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Thermal insulation products — Common evaluation rules

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National foreword

This British Standard is the UK implementation of EN 13172:2024. It supersedes BS EN 13172:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/540, Energy performance of materials, components and buildings.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Contents

European foreword

This document (EN 13172:2024) has been prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2025, and conflicting national standards shall be withdrawn at the latest by April 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13172:2012.

EN 13172:2024 includes the following significant technical changes with respect to EN 13172:2012:

— the adaptation of this document to the terminology used in the European Regulation (EU) No 305/2011 (i.e. Construction Products Regulation - CPR) with AVCP system;

— the removal of references to third parties, bodies and manufacturers into clauses and annexes that can be used in conjunction with harmonised technical specifications;

— the addition of products for civil engineering applications in the scope of this document;

— the addition of a subclause for abbreviated terms;

— the split of Clause 4 into three subclauses;

— the updates and technical adjustments of Clause 5;

— the merging of Annexes B, C and D.

This document is intended to be used as a supporting standard in conjunction with harmonised technical specifications, product standards and any other assessment documents of thermal insulation products to ensure common evaluation rules for all stakeholders.

This document contains three informative annexes:

— Annex A, Guidance for conformity of the products under voluntary certification activities (not for CE marking purposes);

— Annex B, Guidance for common evaluation of the products under AVCP system;

— Annex C, Criteria for assessing non-conformity – Procedure in case of a complaint.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies common evaluation rules useful for the assessment and verification of constancy of performance of a thermal insulation product with harmonised technical specifications, product standards and any other assessment documents. Harmonised technical specifications, product standards and other assessment documents are called European product specifications in this document.

This document applies to factory made products for buildings, factory made products for building equipment and industrial installations, *in situ* products for buildings, *in situ* products for building equipment and industrial installations, to products for civil engineering applications, and to external thermal insulation composite kits.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12664:2001, *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 12667:2001, *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 12939:2000, *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*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
product
thermal insulation product produced under conditions which are presumed uniform to a given specification and placed on the market

3.1.2
factory production control
documented, permanent and internal control of production in a factory

3.1.3
production line
assemblage of equipment that produces products using a continuous process

3.1.4
production unit
assemblage of equipment that produces products using a discontinuous process

3.1.5
manufacturing plant
all the production equipment on the same site including all production lines and units

Note 1 to entry: The term factory also refers to the manufacturing plant.

3.1.6
assessment of performance
assessment of the performance of the product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product

3.1.7
verification of constancy of performance
factory production control system, procedures, regular inspections and tests and/or assessments ensuring that the performance in relation to the declared characteristics are maintained

3.2 Abbreviated terms

AoP is the Assessment of performance

VoCP is the Verification of Constancy of Performance

AVCP is Assessment and Verification of Constancy of Performance

FPC is Factory Production Control

4 Assessment and verification of constancy of performance

4.1 General

The assessment and verification of constancy of performance shall include all parts of the tasks given in Clause 5 of this document.

NOTE 1 Annex A is included for the purposes of voluntary activities.

NOTE 2 Annex C is included for the purposes of describing how the case of a complaint may be handled.

NOTE 3 The Annex ZA of the relevant harmonised standard or the European Assessment Document assigns the AVCP tasks for CE marking activities.

4.2 Type of production process

Thermal insulation can be commonly manufactured using two types of production processes:

— For continuous production processes, each production line is considered separately in terms of both AoP and VoCP.

— For discontinuous or batch production processes, production units using the same process in one manufacturing plant are considered together (as if one production line) in terms of both AoP and VoCP.

4.3 Product family

Products may be grouped into families for the purposes of assessment (i.e. AoP and VoCP) subject to the following conditions:

— They shall have the same type of production process and shall be derived from the same family of raw material; a distinction is made between glass wool and stone wool and between foams with different blowing agents.

— They shall differ only in aspects that do not influence the characteristics defined in the relevant European product specification.

— They shall be covered by a single European product specification.

— Products which differ only with regard to some characteristics may be grouped together by their common characteristics.

