EUROPEAN ASSESSMENT DOCUMENT

EAD 350454-00-1104

September 2017

FIRE STOPPING AND FIRE SEALING PRODUCTS

PENETRATION SEALS

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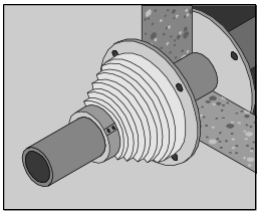
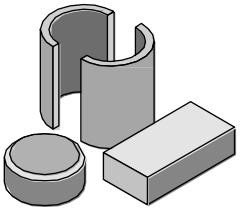
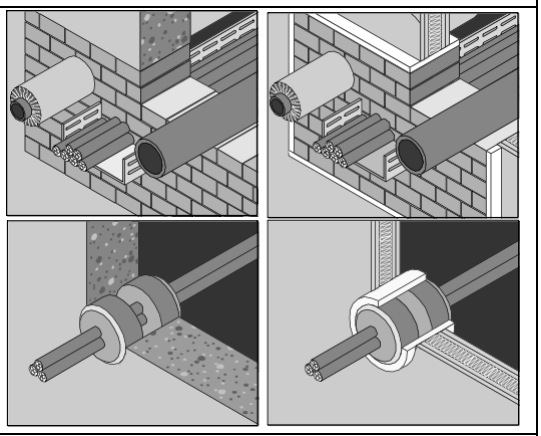
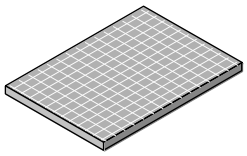
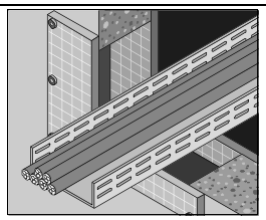
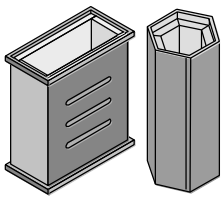
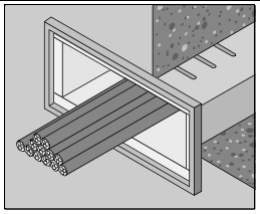
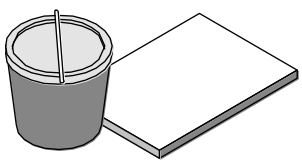
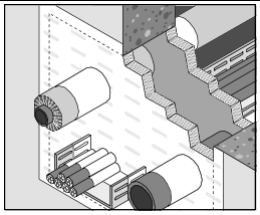
1 SCOPE OF THE EAD

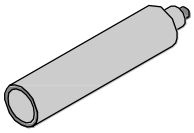
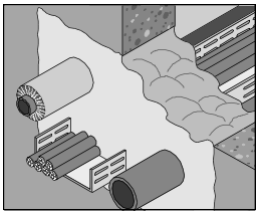
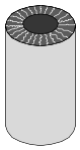
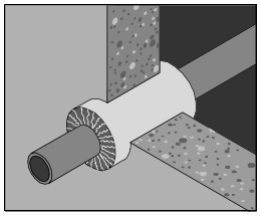
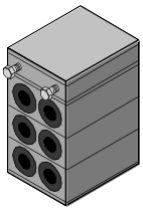
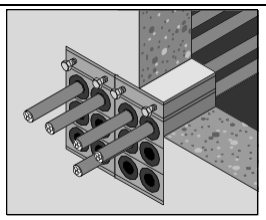
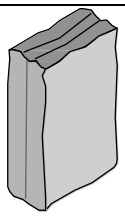
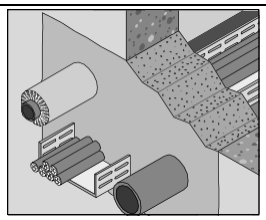
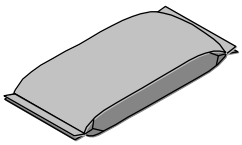
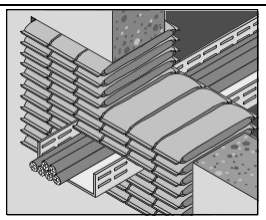
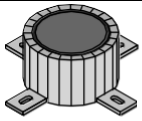
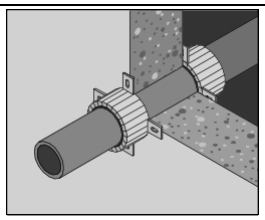
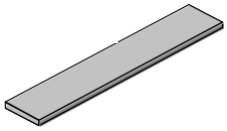
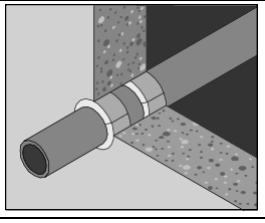
1.1 Description of the construction product

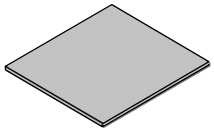
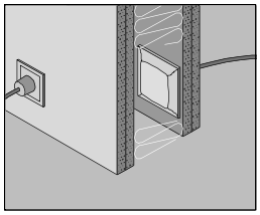
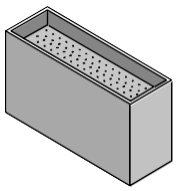
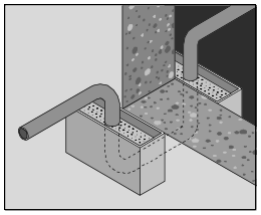
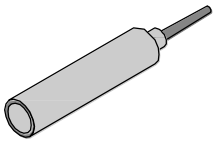
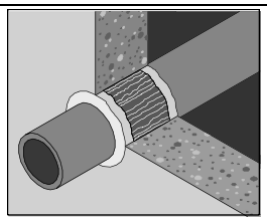
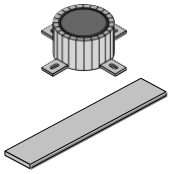
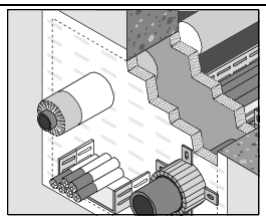
A penetration seal is either formed from a single product, from a kit or from a combination with other products assembled on site.

Thereafter, examples of products intended to be used as penetration seals are shown.

Designation	**Illustration[1] of the**	
	Product/component	**Penetration seal**
Bellows seals		
Blocks, plugs		
Boards		
Cable boxes		
Coated mineral wool slabs (e.g. intumescent or ablative coating)		

1 The illustrations of the products / components and penentration seals are only intended as examples, notably in terms of size of the seal, type and number of services, distances etc.

Designation	**Illustration[1] of the**	
	Product/component	**Penetration seal**
Foams		
Mineral wool		
Modular systems		
Mortar		
Pillows (also referred to as “bags” or “cushions”)		
Pipe closure devices		
● Collars (integrated into or outside the wall / floor)		
● Wraps (integrated into a wall or floor) including strips and composite strips		
● Mechanically actuated systems for pipes	variable	variable

Designation	Illustration[1] of the	
	Product/component	Penetration seal
Putties		
Sand gaskets		
Sealants/Mastics		
Combinations of the products named above		

A penetration seal may contain either one type of the services listed in Clause 1.2.1 in this EAD (services 1 to 7), or different types. The number of services is variable.

The product is not covered by a harmonised European standard (hEN) and is not covered by another European Assessment Document.

Products covered by EAD 350005-00-1104 are deviating from products according to this EAD due to the scope and limited number of essential characteristics, the assessment methods mentioned therein and due to different assessment concepts.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

Penetration seals are intended to maintain the fire resistance of a separating element at the position where services pass through. The penetration seals are intended to be penetrated by the following services (exhaustive list[2]):

1. Cables (single or bundled), cable carriers, e.g. cable trays, ladders, baskets
2. Bus bars, bus bar trunking units
3. Pipes[3] and conduits of reaction to fire class A1 according to EN 13501-1[4] with a melting or decomposition point greater than 1000°C (e.g. steel, cast iron, copper and copper alloys, nickel alloys), either insulated or non-insulated, hereafter referred to as "metal pipes". Included in this group are the above pipes with a coating provided the overall reaction to fire class is minimum A2.
4. Trunking of reaction to fire class A1 according to EN 13501-1 with a melting or decomposition point greater than 1000°C. Included in this group are the above trunkings with a coating provided the overall reaction to fire class is minimum A2.
5. Pipes[3], trunking and conduits of reaction to fire class A1 or A2 according to EN 13501-1 with a melting or decomposition point equal to or less than 1000°C (e.g. lead, aluminium and aluminium alloys) and/or the risk of fracture (glass, fibre cement), either insulated or non-insulated.
6. Pipes[3] not classified A1 or A2 according to EN 13501-1 (e.g. made from thermoplastic or thermosetting material) including non-homogeneous materials (e.g. glass fibre reinforced plastic pipes or layered pipes), either insulated or non-insulated, hereafter referred to as “plastic pipes”.
7. Trunking and conduits not classified A1 or A2 according to EN 13501-1 (e.g. made from thermoplastic material or thermosetting material) including non-homogeneous materials, either insulated or non-insulated, hereafter referred to as “plastic trunkings” and “plastic conduits”.

A penetration seal may contain either a single type of the services described above, or various types (mixed penetrations). The number of services may vary (including blank penetration seals where no services are included). The services may or may not include service support constructions.

Penetration seals may be used in various environmental conditions, described by the following use conditions:

Type X: intended for use in conditions exposed to weathering

Type Y_1: intended for use at temperatures below 0°C with exposure to UV but no exposure to rain

Type Y_2: intended for use at temperatures below 0°C, but with no exposure to rain no UV

Type Z_1: intended for use in internal conditions with humidity equal to or higher than 85 % RH excluding temperatures below 0°C[5], without exposure to rain or UV

Type Z_2: intended for uses in internal conditions with humidity lower than 85% RH excluding temperatures below 0°C, without exposure to rain or UV

Products that meet requirements for type X, meet the requirements for all other types. Products that meet requirements for type Y_1 also meet the requirements for type Y_2, Z_1 and Z_2. Products that meet the requirements for type Y_2 also meet the requirements for type Z_1 and Z_2. Products that meet the requirements for type Z_1, also meet the requirements for type Z_2.

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2 Penetration seals intended to be used to seal gaps around chimneys, air ventilation systems, fire rated ventilation ducts, fire rated service ducts, shafts, smoke extraction ducts, dampers and smoke control dampers are not covered by this EAD

3 Pipes of or around conveyor systems and trackbound transportation systems are excluded

4 In this text “classified according to EN 13501-1” means classification according to EN 13501-1, or classification A1 according to Decision 96/603/EEC as amended or according to a relevant CWFT Decision as stated in the foreword of EN 13501-1

5 These uses apply for internal humidity class 5 in accordance with EN ISO 13788

This EAD does not define specific test methods for the resistance to environmental conditions others than those listed above.

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the product for the intended use of 25 years when installed in the works, provided that product is subject to appropriate installation (see Clause 1.1 of this EAD). However, if the product is a reactive material or includes a reactive material, the working life is 10 or 25 years depending on available evidence. These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[6].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

1.3 Specific terms used in this EAD (if necessary in addition to the definitions in CPR, Art 2)

1.3.1 Blank penetration seal

A seal without penetrating services that seals an aperture in a separating element.

1.3.2 Bellows Seal

A flexible seal, often based on a coated fabric sleeve, to allow movement of services.

1.3.3 Block

Product, available in a variety of shapes and sizes; generally cuboid for rectangular penetrations. See also *Plugs*.

