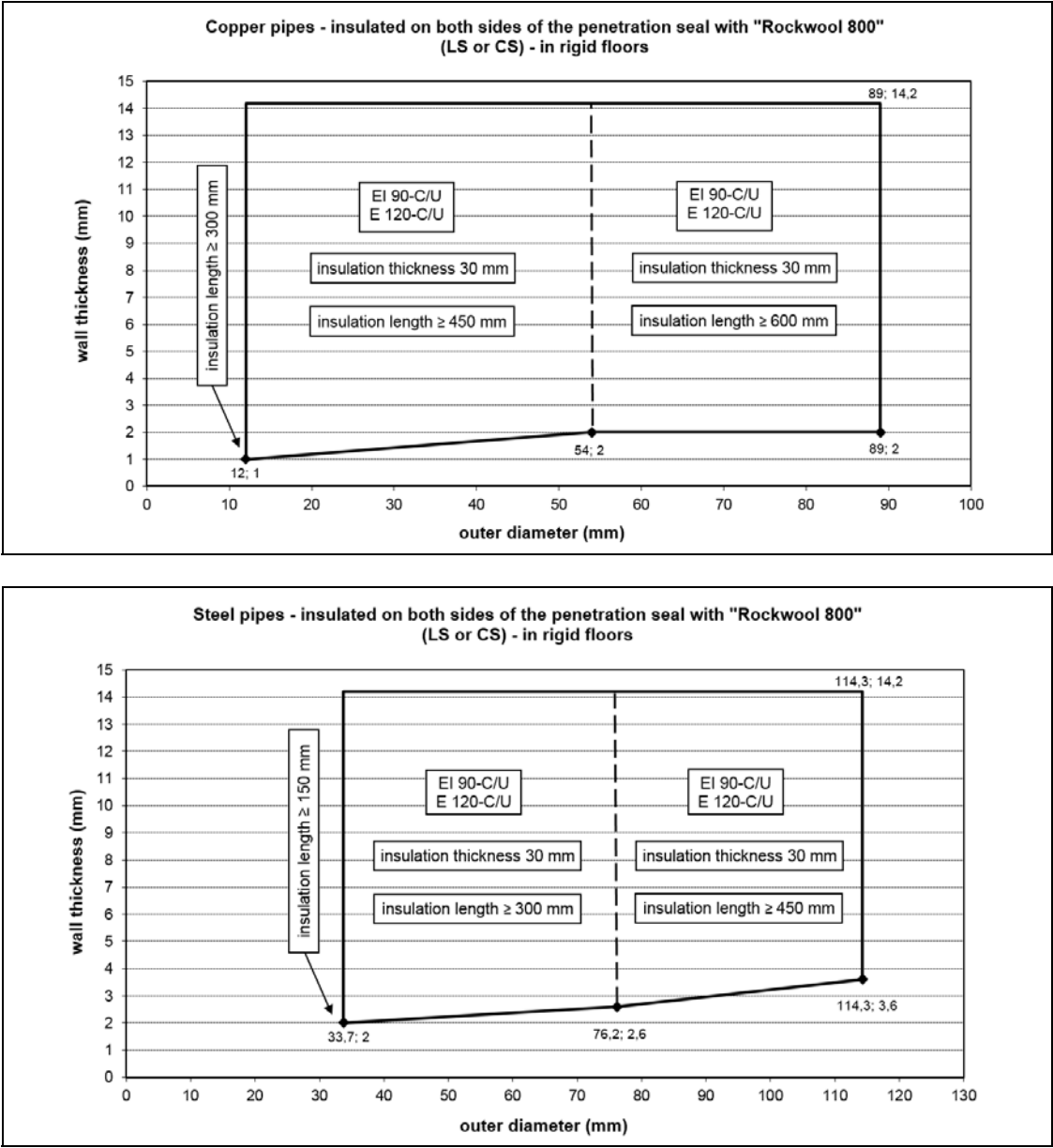
System KBS Kombischott INT
(System KBS Mixed Penetration Seal INT)
- Installation in rigid floor -

ANNEX F-5

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) 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 60 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 ≤ 15 mm	EI 90 E 120
“Synflex 1300” from manufacturer “EATON Industries GmbH” or “SERTOflex 12 S” from manufacturer “SERTO GmbH” with a diameter of 12 mm and a wall thickness of 1,9 mm (without cables)	
“PVC-Spezial-Pneumatikschlauch” from manufacturer “Riegler & Co. KG” with a diameter of 12 mm and a wall thickness of 1,3 mm (without cables)	
Note: The fire resistance class of “System KBS Kombischott INT” (System KBS Mixed Penetration Seal INT) - when penetrated by sheathed cables with classification EI 60 / E 120 - is EI 60 / E 120	