— Products which are identical except for the facing and for which the different facings have been shown to have the same effect on the declared characteristics (e.g. regarding thermal characteristics, the gas tight facings of some PU products), may be grouped.

Products with a common production specification, originating from the same type of production process and belonging to the same family of raw material may be grouped for verification of constancy of performance, although covered by different European product specifications (e.g. for thermal insulation products intended for buildings, civil engineering applications and for building equipment and industrial installations).

EXAMPLE Cellular glass in accordance with EN 13167:2012+A1:2015 and EN 14305:2015 or expanded polystyrene in accordance with EN 13163:2012+A2:2016 and EN 14309:2015.

The characteristics outside these common families shall be tested product by product.

Products which are outside the scope of a European product specification cannot be grouped for declaration purposes with products declared under the scope of that European product specification.

Provided that a product within the family complies with a European product specification then all products within the same family shall be deemed to comply with the European product specification for the characteristics concerned. If the same product fails to comply with the European product specification then the whole family shall be assumed to have failed to comply with the European product specification.

5 Verification of constancy of performance - Factory production control

5.1 General

Factory production control shall be fulfilled for each manufacturing plant.

5.2 Organization

5.2.1 General

Factory production control shall be operated according to an FPC system that shall be established, documented, operated and maintained to ensure that the products comply with the declared performance.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

5.2.2 Responsibility and authority

The responsibility, authority and the interrelationships between all persons who manage, perform, or verify work affecting constancy of performance of the product, shall be assigned. This applies particularly to persons who need the organisational freedom and authority to

a) initiate action to prevent the occurrence of non-constancy of performance of product;

b) identify and record any product deviations from other than declared performances (e.g. aspect, packaging, …).

5.2.3 Factory production control system review

The factory production control system shall be reviewed at appropriate intervals to ensure its continuing suitability, adequacy and effectiveness. Records of such reviews shall be maintained.

NOTE FPC system review is usually included as part of the management review.

5.3 Documents defining the factory production control system

Documents defining the factory production control system shall be relevant to the production and process control used during manufacture of the product. All the elements and provisions shall be documented in a systematic manner in the form of written policies and procedures.

Documents defining the factory production control system shall provide the following details:

a) the factory production control system aims and the organizational structure, responsibilities and authority with regard to constancy of performance of product;

b) the procedures for specifying and verifying the raw materials and other constituent materials;

c) the production control and other techniques, processes and systematic actions that will be used;

d) the inspections and tests to be carried out before, during and after manufacture, together with their frequency (see 5.4) and possible retest procedures (see 5.5);

e) the procedures for handling, storage, packaging, marking and labelling the product (see 5.6);

f) the procedures for affixing traceability product codes and/or markings (see 5.7);

g) the procedures for all persons to receive training in the activities affecting the constancy of performance of the product (see 5.8).

NOTE Documents defining FPC system can be in any format and media and from any source.

Documents defining the factory production control system shall be drawn up and kept up-to-date.

5.4 Inspection and testing

5.4.1 General

All necessary facilities, equipment and persons shall be available to carry out the inspections and tests. Inspections and tests shall be performed according to the FPC system. In case of subcontracting, these provisions shall apply too.

Inspection and testing shall be performed by persons qualified for such tasks on the basis of documented appropriate education, training, skills or experience.

Equipment shall be used in a manner that ensures that any measurement uncertainty is not greater than the necessary measurement capability.

5.4.2 Test equipment

5.4.2.1 General

Tests to demonstrate constancy of performance of the finished product shall be performed using equipment in accordance with the test methods referred to in the European product specification.

The on-going suitability of the test equipment shall be ensured.

The test equipment (including software) shall be capable of achieving the accuracy specified by the test methods referred to in the European product specification.

5.4.2.2 Calibration

The accuracy of the test equipment shall be ensured by periodic calibration. All calibrations and calibration checks shall be traceable to relevant internationally or, failing that, nationally recognized reference test specimens (standards). Where no such reference test specimens exist, the basis used for calibration shall be documented.