1.3.4 Bus Bar/Bus Bar trunking unit

Bus bar: A low impedance conductor to which several electric circuits can be connected. For bus bar trunking unit see EN 60439-2.

1.3.5 Cable box

Consists of a metal frame, with intumescent inlays, that forms a type of channel, often incorporating plastic lids (to prevent the passage of cold smoke).

1.3.6 Cable bundle

Several cables running in the same direction and bound closely together by mechanical means.

6 The real working life of a product incorporated in a specific works depends on the environmental conditions the works is subjected to, as well as on the particular conditions of the design, execution, use and maintenance of those works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than those referred to.

1.3.7 Collar

See *Pipe closure device.*

1.3.8 Conduit

A metal or plastic casing designed to accommodate cables. Normally a conduit is circular or oval in section.

See also *Trunking.*

1.3.9 Foam

Material, that cures at room temperature, increasing its volume upon application and creating a cellular structure.

1.3.10 Intumescent sleeve

Pipe penetration seal, in the form of a longitudinally split cylinder, generally made from a base material containing intumescent material.

1.3.11 Mixed penetration seal

A seal, that allows the installation of different types of services listed in Clause 1.2.1 in this EAD in a single opening.

1.3.12 Modular system

System comprising a steel frame into which elastomeric blocks are installed, compressed around the service.

1.3.13 Mortar

A blend of gypsum or cement based powder, fillers, water and chemical modifiers, with or without reinforcement.

1.3.14 Pillow (also referred to as “bag” or “cushion”)

Malleable, pillow-like bag, filled with reactive or non-reactive material, for the temporary or permanent closing of penetrations or openings.

1.3.15 Pipe closure device

A pre-fabricated, heat activated device that, under fire exposure, acts to crush plastic pipes or service ducts that pass through vertical or horizontal separating elements and/or fill the hollow space with an intumescent foam. Two types are considered here: collars and wraps.

Collars incorporate an outer casing which acts as a restraint for an intumescent material, enabling the collar to be either surface fixed to the separating element or incorporated within it.

Wraps have no casing and hence shall be located within the separating element, which acts as a restraint for the intumescent.

1.3.16 Pipe diameter

Where “pipe diameter” is used in this EAD this refers to the nominal external diameter of the service pipe.

1.3.17 Plug

As blocks, but cylindrical/conical in shape (for circular penetrations).

1.3.18 Putty

Material similar to some sealants/mastics capable of being formed and directly installed by hand, but remaining in a plastic condition.

1.3.19 Sand Gasket

An open metal frame, which is fixed in a wall and filled with specific sand. The cables run through the sand.

1.3.20 Sealant/Mastic

Single or multi-component material, comprising organic and/or inorganic fillers pre-dispersed in a binder (i.e. acrylic, polysulphide, silicone etc.), that cures or dries after application to an elastic or plasto-elastic material.

1.3.21 Service support construction

A mechanical support provided in the form of clips, ties, hangers, ladder racks or trays, or any device designed to carry the load of the penetrating services.

1.3.22 Small cable penetration seal

Definition according to EN 1366-3 applies.

1.3.23 Trunking

A metal or plastic casing designed to accommodate cables. Normally trunking is square or rectangular in section. See also *Conduit*.

1.3.24 Wrap

See *pipe closure device*

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of the product is assessed in relation to the essential characteristics.

Table 1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance *(level, class, description)*
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	Class
2	Resistance to fire	2.2.2	Class
Basic Works Requirement 3: Hygiene, health and the environment			
3	Air permeability	2.2.3	Level
4	Water permeability	2.2.4	Description
5	Content, emission and/or release of dangerous substances	2.2.5	Description
Basic Works Requirement 4: Safety and accessibility in use			
6	Mechanical resistance and stability	2.2.6	Description
7	Resistance to impact / movement	2.2.7	Description
8	Adhesion	2.2.8	Description
9	Durability	2.2.9	Description
Basic Works Requirement 5: Protection against noise			
10	Airborne sound insulation	2.2.10	Level
Basic Works Requirement 6: Energy economy and heat retention			
11	Thermal properties	2.2.11	Level
12	Water vapour permeability	2.2.12	Level

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

Characterisation of the products to be assessed shall be done in accordance with available specifications, notable those given in Table 2 of this EAD.

Table 2 Characterization of the products / components

N°	Property	Test method
Tab 2.1 Blocks and Plugs		
1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Dimensions	B.10
5	Density	B.6.5
6	Expansion ratio (if relevant)	EOTA TR 024, clause 3.1.11
7	Expansion pressure (if relevant)	EOTA TR 024, clause 3.1.12
Tab 2.2 Boards		
Calcium silicate boards		
1	EAD 350142-00-1106	
Mineral wool boards manufactured according to EN 13162 or EN 14303[7]		
2	see EN 13162 or EN 14303 for properties as relevant for this EAD	
3	Apparent density	B 6.3
4	“Melting point”	One of the methods of B.8 shall be used
Gypsum boards		
5	see EN 520 for properties as relevant for this EAD	
6	Apparent density	EN 520
Boards other than Calcium silicate, Mineral wool and Gypsum based boards		
7	TGA or DTA	B.2
8	Content of non-volatile components	B.3
9	Loss off mass on heating	B.4
10	Dimensions	B.10
11	Apparent density	B.6.6

[7] Products produced according to EN 14303 or EN 13162 may be suitable for penetration seal applications but “melting point” and density are properties relevant for this application which are not covered in these standards.

Tab 2.3 Modular systems

Modules		
1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Dimensions	B.10
5	Density	B.6.5
6	Shrinkage cavities / Homogeneity	(minimum mass for given dimension)
Frame		
7	Dimensions	B.10 / drawings
8	Steel specification according to EN standard	

Tab 2.4 Cable boxes

Intumescent inlays		
1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Dimensions	B.10 / drawings
5	Expansion ratio	EOTA TR 024, clause 3.1.11
6	Expansion pressure (if relevant)	EOTA TR 024, clause 3.1.12
Housing		
1	Dimensions / design	B.10 / drawings
2	Steel specification to EN standard	

Tab 2.5 Coatings/fillers[8] (for coated mineral wool slabs)

Coating / filler		
1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Viscosity of “liquid” material	B.7
5	Density of “liquid” material	B.6.1
6	Expansion ratio	EOTA TR 024, clause 3.1.11
7	LOI[9]	EOTA TR 024, clause 3.1.14
8	Flexibility[10]	EOTA TR 024, clause 3.1.13

8 In the context of coated mineral wool slab seals a filler is the material used around the perimeter of the seal, between the mineral wool slabs and between the mineral wool slab and the penetrating services for adhesion or filling gaps. It may be the same product as the coating but with a higher viscosity.

9 Only for ablative products; For FPC of ablative components a combination of flexibility, ash content/content of non-volatile components and density is considered to be sufficient but if an enterprise owns the equipment and skilled staff for LOI-testing the method may be used for FPC.

10 Only for coatings

Tab 2.6 Collars

Inlay		
1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Dimensions	B.10 / drawings
5	Expansion ratio	EOTA TR 024, clause 3.1.11
6	Expansion pressure	EOTA TR 024, clause 3.1.12
Housing		
7	Thickness of steel sheet	Specifications / drawings
8	Thickness of Zn layer (if relevant)	Specifications / drawings
9	Thickness of protective coating (if relevant)	Specifications / drawings
10	Tensile strength of steel	Specifications / drawings
11	Dimensions / design	B.10 / drawings

Tab 2.7 Pillows

Filling material		
1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Quantity (mass) per bag	
5	Non-compacted bulk density	B.6.4
6	Particle size distribution	B.10.3
7	Expansion ratio	EOTA TR 024, clause 3.1.11
Bag		
8	Type of bag material(s)	Specifications / Drawings
9	Dimensions of empty bag	B.10
10	Tear strength of bag (fabric/seams)	B.5.4
11	Tear strength of fabric	B.5.4.1
12	Mass per area of fabric	

Tab 2.8 Bellows seals (fabric)

1	Type of material(s)	Specifications / drawings
2	Dimensions	B.10 / drawings
3	Tear strength of fabric	B.5.4.1
4	Mass per area of fabric	
5	Tear strength of seams (if relevant)	B.5.4.2
6	Impregnation / flame retardants (quantity per unit area of fabric)	

Tab 2.9 In-situ applied foams

1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Density of cured foam	B.6.2
5	Expansion ratio (if relevant)	EOTA TR 024, clause 3.1.11
6	Curing behaviour (tack free time)	B.9
7	Dimensional stability (change in volume)	B.11

Tab 2.10 Mortars (cement based) and Plasters (gypsum based)

1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Non-compacted bulk density	B.6.4
5	Setting time according to a relevant technical specification	
6	Compressive strength after 3 or 7 days (cement based)	B.5.1.1
7	Compressive strength after 28 days (cement based)	B.5.1.1
8	Compressive strength after 24 hours - fully saturated (gypsum based)	B.5.1.2
9	Compressive strength fully dried (gypsum based)	B.5.1.2
10	Linear expansion on setting (gypsum based)	B.11.2

Tab 2.11 Sealants/mastics and putties

1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Density of uncured (“liquid”) material	B.6.1
5	Viscosity of uncured (“liquid”) material	B.7
6	Hardness after curing (if relevant)	B.5.3
7	Expansion ratio (if relevant)	EOTA TR 024, clause3.1.11

Tab 2.12 Wraps (including intumescent strips and composite strips) and intumescent sleeves

1	TGA or DTA	B.2
2	Content of non-volatile components	B.3
3	Loss of mass on heating	B.4
4	Dimensions	B.10
5	Expansion ratio	EOTA TR 024, clause3.1.11
6	Expansion pressure	EOTA TR 024, clause 3.1.12

2.2.1 Reaction to fire

The product shall be classified according to EN 13501-1. Generally, one or more of the following options shall apply:

- The product shall be assessed, using the conditioning and test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1. If the test regime for a certain class requires a test according to EN 13823 (SBI) the mounting and fixing procedure described in Annex A.1 of this EAD shall be used. Due to the nature of the SBI test, this evaluation method shall not be used for products such as collars and plugs. For these products, EN ISO 11925-2 shall be applied to assess compliance with the requirements for Class E, if required by the manufacturer. Further details for tests according to EN ISO 11925-2 are given in Annex A.2 of this EAD.
- Products satisfying the requirements for the reaction to fire class A1, without the need for testing, may be classified in accordance with the provisions of Decision 96/603/EC, as amended[11], without the need for testing on the basis of it being specified in that decision.
- Products that satisfy the requirements for the required performance class of the characteristic reaction to fire may be classified in accordance with an appropriate EC CWFT decision without the need for further testing on the basis of its conformity with the specification of the product detailed in that decision and its intended end use application being covered by that decision.

2.2.2 Resistance to fire

An assembly representative of the assembled system in which the product is intended to be incorporated, installed or applied shall be tested, using the test method relevant for the corresponding fire resistance class, in order to be classified according to EN 13501-2.

The test configuration shall be based on the desired field of application, taking account of the rules given in EN 1366-3 and this EAD.

In addition to the provisions given above, the largest envisaged size of all penetration seals shall be tested without services (blank penetration seal). A blank penetration seal test may be omitted for mortar seals, seals made from rigid boards and mineral wool boards of a density of minimum 140 kg/m³ and for penetration seals which by their nature cannot be used without services. The exception for rigid boards and mineral wool boards is not permitted in case the seal includes a splice, i.e. it is made from more than one single board, or its size exceeds 1,5 m².