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) penetrated by metal pipes acc. to cl. 2.1 of the ETA insulated on both sides of the penetration seal with "Rockwool 800" (local-sustained LS or continued-sustained CS) – installed in rigid floors acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: "Rockwool 800"	Fire resistance classification
Copper pipes:		
Outer diameter 12 mm Wall thickness 1,0 mm to 14,2 mm	Length ≥ 300 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
Outer diameter > 12 mm to 54 mm Wall thickness 2,0 mm to 14,2 mm	Length ≥ 450 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
Outer diameter > 54 mm to 89 mm Wall thickness 2,0 mm to 14,2 mm	Length ≥ 600 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
Penetrating elements*	Additional precaution: "Rockwool 800"	Fire resistance classification
Steel pipes:		
Outer diameter 33,7 mm Wall thickness 2,0 mm to 14,2 mm	Length ≥ 150 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
Outer diameter > 33,7 mm to 76,2 mm Wall thickness 2,6 mm to 14,2 mm	Length ≥ 300 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
Outer diameter > 76,2 mm to 114,3 mm Wall thickness 3,6 mm to 14,2 mm	Length ≥ 450 mm**, on both sides of the penetration seal Thickness 30 mm	EI 90-C/U E 120-C/U
<p>* Only pipe diameters (outer diameters) and wall thicknesses as defined in Annex H-1 of the ETA are allowed.</p> <p>** required minimum insulation length (measured from the surface of the penetration seal)</p>		
System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) - Fire resistance classification -		ANNEX G-2

System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) penetrated by plastic pipes acc. to cl. 2.1 of the ETA equipped at the bottom side of the penetration seal with "KBS Pipe Seal SN" – installed in rigid floors acc. to cl. 2.1 of the ETA		
Penetrating elements*	Additional precaution: "KBS Pipe Seal SN" [dimensions of intumescent inlay [thickness (C) x height (D)]]	Fire resistance classification
PVC-U pipes:		
Outer diameter 32 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 32)	EI 90-U/U E 90-U/U
Outer diameter 40 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 40)	EI 90-U/U E 90-U/U
Outer diameter 50 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 50)	EI 90-U/U E 90-U/U
Outer diameter 63 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 63)	EI 90-U/U E 90-U/U
Outer diameter 75 mm Wall thickness 1,8 mm to 3,6 mm	10 mm x 18 mm (type SN 75)	EI 90-U/U E 90-U/U
Outer diameter 90 mm Wall thickness 1,8 mm to 4,3 mm	15 mm x 28 mm (type SN 90)	EI 90-U/U E 90-U/U
Outer diameter 110 mm Wall thickness 1,8 mm to 5,3 mm	15 mm x 28 mm (type SN 110)	EI 90-U/U E 90-U/U
Outer diameter 125 mm Wall thickness 1,8 mm to 6,0 mm	20 mm x 58 mm (type SN 125)	EI 90-U/U E 90-U/U
Outer diameter 140 mm Wall thickness 1,8 mm to 6,7 mm	20 mm x 58 mm (type SN 140)	EI 90-U/U E 90-U/U
Outer diameter 160 mm Wall thickness 1,8 mm to 7,7 mm	20 mm x 58 mm (type SN 160)	EI 90-U/U E 90-U/U
Penetrating elements*	Additional precaution: "KBS Pipe Seal SN"	Fire resistance classification
PE-HD pipes:	[dimensions of intumescent inlay [thickness (C) x height (D)]]	
Outer diameter 32 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 32)	EI 90-U/U E 90-U/U
Outer diameter 40 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 40)	EI 90-U/U E 90-U/U
Outer diameter 50 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 50)	EI 90-U/U E 90-U/U
Outer diameter 63 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 63)	EI 90-U/U E 90-U/U
Outer diameter 75 mm Wall thickness 1,9 mm to 4,3 mm	10 mm x 18 mm (type SN 75)	EI 90-U/U E 90-U/U
Outer diameter 90 mm Wall thickness 2,2 mm to 5,1 mm	15 mm x 28 mm (type SN 90)	EI 90-U/U E 90-U/U
Outer diameter 110 mm Wall thickness 2,7 mm to 6,3 mm	15 mm x 28 mm (type SN 110)	EI 90-U/U E 90-U/U
Outer diameter 160 mm Wall thickness 9,1 mm	20 mm x 58 mm (type SN 160)	EI 90-U/U E 90-U/U
* Pipe diameters (outer diameters) and wall thicknesses as defined in Annex H-2 of the ETA are allowed.		
System KBS Kombischott INT (System KBS Mixed Penetration Seal INT) - Fire resistance classification -		ANNEX G-3