NOTE Calibration is the right term for the first time “calibration” and if a calibration check leads to adjustment of the equipment. The calibration check, that is performed e.g. annually for heat flow meter (HFM) equipment (see Table 1), is the right term to use without adjustment of the equipment. To simplify the text here the term “calibration” is used both for calibration and calibration check.

Compliance criteria for each piece of equipment shall be defined.

The equipment shall be calibrated or verified

— before being placed into service;

— periodically respecting the minimum frequencies specified in Table 1;

— after any repair or adjustment (see 5.4.2.4);

— to verify the test results obtained before being taken out of service. If internal checks are sufficient (e.g. for heat flow meter (HFM) equipment) then this calibration is not needed.

Equipment not listed in Table 1 shall be calibrated in accordance with the documented procedures.

The calibration results shall be assessed and the results of such assessments shall be documented. The calibration records shall be maintained for a period of 10 years.

5.4.2.3 Internal checks of equipment

In addition to the traceable calibration, internal checks to verify the stability of the equipment shall be carried out. Compliance criteria for results of internal checks shall be defined. Internal checks shall be carried out at frequencies respecting the minimum frequencies given in Table 1.

Equipment not listed in Table 1 shall be checked in accordance with the documented procedures. Records of internal checks shall be maintained for a period of 10 years.

Table 1 — Minimum frequencies of internal checks and calibrations of test equipment

Characteristics	Internal checks	Calibration of test equipment
Thickness	Once per month [a, c]	Prior to first use of equipment, and annual calibration checks thereafter
Mass	Once per month [a, c]	
Mechanical characteristics	-	
Thermal characteristics [b]: - heat flow meter - guarded hot plate	 Once per two weeks [c] Once per year [c]	

[a] A lower frequency of once every 3 months may be used when stability has been verified for a period of at least one year. If any single measurement indicates significant variation, the frequency reverts to once a month.

[b] For thermal characteristics a part of the calibration shall be to compare test results obtained by the equipment used for the FPC with those obtained by an accredited laboratory under EN 12664:2001, EN 12667:2001 or EN 12939:2000 on the same sample, typically once a year. Test specimens to be used for the calibration and the annual calibration checks shall be traceably calibrated to the reference materials IRMM 440 or ERM-FC440 defining the European thermal conductivity level. The reference materials IRMM 440 or ERM-FC440 can be directly used for the calibration and the annual calibration checks. Test specimens provided by a reference material producer accredited under EN ISO 17034:2016 can be used for the calibration and the annual calibration checks.

[c] For internal checks, test specimens can be used to verify the stability of the performance of the equipment provided that the stability of the specimens is ensured.

5.4.2.4 Defective equipment

Equipment that has been subjected to abuse or mishandling, which gives suspect results or has been shown to be defective or outside specified limits, shall be taken out of service immediately and marked as defective.

It shall be examined whether or not defective equipment gives cause for concern regarding the constancy of performance of the products tested using the defective equipment. This examination shall be documented.

In case of any doubt regarding constancy of the performance of products, 5.5 applies.

After any repair, calibration shall be repeated before the equipment is placed into use.

5.4.3 Inspection and testing of raw materials and other constituent materials

The compliance of raw materials and other constituent materials shall be ensured in accordance with the procedures specified in the FPC system. In determining the checks, necessary consideration shall be given to the control exercised and the documented evidence of compliance supplied with raw materials and other constituent materials.

The incoming raw materials and other constituent materials shall be used or processed only after they have been verified as complying with the defined specifications. Where incoming material is released for urgent production purposes prior to verification it shall be identified and recorded in order to permit immediate recall in the event of non-compliance.

5.4.4 Inspection and testing during production

In order to manufacture products which meet the declared performances, production process shall be controlled and inspection and tests shall be performed as described in the FPC procedures.

All equipment used in the production process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the production process.

5.4.5 Product testing

5.4.5.1 General

Assessment of performance of the product carried out in accordance with Clause 6 shall be ensured prior to placing a product on the market.