The performance of a blank penetration seal may differ from one where services are included as these may support the seal during the test, particularly if shrinkage occurs due to decomposition. The worst result of the tests with and without services shall be used for classification.

The penetration seal shall be classified according to EN 13501-2 in relation to its intended use, taking into account the rules given in EN 1366-3.

The intention of a test of a blank penetration seal is to provide information on the maximum permissible seal size. The result of a blank penetration seal shall not be used for a stand-alone classification but always be accompanied by test results / classification of the penetration seal including services.

If the penetration seal has different classifications depending e.g. on the installed services or the installation conditions, each classification shall be specified in the ETA together with its associated conditions. This classification shall refer to the maximum fire resistance duration which was demonstrated in the fire test (although the test also meets the requirements of lower classifications).

Mixed penetration seals shall be classified according to EN 13501-2, including the identification of the end configuration of the pipes, e.g. EI 30-U/U, for cases where pipes are included in the field of application.

11 OJ L 267, 19.10.1996, p.23, OJ L 258, 12.10.2000, p.36 and OJ L 144, 12.6.2003, p.9

The following rules shall be applied in relation to the assessment of integrity or insulation. Test results achieved on a single cable may be used for classification of the seal with this single cable type, provided the cable is clearly defined by its designation according to the related standard classification relating to the insulation/sheath materials or the diameter of the cable is not permitted.

For tests using option 1 of EN 1366-3, Annex F.4.2 the following rule shall be applied. In the case that option 1 is used and the results for the cables in the standard mixed module are worse than in the standard cable module, the results for the standard mixed module shall be used for classification of the mixed penetration seal related to the cables. The results for the standard cable configuration may be used for the classification of a cable seal. If the pipe result is lower than the cable result, than the pipe result shall be used for the classification of the mixed penetration seal.

In the case that option 1 is used and the results for the cables in the cable module are worse than in the mixed module, the results for the cable module shall be used for classification of the mixed penetration seal related to the cables. If the pipe result is lower than the cable result, then the pipe result shall be used for the classification of the mixed penetration seal.

The lowest performance assessed with thermocouples 3, 4, 5, 6 and 8 according to EN 1366-3, Figure 3, shall be used for the classification of the seal.

The lowest performance assessed with thermocouples 1 and 2 according to EN 1366- 3, Figure 3, for any single service incorporated in a penetration seal shall constitute the performance of that seal unless the field of application is restricted according to the field of application rules.

If the performance assessed for a cable carrier is lower than the performance assessed for the cables on top of it (and both results are above the lowest classification permitted by EN 13501-2), the seal may be classified for installation in openings with cables and for installation in openings with cable carriers (with or without cables) separately, using the lowest relevant test result.

When using EN 1366-3, clause A.3, the following shall be taken into account. In case the performance assessed of cable group “Small” is lower than the performance assessed of cable groups “Medium” and/or “Large” the performance of cable group “Small” shall be used for the classification of the seal (also, when only cables of cable groups “Medium” and “Large” are installed). In case the performance assessed of cable group “Medium” is lower than the performance assessed of cable group “Large” the performance assessed of cable group “Medium” shall be used for the classification of the seal (also, when only cables of cable group “Large” are installed).

EN 1366-3, clause E.2.7.4 does not apply.

Table 3 Field of application rules for pipe end configuration of metal pipes

		Tested			
		U/U	**C/U**	**U/C**	**C/C**
Covered	**U/U**	Y	N	N	N
	C/U	Y	Y	Y	N
	U/C	Y	N	Y	N
	C/C	Y	Y	Y	Y
Y = acceptable, N = not acceptable					

2.2.3 Air permeability

The principles of the test method described in EN 1026 shall be applied. The window test sample described in the standard shall be replaced with a suitably designed sample of the penetration seal without services.

The test result for the air permeability of the product shall be presented as area specific leakage rate with the unit being $m^3h^{-1}m^{-2}$.

2.2.4 Water permeability

The test method described in Annex C of this EAD applies.

The water permeability of the product shall be given by the following description: “water tight to x mm head of water” or “water tight to x Pa”.

2.2.5 Content, emission and/or release of dangerous substances

The performance of the product related to the emissions and/or release and, where appropriate, the content of dangerous substances will be assessed on the basis of the information provided by the manufacturer[12] after identifying the release scenarios (in accordance with EOTA TR 034) taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenarios for this product and intended use with respect to dangerous substances are:

IA1: Product with direct contact to indoor air.

IA2: Product with indirect contact to indoor air (e.g. covered products) but possible impact on indoor air.

S/W 2: Product with indirect contact to soil, ground- and surface water.

2.2.5.1 SVOC and VOC

For the intended use covered by the release scenarios IA1 and IA2 semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) are to be determined in accordance with EN 16516. The loading factor to be used for emission testing is 0,007 m^2/m^3.

All possible materials and components of the product/kit are to be considered for the preparation of the test specimen in accordance with the manufacturer's product installation instructions or (in absence of such instructions) the usual practice of installation.

Once the test specimen has been produced, it should immediately be placed in the emission test chamber. This time is considered the starting time of the emission test.

The test results have to be reported for the relevant parameters (e.g. chamber size, temperature and relative humidity, air exchange rate, loading factor, size of test specimen, conditioning, production date, arrival date, test period, test result) after 3 and 28 days testing.

The relevant test results shall be expressed in [mg/m^3] and stated in the ETA.

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12 The manufacturer may be asked to provide to the TAB the REACH related information which he must accompany the DoP with (cf. Article 6(5) of Regulation (EU) No 305/2011).
The manufacturer is **not** obliged:
- to provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
- to provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the “Indicative list on dangerous substances” of the SGDS.

Any information provided by the manufacturer regarding the chemical composition of the products may not be distributed to EOTA or to TABs.

2.2.6 Mechanical resistance and stability

Mechanical resistance and stability is covered by the assessment according to 2.2.7 of this EAD.

2.2.7 Resistance to impact / movement

For products that may be used to form a blank seal and where no precautions (precautions/protection are not covered by this EAD) are taken to prevent a person stepping onto a horizontal penetration seal or falling against a vertical, or sloped, penetration seal, tests according to EOTA TR 001 shall be used to assess the impact resistance taking account of the following:

- The tests shall be performed without services passing through.
- The size of the test specimen for impact resistance shall be that covered by the fire resistance classification, but limited to a maximum[13] of (1 x 1,5) m.
- Only one specimen may be used.
- Where the size of the penetration seal is in excess of (150 x 150) mm but less than or equal to (150 x 400) mm the test method described in EOTA TR 001, clause 3, applies. Where the size is in excess of (150 x 400) mm clause 2 of EOTA TR 001 applies in addition.

The zone type for which the product is suitable, by reference to EOTA TR 001, shall be stated in the ETA together with the maximum dimensions of the penetration seal and the type of impactor used.

2.2.8 Adhesion

Adhesion is covered by the assessment according to 2.2.7 of this EAD.

2.2.9 Durability

2.2.9.1 General

There are two groups of materials used for penetration seal products:

- Materials covered by a European standard: Details given in 2.2.9.2 of this EAD.
- Materials not covered by a European standard: Details given in 0 of this EAD.

The assessment of any single product may require considering materials of both types.

2.2.9.2 Durability of materials covered by a European standard

When the material/product (e.g. metal parts or other components) meet the relevant requirements given in the standards referenced they are considered as being durable.

2.2.9.2.1 Painted/coated steel

The adequacy of a coating on steel shall be assessed according to EN ISO 12944 in its various parts.

2.2.9.2.2 Galvanised steel

The adequacy of zinc corrosion protection shall be assessed according to EN ISO 14713, which gives general recommendations on corrosion protection.

2.2.9.2.3 Coil-coated steel

Coil-coated steel shall be assessed according to EN 10169.

13 The limitation is valid only for seals of a maximum seal size of less than (2 x 3) m in wall applications or (2 x infinite) m in floor applications.

2.2.9.2.4 Coil-coated aluminium

Coil-coated aluminium shall be assessed according to EN 1396.

2.2.9.2.5 Stainless steel

Stainless steels shall be classified by reference to the relevant part of EN 10088.

Ferritic stainless steels have relatively low corrosion resistance and their use is normally restricted to mild indoor or similarly protected environments. This type of stainless steel is suitable for use in use conditions Z_1, Z_2, Y_1 and Y_2 according Clause 1.2.1 of this EAD.

Austenitic stainless steel: The most common alloys are 1.4301 (X5CrNi18-10) and 1.4401 (X5CrNiMo17-12-2). These austenitic stainless steels are normally suitable for use in all use conditions as defined in Clause 1.2.1 of this EAD. However, where high chloride contents or more severe conditions are likely to be present in the environment (e.g. rooms with indoor swimming pools, facades in cities with heavy traffic, in coastal areas), alloys with higher molybdenum content, e.g. 1.4429 (X2CrNiMoN17-13-3), 1.4539 (X1NiCrMoCu25-20-5) or 1.4529 (X1NiCrMoCuN25-20-7), may be required by the manufacturer.

Austenitic-ferritic steels, e.g. 1.4462 (X2CrNiMoN22-5-3), are comparable to a CrNiMo-steel with 2,5 to 3% Mo.

2.2.9.2.6 Thermoplastic polymeric materials[14]

Thermoplastic polymeric materials used in these products are generally used to form cover plates, frames etc. and thus do not fulfil a primary function. It is therefore sufficient to ensure that the component/material possesses characteristics that define it as being an acceptable quality moulding or extrusion.

Extruded profiles in PVC-U shall be assessed for suitability using EN 13245-1 or -3 and the associated tests in EN 13245-2. These standards allow a distinction to be made between profiles that are intended to be externally exposed and those that are for internal use only.

For injection moulded components, the effects of heating shall be assessed, using the method described in EN ISO 580, by carrying out the assessment on 3 samples selected from each of 5 production batches.

After conditioning, no weld line shall have opened completely and no cracks or delamination shall penetrate more than 50 % of the thickness, at the point of injection. If 1 of any 3 specimens exhibits a failure a retest may be undertaken on 6 further specimens. If any of these samples fails the product shall be deemed unacceptable.

2.2.9.2.7 Mineral wool

Mineral wool complying with those requirements of EN 13162 or EN 14303 which are related to durability is deemed to satisfy the durability requirements for use conditions Z_1, Z_2, Y_1 and Y_2 (as tested to one of these standards) according to Clause 1.2.1 of this EAD.

14 This assessment is not intended to assess the durability and tightness of wrappings/casings used to protect reactive materials that are not durable on their own. These are assessed as part of the reactive component.

2.2.9.3 Materials not covered by a European standard

2.2.9.3.1 General

The principle of the durability tests is to select suitable physico-chemical or technological properties of the product as given thereafter and to check whether these properties have changed during exposure of the product to defined exposure conditions as given thereafter.

Use conditions related to environmental conditions	EOTA TR 024 (reactive materials)
Type Z_2	Clause 4.2.7
Type Z_1	Clause 4.2.6
Type Y_2	Clause 4.2.5
Type Y_1	Clause 4.2.4
Type X	Clause 4.2.3

For the assessment of the durability, a change of the mean value of the relevant properties of not more than 15 %, assessed before and after, applies.