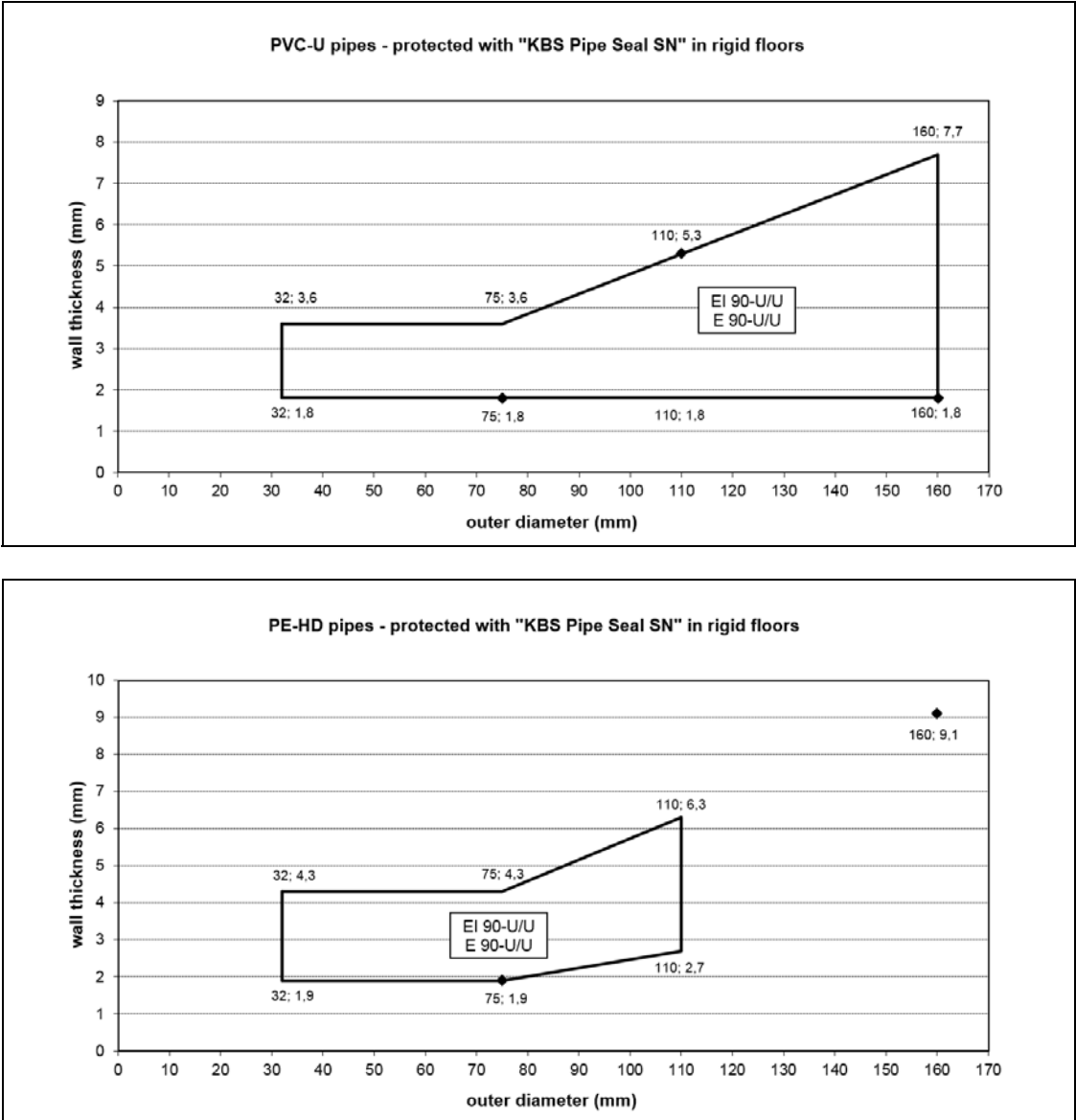


Note: The given graphs and therein enclosed fire resistance classes according to EN 13501-2:2007+A1:2009 are only valid for metal pipes according to clause 2.1 of the ETA.

Note: The dashed vertical lines mark the upper limit of the required insulation length.

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
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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 plastic pipes according to clause 2.1 of the ETA.

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