The finished products shall be tested in accordance with the relevant European product specification, using direct and/or indirect testing, in accordance with 5.4.5.3. One test is considered as the test(s) on one sample of the product using one or more test specimens as specified in the relevant testing standard or European product specification.

The samples shall be drawn periodically from each production line/unit according to the test plan. The minimum testing frequencies for the relevant characteristics for regular production conditions are specified in the relevant European product specification. For characteristics automatically recorded during the manufacturing process at a higher frequency than given in the relevant European product specification, the testing frequency may be lowered.

5.4.5.2 Direct testing

Direct testing shall be applied according to the test regime specified in the relevant European product specification.

Reduced testing frequencies for direct testing may be used for well-established production lines/units for characteristics other than reaction to fire and thermal resistance/conductivity:

— In the case of a given characteristic where a well-controlled production process can be demonstrated, the testing frequency may be reduced as described below following the relevant statistical rule.

— The frequency for direct testing cannot be reduced to less than 10 % of the minimum frequency given in the relevant European product specification. In no case shall that frequency be less than once a year.

— The risk of failure in a test shall not exceed 1,0 %. For dimensional tolerances the confidence level shall be at least 99 %, for other characteristics the confidence level shall be at least 50 %.

Three situations arise:

I) for characteristics with declared classes – tolerance interval, T (one-sided interval for dimensional characteristics where only a plus or a minus tolerance interval is declared and two-sided interval for e.g. dimensional characteristics where a plus-minus tolerance interval is declared).

If the Gaussian distribution can be assumed for the test results, then Formula (1) applies.

$$T^2 \geq (k_{99/99} \cdot s)^2 \quad (1)$$

where

T is the tolerance interval for the test results obtained over a period not exceeding 3 years;

s is the estimate of the standard deviation of the test results obtained over a period not exceeding 3 years;

k is a factor corresponding to the number of test results, n, available over a period not exceeding 3 years at the reduced testing frequency.

Table 2 gives the k factors corresponding to a 99 % tolerance interval with a confidence level of 99 % (99/99).

II) for characteristics with limit values – one-sided tolerance interval.

If the Gaussian distribution can be assumed for the test results, the Formula (2) or (3) applies.

$$\bar{x} - x_D \geq k_{90/50} \cdot s \text{ for minimum values} \quad (2)$$

$$x_D - \bar{x} \geq k_{90/50} \cdot s \text{ for maximum values} \quad (3)$$

where

$\bar{x}$ is the mean of the measured values;

x_D is the declared value;

s is the estimate of the standard deviation of the test results obtained over a period not exceeding 3 years;

k is a factor corresponding to the number of test results, n, available over a period not exceeding 3 years at the reduced testing frequency.

Table 2 gives the k factors corresponding to a 99 % tolerance interval with a confidence level of 50 % (99/50).

Table 2 — *k* factors for estimated standard deviations

Number of test results *n*	*k* factors		
	*k*99,99		*k*99,50
	One-sided interval [a]	Two-sided interval [b]	One-sided interval [c]
10	5,074	5,610	2,411
20	3,832	4,170	2,366
50	3,125	3,390	2,342
100	2,850	3,098	2,334
200	2,679	2,922	2,330

NOTE 1 For other numbers of test results, see ISO 16269-6:2014, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals* and ISO 12491:1997, *Statistical methods for quality control of building materials and components*.

NOTE 2 Linear interpolation is acceptable.

[a] Applicable for a plus or a minus-tolerance.

[b] Applicable for plus-minus-tolerances.

[c] Applicable for limit values.

III) For characteristics where test results are expressed in terms of pass/fail, a binominal distribution can be assumed. To lower the frequency, it is needed that the test shall be performed on at least 100 different samples, from different production days and 99 % shall pass.

Satisfaction of the conditions for reduced testing frequencies (I, II or III) shall be verified in the event of failure and at least once a year.