In case of high scatter of the test results an alternative is to take a statistical approach, using an appropriate high number of test specimens. This approach may be used to demonstrate that the mean value of the property after exposure does not deviate from the mean value before exposure.

2.2.9.3.2 Board type products covered by EAD 350142-00-1106

See of EAD 350142-00-1106.

2.2.9.3.3 Board type products other than those covered by EAD 350142-00-1106 (i.e. boards specifically designed for the application in penetration seals)

A case by case approach shall be taken to define the relevant properties of the product. Examples of properties that may be selected are appearance (e.g. blistering, cracking), density, thickness and mechanical properties.

2.2.9.3.4 Blocks and plugs

Property	Test method
Appearance	B.12
Density	B.6.5
Expansion ratio[15]	EOTA TR 024, clause 3.1.11
Expansion pressure[15] (if relevant)	EOTA TR 024, clause 3.1.12

2.2.9.3.5 Coatings and fillers (non-reactive)

Property	Test method
Appearance	B.12
Flexibility	B.5.5

15 Only relevant for intumescent products

2.2.9.3.6 Coatings and fillers (reactive)

Property	Test method
Appearance	B.12
Expansion ratio[15]	EOTA TR 024, clause 3.1.11
Flexibility	B.5.5
LOI[16]	EOTA TR 024, clause 3.1.14

2.2.9.3.7 Collars (inlay), wraps (including intumescent strips and composite strips) and intumescent sleeves

Property	Test method
Appearance	B.12
Expansion ratio[15]	EOTA TR 024, clause 3.1.11
Expansion pressure[15] (if relevant)	EOTA TR 024, clause 3.1.12

2.2.9.3.8 Fabrics

Property	Test method
Appearance	B.12
Tear strength of fabric	B.5.4.1

2.2.9.3.9 In-situ Foams (non-reactive)

Property	Test method
Appearance	B.12
Density of cured foam	B.6.2 (trimmed surfaces)

2.2.9.3.10 In-situ Foams (reactive)

Property	Test method
Appearance	B.12
Density of cured foam	B.6.2 (trimmed surfaces)
Expansion ratio[15]	EOTA TR 024, clause 3.1.11
Expansion pressure[15] (if relevant)	EOTA TR 024, clause 3.1.12

2.2.9.3.11 Mortar (cement based) and Plaster (gypsum based)

Property	Test method
Appearance	B.12
Compression strength after 3, 7 or 28 days	B.5.1.1
Compressive strength fully dried (gypsum based)	B.5.1.2

16 Only for ablative coatings / products

2.2.9.3.12 Pillows

Property	Test method
Bag	
Appearance	B.12
Tear strength of fabric	B.5.4.1
Tear strength of seams	B.5.4.2
Filling material (non-reactive)	
A case by case approach to define the properties shall be taken	
Filling material (reactive)	
Expansion ratio[15]	EOTA TR 024, clause 3.1.11
Expansion pressure[15] (if relevant)	EOTA TR 024, clause 3.1.12
LOI[16]	EOTA TR 024, clause 3.1.14

2.2.9.3.13 Putties and Sealants

Property	Test method
Appearance	B.12
Hardness after curing	B.5.3

2.2.9.3.14 Rubber components of modular systems

Property	Test method
Appearance	B.12
Tensile strength	One of the methods of B.5.2.1 shall be used

2.2.9.4 Component and materials compatibility

The Technical Assessment Body shall assess the suitability of materials in contact, using well-established principles. Whereas, it is impossible to prescribe all the possible risk areas but these include the possibility of bi-metallic corrosion, the effects of over-painting etc.

2.2.10 Airborne sound insulation

EN ISO 10140 Parts 1, 2, 4 and 5 shall be used to assess the $R_w(C;C_{tr})$ values.

Taking into account the large types and ranges of services considered, the test shall be carried out without services passing through the specimen, using the “specific small sized opening” in accordance with EN ISO 10140-5, clause 3.3.3.

The measured airborne sound insulation shall be expressed as a single number rating $R_w(C;C_{tr})$ in accordance with EN ISO 717-1.

2.2.11 Thermal properties

The thermal conductivity shall either be determined based on declared values as quoted in harmonised European technical specifications or assessed according to EN 12664, EN 12667 or EN 12939.

Alternatively the thermal resistance and thermal transmittance (U-value) shall be assessed according to EN ISO 8990.

If necessary, the thermal resistance shall be calculated on the basis of EN ISO 6946.

If thermal bridges do occur, their effect on the overall thermal performance shall be incorporated in the above mentioned thermal resistance calculations, taking into account results of thermal bridges calculation methods as described in EN ISO 14683 or EN ISO 10211.

EN ISO 10456 may be used, as far as applicable for the product concerned.

On the basis of the assessment method used, the corresponding tabulated or measured λ-value (in W/mK), the thermal resistance value R (in m^2 K/W), or the thermal transmittance coefficient, U (in W/m^2K), calculated, where relevant, in accordance with EN ISO 6946, shall be given.

2.2.12 Water vapour permeability

The water vapour transmission coefficient shall be assessed on the basis of tabulated values given in European harmonised product standards, European Technical Assessments or tabulated values in accordance with EN ISO 10456.

Where the applicant requires to declare specific water vapour transmission coefficient values, these shall be tested inaccordance with EN ISO 12572 or EN 12086 or equivalent European standards.

EN ISO 10456 may be used, as far as applicable for the product concerned.

The tabulated or measured value of the water vapour transmission coefficient (μ-value) shall be stated. The source of the values or the standard used to determine the values shall be quoted.

Tests have to be carried out without services passing through the specimen.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For products covered by this EAD the applicable European legal act is: Decision 1999/454/EC[17]

The system is: **1**

In addition, with regard to reaction to fire for products covered by this EAD the applicable European legal act is: Decision 1999/454/EC[17]

The systems are: **1, 3 and 4**

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are specified in Table 4.

Table 4 Control plan for the manufacturer; cornerstones

No	Subject/type of control *(product, raw/constituent material, component - indicating characteristic concerned)*	Test or control method[18]	Criteria, if any	Minimum number of samples[19]	Minimum frequency of control[20]
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					

Tab 4.1 Blocks and Plugs

1	TGA or DTA[21]	EOTA TR 024	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Dimensions	B.10	-	see[19]	1/b

17 Official Journal of the European Communities: No L 178/52 of 14 July 1999, p. 3

18 The test methods shall correspond to those included in the technical specification, but different equipment may be used, as long as correlation may be established. The ETA-holder may also use external laboratories for these tests.

19 One specimen is normally considered to be sufficient. The final number of specimens is to be defined in the ETA or accompanying documents.

20 The abbreviations given stand for the frequency of tests: 1/b = once per batch, 1/10b = once per 10 batches, 1/6m = once per 6 month, 1/h = once per hour, conf = conformation with the technical specification provided by the supplier of the component(s)
batch:
for continuous production: the frequency shall be defined by the Technical Assessment Body on a case by case basis depending on the peculiarities of the manufacturing process and the level of quality management system installed;
for discontinuous production: A batch is the specific amount of material produced at one time using the same process and the same conditions of manufacture.

21 Method 1 or methods 2 plus 3 may be chosen alternatively but the frequency may be further reduced if the components / raw materials and their related mass is recorded automatically (e.g. by means of an automatically recording balance) and an appropriate quality management system is installed.

5	Density	B.6.5	-	see[19]	1/b
6	Expansion ratio[15]	EOTA TR 024, clause 3.1.11	-	see[19]	1/b
7	Expansion pressure[15]	EOTA TR 024, clause 3.1.12	-	see[19]	1/b

Tab 4.2 Boards

Calcium silicate boards					
1	EAD 350142-00-1106				
Mineral wool boards manufactured according to EN 13162 or EN 14303[22]					
1	EN 13162 or EN 14303				
2	Apparent density	B 6.3	-	see[19]	1/h or conf
3	”Melting point“	One of the methods of B.8 shall be used	-	see[19]	1/b of raw material or conf
Gypsum boards					
1	Properties according to EN 520				
2	Apparent density	EN 520	-	see[19]	1/h or conf
Boards other than Calcium silicate, Mineral wool and Gypsum based boards					
1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss off mass on heating[21]	B.4	-	see[19]	1/10 b
4	Dimensions	B.10	-	see[19]	1/b
5	Apparent density	B.6.6	-	see[19]	1/b

22 Products produced according to EN 14303 or EN 13162 may be suitable for penetration seal applications but “melting point” and density are properties relevant for this application which are not covered in these standards.

Tab 4.3 Modular systems

Modules					
1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Dimensions	B.10	-	see[19]	1/b
5	Density	B.6.5	-	see[19]	1/b
6	Shrinkage cavities / Homogeneity	(minimum mass for given dimension)	-	see[19]	1/b
Frame					
1	Dimensions	B.10	-	see[19]	1/b
2	Steel specification to EN standard		-	see[19]	1/b (conf)
3	Thickness of protective coating (if relevant)		-	see[19]	1/b (conf)

Tab 4.4 Cable boxes

Intumescent inlays					
1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Dimensions	B.10	-	see[19]	1/b
5	Expansion ratio[15]	EOTA TR 024:July 2009, clause 3.1.11	-	see[19]	1/b
6	Expansion pressure (if relevant)[15]	EOTA TR 024, clause 3.1.12	-	see[19]	1/b

Housing					
1	Dimensions	B.10	-	see[19]	1/b
2	Steel specification to EN standard		-	see[19]	1/b (conf)
3	Thickness of protective coating (if relevant)		-	see[19]	1/b (conf)

Tab 4.5 Coatings/fillers[23] (for coated mineral wool slabs)

Coating / filler					
1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Viscosity of “liquid” material	B.7	-	see[19]	1/b
5	Density of “liquid” material	B.6.1	-	see[19]	1/b
6	Expansion ratio[15]	EOTA TR 024, clause 3.1.11	-	see[19]	1/b
7	LOI[24]	EOTA TR 024, clause 3.1.14	-	see[19]	1/b
8	Flexibility[25]	EOTA TR 024, clause 3.1.13	-	see[19]	1/b
Pre-coated mineral wool slab					
1	Thickness of the coating	B.10	-	see[19]	1/b

23 In the context of coated mineral wool slab seals a filler is the material used around the perimeter of the seal, between the mineral wool slabs and between the mineral wool slab and the penetrating services for adhesion or filling gaps. It may be the same product as the coating but with a higher viscosity.

24 Only for ablative products; For FPC of ablative components a combination of flexibility, ash content/content of non-volatile components and density is considered to be sufficient but if an enterprise owns the equipment and skilled staff for LOI-testing the method may be used for FPC.