5.4.5.3 Indirect testing

Indirect testing is a means by which a given characteristic may be assessed through tests on one or more other characteristics, with which a correlation has been established. Indirect testing may also be used to reduce the testing frequency of direct testing.

The correlation shall be established by suitable statistical means, e.g. regression analysis on the basis of adequate preliminary tests for each production line/unit. It shall be re-examined at prescribed intervals and after changes or modifications if these are likely to affect the correlation.

For each indirect testing procedure applied at the place of production the sampling plan and the compliance criteria, for the indirect characteristic, shall be specified taking into account the relevant correlation between the corresponding characteristics.

The use of indirect testing shall result in at least the same confidence level on the characteristic concerned as when using the direct testing.

In case of dispute, the test method specified for the relevant characteristic in the European product specification shall be used.

5.4.6 Inspection and test status

The constancy or non-constancy of performance of a product shall be determined by tests and inspection which records passed, failed or due to be reclassified.

5.4.7 Inspection and test records (factory production control log)

The results of finished products inspection and testing shall be recorded in the factory production control log. The log shall contain a record of the product identification, the date and time of manufacture and for each characteristic the test methods, the test results, the expected level or class or the declared performance, the inspection result and the identification of the person carrying out the inspection.

Where products do not comply with the declared performance or specification defined by the FPC system, a note shall be made in the factory production control log of the remedial measures taken.

The factory production control log shall be kept for at least 10 years after placing the product on the market.

5.5 Actions in the case of non-constancy of performance of the product

If the result of a test or the inspection of a product is a failure, the steps necessary to rectify the deficiency shall be immediately taken. Products which do not comply with the declared performance, shall be marked accordingly. When the deficiency has been identified and rectified, the test or inspection in question shall be repeated without delay according to the FPC procedures, to provide evidence that the defects have been overcome.

In the event that products are dispatched before the result of the inspection is available prompt notification shall be given to prevent any consequential damage and a record maintained of such notification.

Products, which have not met the performance intended to be declared for a given characteristic shall be permitted to qualify for a less stringent performance of that characteristic and shall be labelled accordingly.

5.6 Handling, storage, packaging and marking of products

In accordance with the documents defining the FPC system (see 5.3):

a) methods of handling that prevent damage or deterioration shall be provided;

b) suitable storage areas or stock rooms to prevent damage or deterioration of the product shall be provided;

c) the packaging, storage and the marking processes shall be controlled.

The provision of dematerialised information with the product, its packaging or its label, readable by an electronic media (e.g. QR code) shall reflect the product placed on the market.

5.7 Traceability of products

Individual products or product batches or packages shall be identifiable and traceable back to the origin of their production.

Written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly shall be maintained.

5.8 Training, qualification and competence

Procedures for the identification of the training needs shall be established and maintained. The training of all persons performing tasks affecting the assessment and verification of constancy of performance of the product shall be provided.

Persons performing specific assigned tasks shall be qualified and competent on the basis of appropriate education, training, skills or experience.

Records of training shall be kept up to date.

6 Assessment of performance (AoP)

Prior to placing a product on the market, AoP shall be carried out in order to ensure the determination of the product performance.

Assessment previously performed in accordance with the provisions of European product specifications, may be considered, provided that this assessment was performed to the same or a more rigorous assessment method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

Where kit components are used whose performance in relation to their characteristics has already been determined on the basis of assessment methods of other harmonised technical specifications and those components bear CE marking in accordance with those harmonised technical specifications, these performances do not need to be re-assessed, if the intended use and the assessment methods of this standard correspond to previously used, otherwise extra assessment shall be necessary. The specifications of these components shall be documented.

AoP of relevant characteristics shall be repeated on changes or modifications if these are likely to affect the declared performance of the products.

Tests shall be carried out in accordance with the European product specification, by direct testing. One test is considered as the test of one sample of the product consisting of one or more test specimens as specified in the relevant testing standard or European product specification.

For CE marking purposes, the AoP is specified in Annexes ZA of harmonised standards or tasks included in European Assessment Documents.