25 Only for coatings

Tab 4.6 Collars

Inlay					
1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Dimensions	B.10	-	see[19]	1/b
5	Expansion ratio[15]	EOTA TR 024, clause 3.1.11	-	see[19]	1/b
6	Expansion pressure[15] (if relevant)	EOTA TR 024, clause 3.1.12	-	see[19]	1/b
Housing					
1	Thickness of steel sheet	B.10	-	see[19]	1/b (conf)
2	Thickness of Zn layer (if relevant)		-	see[19]	1/b (conf)
3	Thickness of protective coating (if relevant)		-	see[19]	1/b (conf)
4	Tensile strength of steel		-	see[19]	1/b (conf)
5	Dimensions	B.10	-	see[19]	1/b

Tab 4.7 Pillows

Filling material					
1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Quantity (mass) per bag		-	see[19]	1/b
5	Bulk density	B.6.4	-	see[19]	1/b
6	Particle size distribution	B.10.3	-	see[19]	1/b
7	Expansion ratio[15]	EOTA TR 024, clause 3.1.11	-	see[19]	1/b

Bag					
1	Type of bag material(s)	-	-	see[19]	1/b (conf)
2	Dimensions of empty bag	B.10	-	see[19]	1/b
3	Tear strength of bag (fabric/seams)	B.5.4	-	see[19]	1/10 b[26]
4	Tear strength of fabric	B.5.4.1	-	see[19]	1/b (conf)
5	Mass per area of fabric		-	see[19]	1/b (conf)
6	Mass per length of thread		-	see[19]	1/b (conf)

Tab 4.8 Bellow seals (fabric)

1	Type of material(s)		-	see[19]	1/b (conf)
2	Dimensions	B.10	-	see[19]	1/b
3	Tear strength of fabric	B.5.4.1	-	see[19]	1/b (conf)
4	Mass per area of fabric		-	see[19]	1/b (conf)
5	Tear strength of seams (if relevant)	One of the methods of B.5.4.2 shall be used	-	see[19]	1/10 b
6	Impregnation / flame retardants (quantity per unit area of fabric)		-	see[19]	1/b

Tab 4.9 Foams in-situ applied

1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Density of cured foam	B.6.2	-	see[19]	1/b
5	Expansion ratio[15]	EOTA TR 024, clause 3.1.11	-	see[19]	1/b
6	Curing behaviour (tack free time)	B.9	-	see[19]	1/b
7	Dimensional stability (change in volume)	B.11	-	see[19]	1/10 b[27]

26 If the bag is purchased as a component a confirmation with the technical specification shall be provided for every delivery

27 Depending on how close the result of the assessment test is to the threshold value of the specification

Tab 4.10 Mortar (cement based) and Plaster (gypsum based)

1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Non-compacted bulk density	B.6.4	-	see[19]	1/b
5	Setting time (if relevant)		-	see[19]	1/b
6	Compressive strength after 3 or 7 days (cement based)	B.5.1.1	-	see[19]	1/b
7	Compressive strength after 28 days (cement based)	B.5.1.1	-	see[19]	1/6 m
8	Compressive strength after 24 hours - fully saturated (gypsum based)	B.5.1.2	-	see[19]	1/b
9	Compressive strength fully dried (gypsum based)	B.5.1.2	-	see[19]	1/6 m

Tab 4.11 Sealants/mastics and putties

1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Density of uncured (“liquid”) material	B.6.1	-	see[19]	1/b
5	Viscosity of uncured (“liquid”) material	B.7	-	see[19]	1/b
6	Hardness after curing (if relevant)	One of the methods of B.5.3 shall be used	-	see[19]	1/10 b
7	Expansion ratio[15]	EOTA TR 024, clause3.1.11	-	see[19]	1/b

Tab 4.12 Wraps (including intumescent strips and composite strips) and intumescent sleeves

1	TGA or DTA[21]	B.2	-	see[19]	1/10 b
2	Content of non-volatile components[21]	B.3	-	see[19]	1/10 b
3	Loss of mass on heating[21]	B.4	-	see[19]	1/10 b
4	Dimensions	B.10	-	see[19]	1/b
5	Expansion ratio[15]	EOTA TR 024, clause3.1.11	-	see[19]	1/b
6	Expansion pressure[15]	EOTA TR 024, clause 3.1.12	-	see[19]	1/b

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for the product are specified in Table 5.

Table 5 Control plan for the notified body; cornerstones

N°	Subject/type of control *(product, raw/constituent material, component - indicating characteristic concerned)*	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control *(for system 1 only)*					
1	The notified product certification body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of the product according to the European Technical Assessment.				-
Continuous surveillance, assessment and evaluation of factory production control *(for system 1 only)*					
2	The notified product certification body shall verify that the manufacturing process and the system of factory production control are maintained.				2 / year

4 REFERENCE DOCUMENTS

For dated references, the date represents the year of publication. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1396	Aluminium and aluminium alloys - Coil coated sheet and strip for general applications – Specifications
EN 520	Gypsum plasterboards, Definition, requirements and test methods
EN 1015-1	Methods of test for mortar for masonry - Part 1: Determination of flexural and compressive strength of hardened mortar
EN 1015-11	Methods of test for mortar for masonry - Part 11: Determination of flexural and compressive strength of hardened mortar
EN 1026	Windows and doors - Air permeability - Test method
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 1426	Bitumen and bituminous binders - Determination of needle penetration
EN 1602	Thermal insulating products for building applications - Determination of the apparent density
EN 10088-1	Stainless steels - Part 1: List of stainless steels
EN 10088-2	Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general and construction purposes
EN 10088-3	Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general and construction purposes
EN 10088-4	Stainless steels - Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes
EN 10088-5	Stainless steels - Part 5: Technical delivery conditions for bars, rods, wire, sections and bright products of corrosion resisting steels for construction purposes
EN 10169	Continuously organic coated (coil coated) steel flat products - Technical delivery conditions
EN 12086	Thermal insulating products for building applications - Determination of water vapour transmission properties
EN 12092	Adhesives - Determination of viscosity
EN 12664	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance
EN 12667	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance
EN 12939	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Thick products of high and medium thermal resistance
EN 13162	Thermal insulation products for buildings – Factory made mineral wool (MW) products - Specification
EN 13238	Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates
EN 13245-1	Plastics - Unplasticised poly(vinyl) chloride (PVC-U) profiles for building applications - Part 1: Designation of light coloured profiles

EN 13245-2	Plastics - Unplasticised poly(vinyl) chloride (PVC-U) profiles for building applications - Part 2: Profiles for internal and external wall and ceiling finishes
EN 13245-3	Plastics - Unplasticised poly(vinyl) chloride (PVC-U) profiles for building applications - Part 3: Designation of coloured profiles
EN 13823	Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item
EN 14303	Thermal insulation products for building equipment and industrial installations - Factory made mineral wool (MW) products – Specification
EN 13501-1	Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests
EN 13501-2	Fire classification of construction products and building elements - Part 2: Classification using test data from fire resistance tests
EN 16516	Construction products – Assessment of release of dangerous substances – Determination of emissions into indoor air
EN 60439-2	Low-voltage switchgear and controlgear assemblies - Part 2: Particular requirements for busbar trunking systems (busways)
EN ISO 527-2	Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics
EN ISO 580	Plastics piping and ducting systems - Injection-moulded thermoplastics fittings - Methods for visually assessing effects of heating
EN ISO 717-1	Acoustics - Rating of sound insulation of buildings and of building elements - Part 1: Airborne sound insulation
EN ISO 1519	Paints and varnishes; Bend test (cylindrical mandrel)
EN ISO 2811-1	Paints and varnishes - Determination of density - Part 1: Pyknometer method
EN ISO 2811-2	Paints and varnishes - Determination of density - Part 2: Immersed body (plummet) method
EN ISO 3219	Plastics; Polymers/resins in the liquid state or as emulsions or dispersions; Determination of viscosity using a rotational viscometer with defined shear rate
EN ISO 3251	Paints, varnishes and plastics; Determination of non-volatile-matter content
EN ISO 3451-1	Plastics; Determination of ash; Part 1: General methods
EN ISO 6946	Building components and building elements - Thermal resistance and thermal transmittance - Calculation method
EN ISO 8990	Thermal insulation - Determination of steady-state thermal transmission properties - Calibrated and guarded hot box
EN ISO 10140-1	Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
EN ISO 10140-2	Acoustics; Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation
EN ISO 10140-4	Acoustics; Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
EN ISO 10140-5	Acoustics; Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment

EN ISO 10211	Thermal bridges in building construction - Heat flows and surface temperatures - Detailed calculations
EN ISO 10456	Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values
EN ISO 11925-2	Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame - Part 2: Single-flame source test
EN ISO 12572	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties
EN ISO 12944-1	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 1: General introduction
EN ISO 12944-2	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments
EN ISO 12944-3	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 3: Design considerations
EN ISO 12944-4	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 4: Types and surface preparation
EN ISO 12944-5	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems
EN ISO 12944-6	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test methods
EN ISO 12944-7	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 7: Execution and supervision of paint work
EN ISO 12944-8	Paints and varnishes; Corrosion protection of steel structures by protective paint systems - Part 8: Development of specifications for new work and maintenance
EN ISO 14683	Thermal bridges in building construction - Linear thermal transmittance - Simplified methods and default values
EN ISO 14713	Protection against corrosion of iron and steel in structures – Zinc and aluminium coatings - Guidelines
EN ISO 13788	Hygrothermal performance of building components and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation - Calculation methods
EN ISO 13934-1	Tensile properties of fabrics - Part 1: Determination of maximum force and elongation at maximum force using the strip method
EN ISO 13935-1	Seam tensile properties of fabrics and made-up textile articles - Part 1: Determination of maximum force to seam rupture using the strip method
EN ISO 13935-2	Seam tensile properties of fabrics and made-up textile articles - Part 2: Determination of maximum force to seam rupture using the grab method
ISO 37	Rubber, vulcanised or thermoplastic; Determination of tensile properties
ISO 3049	Gypsum plasters; Determination of physical properties of powder
ISO 7619-1	Rubber, vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)
ISO 7619-2	Rubber, vulcanized or thermoplastic - Determination of indentation hardness - Part 2: IRHD pocket meter method

EOTA TR 001	Determination of impact resistance of panels and panel assemblies
EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products
EOTA TR 034	General BWR3 Checklist for EADs/ETAs - Content and/or release of dangerous substances in construction products
EAD 350142-00-1106	Fire Protective Products: Fire protective board, slab and mat products and kits

ANNEX A – MOUNTING AND FIXING PROCEDURES FOR REACTION TO FIRE TESTS

A.1 Tests according to EN 13823 (SBI)

The product shall be assessed in an installation representative of practical use and comprising all components, e.g. sealant, backing material and fixings but without services. The thickness of each component of the penetration seal shall be representative of the installation in practice for the penetration seal size of the intended field of application. The maximum thickness of 200 mm given in EN 13823 may be reduced, provided a minimum unaffected thickness of 10 mm of the product or component forming the surface is left after the test[28].

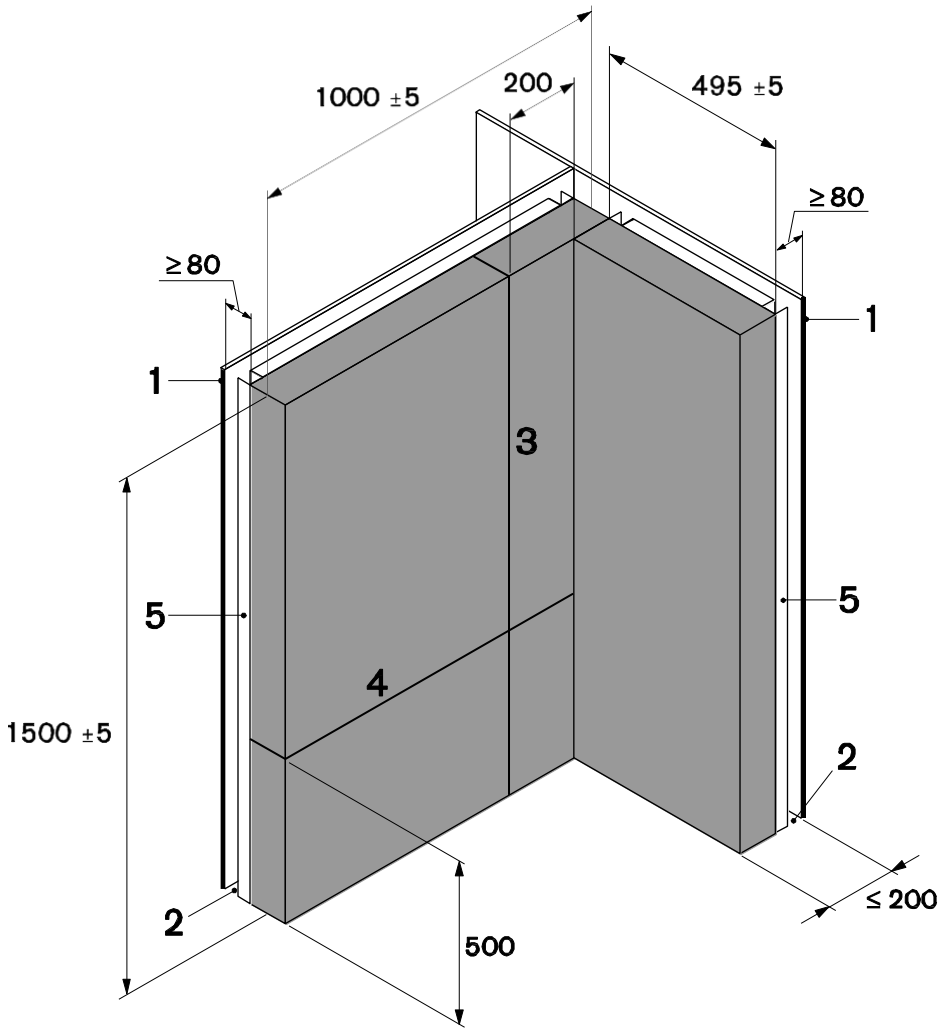
Regarding the size of the specimen the standard configuration shown in Figure A.1 is normally used[29]. Where no lateral spread of flame is expected, outside the area on the long wing covered by the specimen, the configuration shown in Figure A.2 may be used alternatively. When in a test using the configuration according to A.2, lateral spread of flame outside this area is observed the test shall be repeated using the standard configuration according to A.1.

The long wing of specimens that are built from a high number of relatively small parts (e.g. blocks) can be mechanically stabilized by fixing them at the back, to a cross-type frame made of steel (see Figure A.3).

28 This may be relevant for e.g. blocks, pillows or foams. An indicative test, for example using a Bunsen burner will give an estimate of the necessary thickness.

29 The size of the test specimen was chosen considering the fact that even if the size of a single opening is restricted in the ETA because of other reasons, e.g. the resistance to fire performance, it will always be possible to install several penetration seals in a single wall or floor in close proximity. Results of indicative tests with commonly used product types have shown that the full height of the test specimen shall be used to get a reliable result.

Dimensions in millimetres



Key

1 Backing boards according to EN 13823

2 Air gap

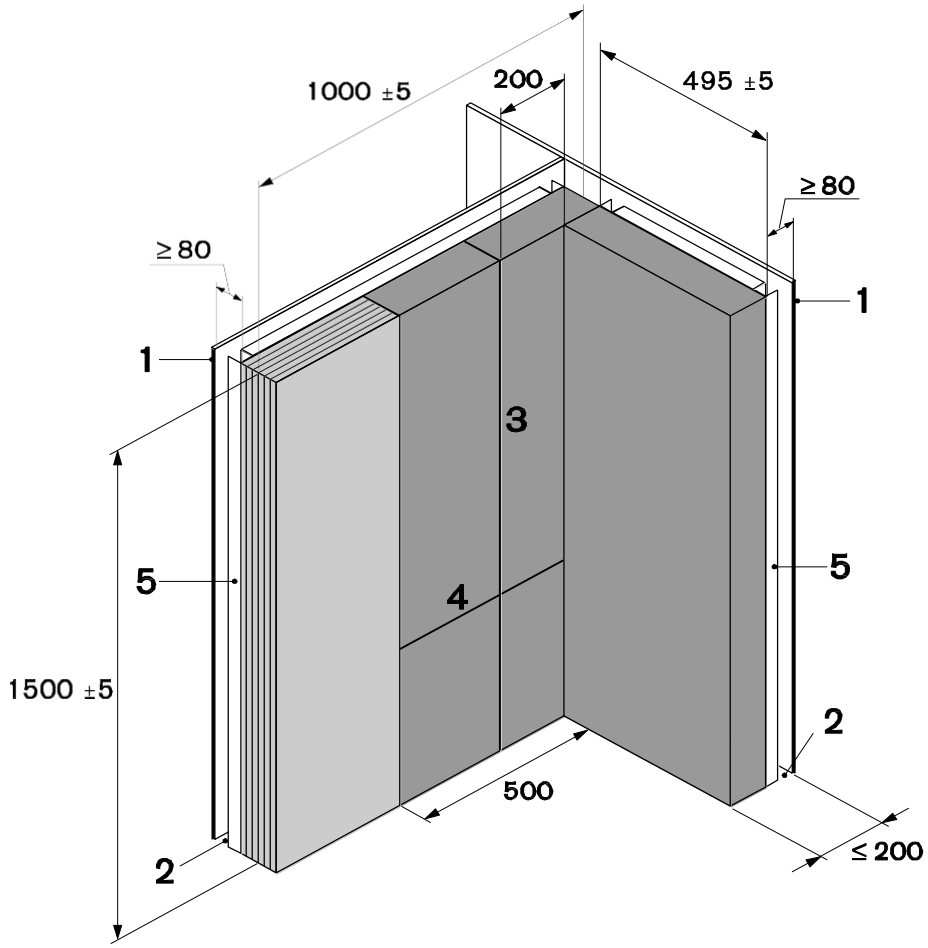
3 Vertical joint (where relevant)

4 Horizontal joint (where relevant)

5 Supporting frame (optional, see Figure A.3)

Figure A.1 Standard configuration

Dimensions in millimetres



Key

	Specimen
	Calcium silicate board
1	Backing boards according to EN 13823
2	Air gap
3	Vertical joint (where relevant)
4	Horizontal joint (where relevant)
5	Supporting frame (optional, see Figure A.3)

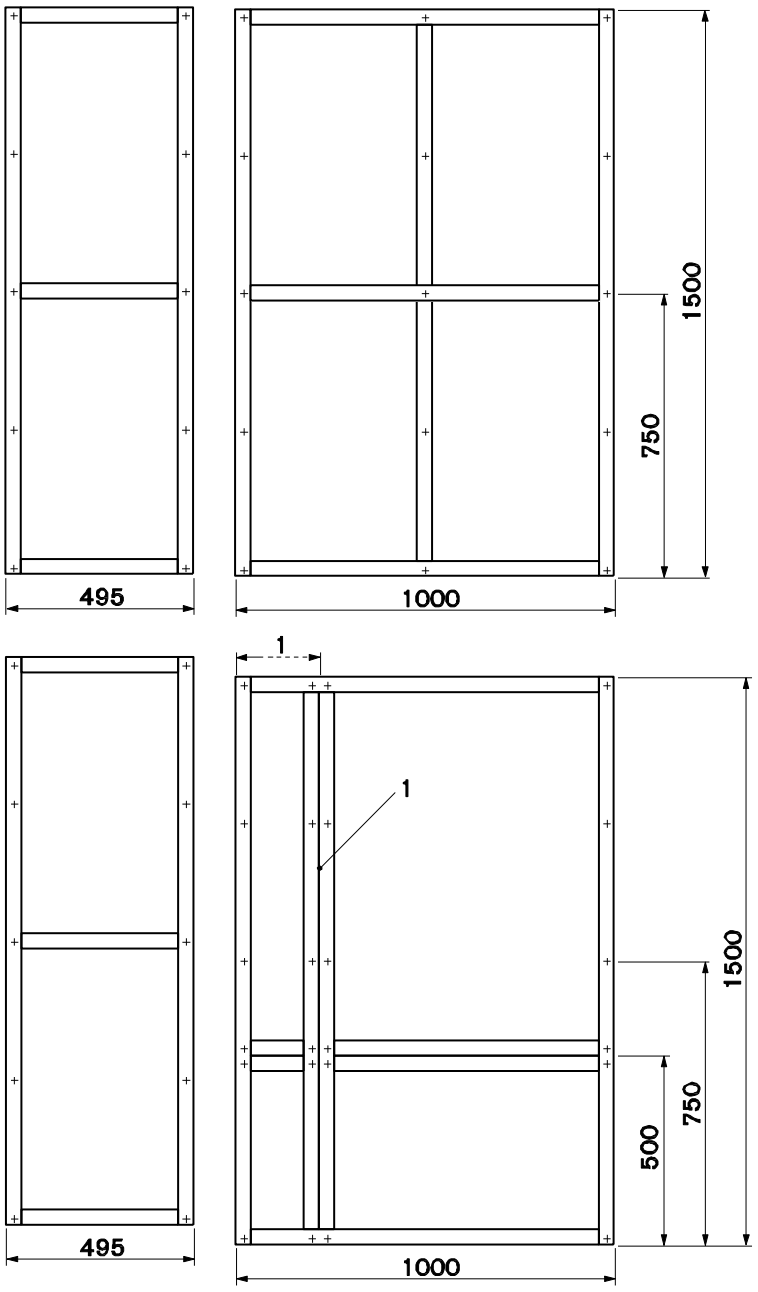
Figure A.2 – Configuration when no lateral spread of flame outside the specimen area on the left wing is expected

When using the configuration according to Figure A.2 the part of the wing that is not covered by the test material shall be made of calcium silicate board.

Dimensions in millimetres

A

B



Key

A Frame for specimens without joints

B Frame for specimens with joints

1 Position of the vertical joint [a]

[a] The position of the vertical joint and the related frame depends on the thickness of the specimen as the overall length of the long wing is defined with (1000 ± 5) mm and the position of the joint at 200 mm from the corner line when the wings are mounted ready for testing

Figure A.3 Cross-type frame on the back of the long wing

A.2 Tests according to EN ISO 11925-2 (small burner test)

The standard size of the specimen (250 mm x 90 mm x maximum 60 mm) shall be used whenever possible, e.g. by flattening the product or cutting it into the required size.

Where the specimen has a cut surface this surface shall not be used as the test surface exposed to the flame.

Where the geometry or nature of the product does not allow the use of the standard specimen size the following rules apply:

- Where the width of the product is smaller than 90 mm, the actual width of the product is used.
- For coatings used on mineral wool (slabs) the standard mineral wool substrate according to EN 13238 shall be used. The thickness of the coating shall be the maximum of any range requested by the manufacturer.
- Where the spacing requirements for the test set up do not allow the use of a particular size of a cushion the size shall be used that optimally fits both the spacing and size requirements.
- Modular systems: The rubber modules can be tested in the uncompressed state. At the request of the manufacturer the compressed state as in practice can also be tested. Ideally a 250 mm x 90 mm x 60 mm specimen is produced. Where this is not feasible a frame closest in size to the standard specimen, filled with “blank” modules (without a hole), shall be used.

Note: To achieve a realistic result tests under compression are particularly recommended for soft (e.g. foam-type) products when they are used under compression in practice.

For thin specimens a calcium silicate backing board shall be used.