Annex A
(informative)

Guidance for conformity of the products under voluntary certification activities (not for CE marking purposes)

A.1 General

This annex supports the European product specifications for thermal insulation products as part of the voluntary activities for conformity of the products.

A.2 Bodies involved in the evaluation of conformity procedure

The following external bodies may be involved in the evaluation of conformity of products with this document:

a) product certification body: an accredited body which provides conformity certification;

b) inspection body: an accredited body which performs initial inspection and surveillance inspections of factory production control, and which selects samples of products for testing;

c) laboratory: an accredited body which measures, examines, tests, calculates or otherwise assesses the performance of materials or products and which calibrates equipment.

NOTE The functions of these three bodies are performed by the product certification body or by different bodies. If different bodies are involved, the inspection body and/or the laboratory carry out their functions on behalf of the certification body.

In this annex these bodies are referred to by the term “accredited body”.

For all certification activities, the certification body shall comply with EN ISO/IEC 17065:2012. For all testing activities, EN ISO/IEC 17025:2017 shall be complied with.

A.3 Tasks for the accredited body

A.3.1 General

A.3 specifies the tasks for the accredited body in the evaluation of conformity procedure and also the manufacturer's duties arising in connection with them.

If a quality management system certified to a quality management system standard, such as EN ISO 9001:2015, is used, this certification shall be taken into account by the product certification body for those elements that are common with this document.

A.3.2 Initial inspection of manufacturing plant and of factory production control

Initial inspection of manufacturing plant and of FPC shall be carried out when the production process has been finalized and in operation. Initial inspection shall determine whether the prerequisites for staff and equipment, for regular and orderly manufacture and for the corresponding factory production control, are in accordance with Clause 4 and Clause 5, and that the FPC in its entirety effectively ensures the conformity of the products.

All locations where final assembly and final testing of the relevant product is performed, shall be assessed.

All assessments, their evidences and their results according to the Clause 5 shall be documented in the initial inspection report.

A.3.3 Sampling

Audit samples shall be taken to check the conformity of the product.

Sampling for initial testing shall be carried out by the representative of the accredited body, normally during the initial inspection, with the manufacturer's representative present. The sample shall be taken from products identified in accordance with 5.4.6 as conforming to the European product specifications (finished products ready for placing on the market). The sample shall be taken at random and shall be representative of normal production and clearly identified to ensure that the sample is used for testing. The minimum quantity of product from which the sample is taken should be large enough to obtain a representative sample for the purpose of applicable tests. The representative of the accredited body shall record the following details:

a) manufacturer name and address;

b) description of the product;

c) how the product is identified;

d) manufacturer's marking of the product;

e) inspection lot size;

f) sample size;

g) location and date of sampling;

h) all necessary information about the product for testing, including shift or time of production and production line/unit or traceability code.

The record shall be agreed and signed by the representatives of the accredited body and the manufacturer.

A.3.4 Initial testing

Each product, which is submitted for assessment, shall be tested by the accredited body in accordance with the European product specifications.

The evaluation of conformity for a product subject to a voluntary product certification shall comply with the AoP according to Clause 6 of this document and in addition the provisions of Annex A. The acceptance of already existing test reports for initial testing is under the responsibility of the certification body in accordance with the Annex A.

Initial testing will be performed by the accredited body for all declared performance. Unless otherwise specified, samples shall be taken from four different production dates and shall cover the range of thickness declared. The number of test results to be determined by the accredited body is four.

Initial test shall be performed for each production line/unit separately.

All test results for each characteristic shall be better than or equal to the declared performance.

NOTE For new production lines/units the normal evaluation of conformity procedures apply. For the manufacturer starting a line/unit, identical in terms of product performance to an existing line/unit, and for existing products/product families, a special agreement can be established to handle the practical start of production and the performance of initial testing where a duration of more than four months is needed by the testing standard. This agreement aims to ensure that all evaluation of conformity can be fully finalised within a period not exceeding the test duration plus two months. In any case the manufacturer has the full responsibility for the declared performances.