According to EN ISO 11925-2 edge flaming is required only where the edge is exposed in practice (protrusion from the surface). This is normally not the case for penetration seals. However for the following products edge flaming will be necessary:

- Pillows
- Collars and wraps.

For wraps which are installed within the opening and whose edge is flush with the surface of the building element, flaming of the small surface that is exposed in practice is used.

For collars: the surface that is exposed in practice shall be exposed.

ANNEX B – MOUNTING AND FIXING PROCEDURES FOR REACTION TO FIRE TESTS

B.1 IR (Infra-Red Spectroscopy)

IR shall be carried out according to the instruction manual of the equipment used. See also EOTA TR 024, Annex C for details when used as identification method (Fingerprint).

B.2 Thermo-analytical methods

B.2.1 Thermo-gravimetric Analysis (TGA)

See EOTA TR 024.

B.2.2 Differential Thermo Calorimetry (DTA)

See EOTA TR 024.

B.3 Content of non-volatile components

Test according to EN ISO 3251.

The value to be reported for identification shall be the mean value of at least three specimens.

B.4 Loss of mass on heating

Test according to EN ISO 3451-1, subject to the following provisions: As “Loss of mass on heating” is a characteristic of a material, protective foils or coatings should be removed if at all possible. When the product is tested with a protective foil or coating this shall be recorded to ensure consistency with future tests.

Note: The standard was written for plastics but other materials can also be tested following the principles of the standard.

The value to be reported for identification shall be the mean value of at least three specimens.

B.5 Mechanical properties

B.5.1 Compressive strength

B.5.1.1 Mortars (cement based)

Test according to EN 1015-11.

The strength at 3, 7 or 28 days may be determined dependent on whether high early strength or normal cement is used.

B.5.1.2 Plaster (gypsum based)

Test according to EN 1015-11.

This method may be applied to gypsum based products subject to the product being tested after 24 hours, fully saturated, and after oven drying at 30°C to 35ºC to constant mass.

B.5.2 Tensile strength

B.5.2.1 Rubber

Test according to ISO 37 or EN ISO 527-2.

B.5.3 Hardness of sealants (cured)

Test according to ISO 7619 -1 or ISO 7619-2.

B.5.4 Tear strength

B.5.4.1 Fabrics

Test according to EN ISO 13934-1.

B.5.4.2 Seam

Test according to EN ISO 13935-1 or EN ISO 13935-2.

B.5.5 Flexibility

Test according to EN ISO 1519.

B.6 Density

B.6.1 Sealants, coatings and other paste like materials

Sealants, coatings and other paste like materials may be tested according to the principles of EN ISO 2811-1 (pyknometer). The mean value of 3 specimens and the standard deviation shall be given. For FPC also EN ISO 2811-2 is a suitable method.

B.6.2 Foams (in-situ, cured condition)

A cardboard beaker (coated with paraffin wax) is filled with the foam (taking care to avoid any holes and cavities). The foam is cut at the edge of the beaker after curing. The specimen shall be kept at ambient temperature. Density = mass total – mass beaker / volume of beaker (kg/m^3). The mean value of 3 specimens and the standard deviation shall be given.

B.6.3 Mineral wool

Test according to EN 1602.

B.6.4 Non-compacted bulk density (mortar, filling material for pillows)

Test according to ISO 3049.

B.6.5 Pre-formed products (e.g. blocks, plugs)

The density is calculated from the mass and the volume of the specimen. The mass of the specimen is to be assessed with a balance of an accuracy of 0,1 g. The dimensions shall be determined to the nearest mm either using a ruler when the product has a regular shape, or determining the volume by using a water displacement technique.

B.6.6 Boards other than Calcium silicate, Mineral wool and Gypsum based boards

Depending on the type of product the test method shall be determined case by case.

B.7 Viscosity

B.7.1 Liquids with high viscosity

Test according to EN ISO 3219.

B.7.2 Liquids with low viscosity

Test according to EN 12092.

B.7.3 Uncured sealants

Test according to EN 1426.

B.8 Behaviour of mineral wool at high temperature (for characterization and FPC)

B.8.1 Visual method of determining the “Melting point”

A sample of the mineral wool shall be pre-treated at (550 ± 10)°C in a muffle furnace until the organic binder will be eliminated. Cut cube specimens of 10 mm x 10 mm x 10 mm from the pre-treated sample.

The cube specimens are inserted into a tube furnace having an internal diameter of 25 mm pre-heated to a temperature approximately 30 degrees below the expected melting temperature. This is achieved by placing the specimen on a suitable carrier (e.g. a metal or ceramic pin or spatula) which is supported outside the tube furnace. The specimen is moved slowly to the centre of the furnace, where the temperature sensor is located. The specimen is held for 10 minutes in that position. The specimen is than carefully removed from the furnace and examined to see whether it has melted. The furnace temperature is noted.

If the specimen is unchanged, raise the furnace temperature by 10 degrees, wait until the temperature is stabilized and repeat the test with a new specimen.

If the specimen has melted, lower the temperature by 10 degrees and repeat the measurement with a new specimen. The temperature where the wool started melting is called the “melting” point.

The dimensions of the inner diameter of the tube furnace and the specimen may be changed provided the ratio is kept constant.

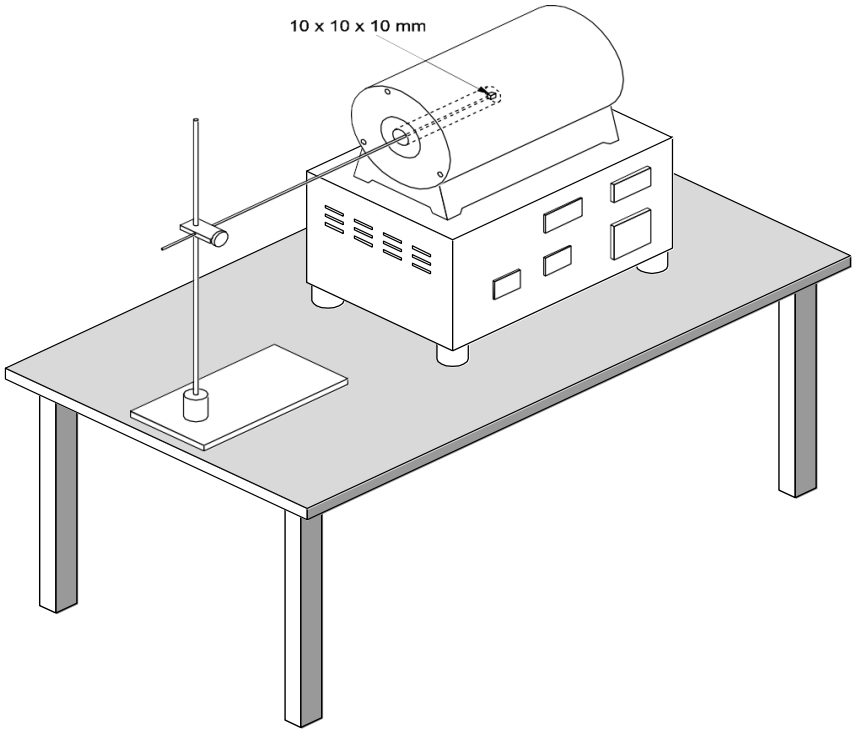


Figure B.1 – Setup for visual method

B.8.2 Thermo-analytical methods

Any thermo-analytical method may be used, e.g. DTA or TGA.

B.8.3 Chemical analysis (for FPC)

The details (definition of the elements/components to be determined) are to be agreed between the Technical Assessment Body and the manufacturer and to be outlined in the documentation accompanying the ETA.

B.8.4 Determination of the melting point of mineral fibre insulating materials

B.8.4.1 General

This method is suitable for mineral fibre material to test whether its “melting point” is above a temperature of 1000°C.

B.8.4.2 Preparation

For every mineral fibre material use at least 2 dry samples.

Cut 2 specimens of 500 mm x 500 mm. The maximum thickness shall be 80 mm.

Dry at (23 ± 2) °C and 50 ± 5% RH until equilibrium (change in mass less than 0,1% within 24 hours).

Apply a steel-plate of a size of 200 mm x 200 mm and a mass of 0,4 kg (causing a pressure of 0,1 kN/m²) with a whole in the centre for determining the thickness of the material (round up to full millimetre).

The density of every specimen will be determined geometrically from mass and the geometrical dimensions.

B.8.4.3 Test procedure

Cover both sides of every specimen by a steel-sheet of a thickness of 1 mm and install them vertically into a small scale furnace (e.g. according to DIN 4102-8) and expose the specimen to a heat regime according to the standardized temperature-time curve according to EN 13501-2, for 90 minutes.

The thickness shall be measured again after exposure (see preparation).

B.9 Curing behaviour

Tack free time of foams: a suitable amount of the material is extruded in to a beaker. Every 2 seconds the surface of the foam is touched by means of a wooden spatula. The tack free time is reached when no foam sticks on the spatula.

B.10 Dimensions

B.10.1 Thickness

The thickness of products in the form of plates, sheets, boards, strips, fabrics, foils etc. is assessed by means of a suitable gauge to the nearest 0.1 mm at 5 locations of the specimen. The minimum size of the specimen is 100 mm x100 mm or a minimum length of 500 mm in case of strips.

B.10.2 Other dimensions

The dimensions shall be assessed to an accuracy of 0,5% by means of a suitable gauge.

B.10.3 Particle size distribution

The method described for dry material in EN 1015-1 is used.

B.11 Dimensional stability

B.11.1 Foams

B.11.1.1 General

Dimensional stability is a cured foam's specific parameter of the resistance to shrink or post-expand after curing as measured in this test. The following protocol describes how to measure dimensional stability in a controlled testing environment.

B.11.1.2 Required equipment

- The application tool (e.g. dispenser) that belongs to the tested system
- Spacers (minimum 100 mm x (15 mm ± 1 mm) x 20 mm, made of dimensionally stable material (for example: PE, PTFE,...), on which polyurethane does not adhere.
- AC grade plywood, about 130 mm x 100 mm, so that a net foam area of 100 mm x 100 mm remains. The thickness of the plywood shall be minimum 9,5 mm.
- Hand clamps
- Calipers
- Knife
- Climatic chamber (controlled environment test equipment)
- Heating chamber, dry but unspecified relative humidity

B.11.1.3 Testing

The foam, the application tool, and the substrate shall be conditioned to constant mass in accordance with EN 13238. Three specimens shall be made according to Figure B.2 and B.3. Be sure that the clamps sit directly on the spacers so as not to compress the assembly. The specimen shall have a gap with the required width of approximately 20 mm. The net foam space shall be an area of approximately 100 mm x 100 mm. Figure B.4 shows how the assembly should be oriented during foaming and how the foam should be applied. Again, make sure that the clamps sit directly on the spacers. After 24 hours, remove the hand clamps and the spacers. Cut the excess foam that has expanded from the interior of the assembly so that it is flush with the plywood edges. Measure the initial, inner plywood to plywood board dimensions. After taking the measurements, store the assemblies in the required test climates.

The test climates are:

- (40 ± 2) ºC / (90 ± 5) % relative humidity
- (30 ± 2) ºC / (30 ± 5) % relative humidity

B.11.1.4 Assessment

At day 7 and 14, the specimens shall be removed from the respective test chambers and then stored for a minimum of 2 hours at standard conditions in accordance with EN 13238. At the four corners, the distance between the boards is measured as near as possible to the interior foam surface (distance “c” in Figure B.3). Alternatively, if there are any surface irregularities, the distance can be measured at the exact middle of the specimen where the two spacers were placed (Figure B.4). After the first measurement, place the specimens back in the proper chamber.

B.11.1.5 Dimensional stability calculation

The dimensional stability, d, is calculated as the percentage change in the assembly dimensions:

$$d = \left(\frac{b}{c}\ x\ 100\right) - 100\ (\%)$$

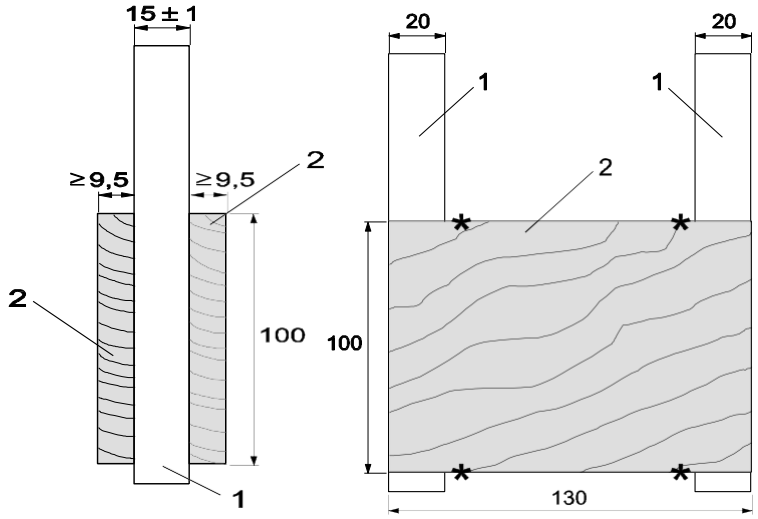
Where:

- b (mm) = Measured width of the gap after storage in the test chamber
- c (mm) = Starting value before storage

The dimensional stability d of one specimen is given by the mean value of the four or two measuring points. The mean value of each assembly and the mean value of all assemblies as well as the standard deviation are recorded.

The overall mean value together with its standard deviation shall be given.

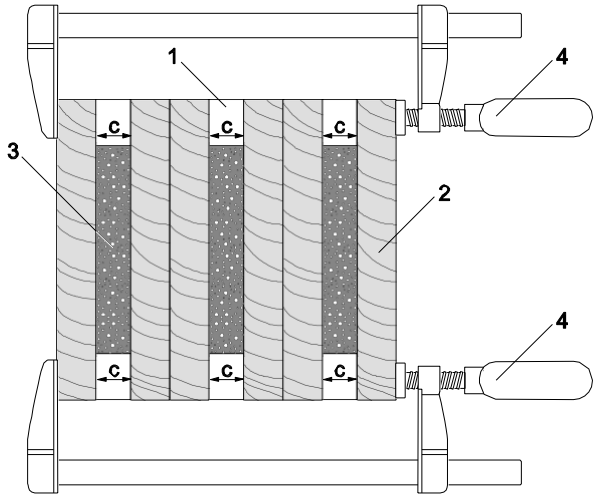
Dimensions in mm



Key

1 Spacer
2 Plywood
***** Locations for determination of thickness after exposure

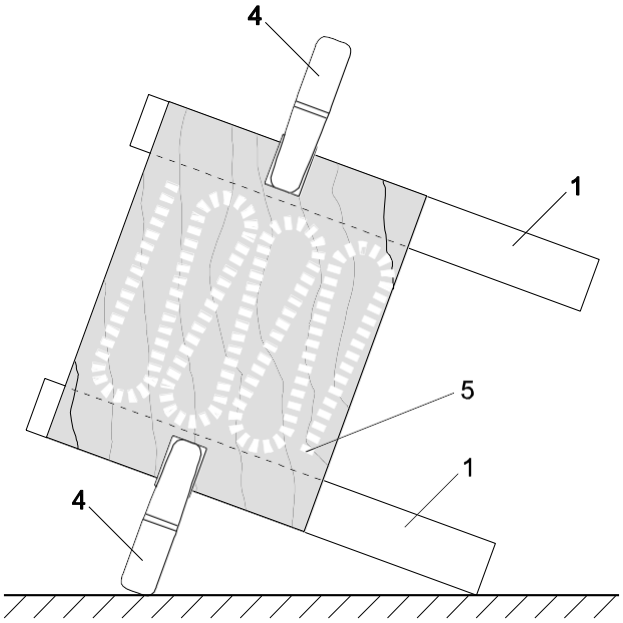
Figure B.2 – Specimens for determination of dimensional stability – Side view



Key

1 Spacer
2 Plywood
3 Foam
4 Clamps
c Dimension of the specimens determined after exposure

Figure B.3 – Specimens for determination of dimensional stability – Top view



Key
1 Spacer
2 Clamps
3 Starting point for foaming

Figure B.4 – Set-up for foaming

B.11.2 Linear expansion on setting (gypsum based mortar)

B.11.2.1 General

The linear expansion on setting shall be assessed in continuous damp air storage by means of a simple extensometer described in B.11.2.2 with the neat plaster gauged to a standard final coat consistence. The plaster shall be stabilised before test by the method described in B.11.2.5.

B.11.2.2 Extensometer

The extensometer has an open V-shaped cradle closed at one end by a fixed plate and at the other end by a movable partition, carried on the stem of an ordinary watch pattern dial micrometer gauge reading to 1/100 mm (see Figure B.5). The cradle is of brass or bronze 100 mm long, about 60 mm wide and 25 mm deep with a rounded bottom. The take-up or returning spring shall be light and the movement free.

To prevent the plaster sticking to the sides of the cradle, grease before use and line internally with thin non-absorbent paper having a glazed surface. Renew the paper lining for each test. Fill the gauged plaster into the cradle while the movable plate is held against the end, and stoke off smooth and level with the top of the cradle.

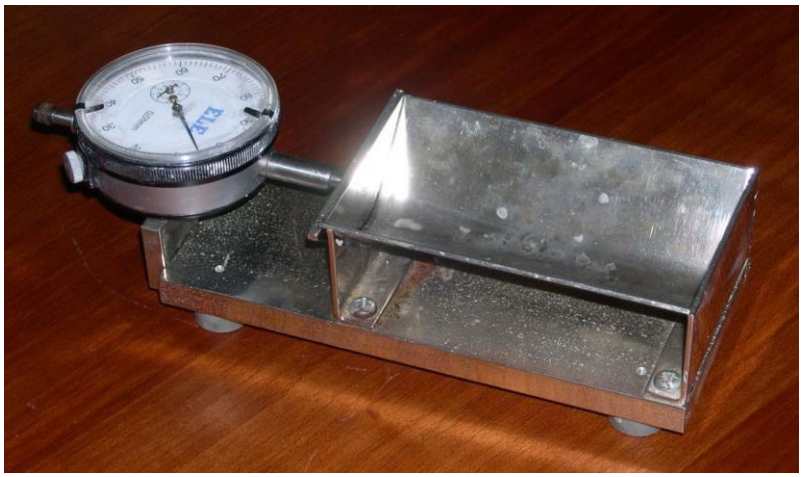


Figure B.5 – Extensometer

B.11.2.3 Zero adjustment

Move the movable partition very slightly forward clear of the end to eliminate backlash. Bring the plaster solid against the movable partition. Make any necessary zero adjustment on the dial.

B.11.2.4 Gauging and measurement

A convenient quantity of plaster to use is about 200 g. Gauge this with water in the manner and to the standard final coat consistence described in B.11.2.6. Fill the gauged plaster immediately into the cradle of the extensometer and adjust the zero point as described in B.11.2.3. Place the extensometer in the damp closet and note the zero reading. Leave it undisturbed for 24 hours and then take the final reading. Calculate the percentage linear expansion

$$\text{Percent linear expansion} = \frac{Difference\ in\ dial\ readings\ in\ 1/100mm}{100}$$

B.11.2.5 Method of stabilizing plasters

Expose the plaster for 3-4 days in a layer not more than 12 mm in thickness to an atmosphere of (65 ± 3) % RH at a temperature of (20 ± 5)°C with vigorous air circulation over the specimen throughout this period.

If a conditioned room is not available, maintain the humidity by means of a saturated solution of ammonium nitrate contained together with the solid salt in a wide dish, and placed in a tightly-closed cabinet. Keep the air in the cabinet moving over both solution and plaster.

B.11.2.6 Standard consistence

The standard final coat consistence shall be assessed by means of a dropping ball penetrometer precisely as described below.

Fill a ring mould made from a rigid material, 100 mm internal diameter, 25 mm internal depth with the paste under test. Rest the mould on a non-porous plate, fill it by using a flexible palette-knife in about ten increments in such a manner as to eliminate voids or air-bubbles. Smooth off the surface of the paste level with the top of the mould.

Drop a 25 mm diameter methylmethacrylate (MMA) ball of a mass of (9,8 ± 1) g from rest from a height of 250 mm measured from the bottom of the ball to the surface of the paste, so that it falls approximately into the centre of the ring. Record the penetration as the distance from the lowest point of the ball to the level of the original surface of the material.

Measure the depth of penetration by a suitable method.

The paste is of the correct consistence, when the ball penetrates 15 mm to16 mm.

When early stiffening occurs, 0,1 g of sodium citrate may be added to the gauging water for the assessment of consistence.

B.12 Visual examination

The appearance of the product shall be assessed for changes in colour, texture, shape and for the appearance of cracks, fissures etc. If changes in appearance are not reflected in the results of the assessment of the other properties given in Clause 2.2.9.3 in this EAD, possible consequences of the changes in appearance, on durability, shall be assessed on a case by case basis.

ANNEX C – WATER PERMEABILITY – TEST METHOD

C.1 Test sample

A sample representative of the fire stopping or fire sealing product shall be used to prepare a blank penetration seal following the installation instructions of the manufacturer. If a splice is required to construct longer seals a single splice shall be included in the test specimen.

C.2 Conditioning

The test specimen shall be conditioned in accordance with EN 13238.

C.3 Test apparatus

The water leakage test apparatus shall consist of a container open both ends the base of which shall form a watertight seal against the test specimen. The container shall accommodate a specimen of minimum 1 m length and the intended width and sufficient part of the supporting construction.

C.4 Test procedure

The water leakage test apparatus shall be sealed to the test specimen using non-hardening sealants, pressure-sensitive tape or rubber gaskets with clamping devices.

Water, with a permanent dye, shall be placed in the water leakage test chamber. The water shall cover the penetration seal to a depth corresponding to the required pressure[30], which shall be maintained during the test.

The temperature of the test assembly shall be maintained within a range of (23 ± 5) °C. A white indicating medium shall be placed immediately below the test specimen.

The test shall be continued until leakage is observed or a maximum of 72 hours.

C.5 Assessment of the test results

The leakage of water through the penetration seal shall be noted by the presence of water or dye on the indicating media or droplets appear on the underside of the test assembly.

C.6 Recorded test data

The result is given as “water tight to x mm head of water” or “water tight to x Pa”.

The test report shall include the following:

a) A description of the assembly and materials of the linear joint seal under test, including drawings depicting geometry, exact size (length, width, and thickness), and location of the seal within the test assembly.
b) The relative humidity of the test assembly and linear joint seal materials, if applicable.

30 Requirement from a regulation or comparable specification