A.3.5 Continuing surveillance

A.3.5.1 General

Production shall be subjected to continuous surveillance by a product certification body, consisting of surveillance inspections (see A.3.5.2), audit testing (see A.3.5.3), actions in the case of non-conformity (see A.3.5.4) and extraordinary inspections (see A.3.5.5).

The representative of the inspection body shall be allowed to enter the manufacturing plant including the warehouse(s), without announcement, at any time during the working hours in order to carry out the necessary works in connection with the continuing surveillance. The representative of the inspection body shall have access to all facilities, persons and relevant information about the product in connection with the continuing surveillance and shall be provided with adequate assistance, particularly for sampling and testing.

The significance of any changes in the FPC system shall be reported by the manufacturer and assessed by the accredited body.

A.3.5.2 Surveillance inspections

Surveillance inspections shall be performed to assess the continued conformity of the factory production control system to the applicable Clause 5. Reference shall be made to the records of the initial inspection and/or previous surveillance inspections to ensure changes to the factory production control system are assessed.

Records of inspections shall include details of the status of the factory production control system as it exists on the date of the inspection.

During each surveillance inspection, the following shall be specifically examined:

a) results of tests and measurement made during the production process and to the finished products to check:

   1) whether tests have been performed at the specified frequency and

   2) that only products that have conformed to the European product specifications have been released;

b) that proper corrective actions have been taken for removing non-compliance;

c) the calibration and maintenance of test equipment;

d) the marking and labelling of products.

The results of the surveillance inspections shall be documented in a record of the inspection.

The surveillance inspections shall be performed twice a year at each manufacturing plant, unless additional extraordinary inspections are carried out according to A.3.5.5.

The frequency of surveillance inspections may be reduced to once per year per manufacturing plant if all the following conditions are fulfilled:

a) the manufacturer does not produce the core insulating material itself;

b) the processes conducted by the manufacturer are limited to cutting and/or addition of a surface layer (non-substantial component);

c) core materials are supplied by manufacturing plant of a supplier exercising factory production control in accordance with the relevant European product specifications and with this document and subject to surveillance in accordance with this document, either by the accredited body itself or by a subcontractor to the accredited body;

d) the agreement(s) with the manufacturer and the supplier allow(s) the product certification body to take into account the surveillance of the factory production control by the supplier of the core insulating material.

Similarly, for satellite plants at which the processes conducted are limited to cutting and/or addition of a surface layer (non-substantial component), product certification bodies shall normally reduce the surveillance frequency for each satellite plant to once per year. The main manufacturing plant shall be audited twice a year.

The surveillance inspections shall be planned to ensure that all relevant functions of the manufacturer are assessed during a prescribed period. The inspections shall aim at reflecting the normal working manner of the manufacturing plant. Inspections may be carried out without any previous announcement.

A.3.5.3 Audit testing - surveillance

Audit samples shall be taken for checking conformity with the European product specifications. Samples shall be taken at random normally during a surveillance inspection at the manufacturing plant and they shall be representative of the normal production. Only if it is agreed between the accredited body and the manufacturer, shall samples be taken from elsewhere.

The representative of the accredited body shall ensure that the manufacturer is aware of his responsibility to forward the selected samples to the testing laboratory in proper condition and without undue delay.

Audit testing and applicable testing frequencies shall be conducted for the characteristics listed by the product certification body.

Audit testing shall be conducted for the characteristics listed in Table A.1 for building insulation products and Table A.2 for products for building equipment and industrial installations once a year, except for the reaction to fire and the maximum service temperature (e.g. EN 14303:2015 through EN 14309:2015, EN 14313:2015, EN 14314:2015), where the frequency may be once every 2 years.

For characteristics other than those listed in Table A.1 and A.2, the audit testing shall be performed once a year unless the direct test frequency, as defined in the factory production control, exceeds one year. In this case, the audit testing shall be conducted in accordance with the direct test frequency defined by the factory production control.

For each product family the accredited body shall select one sample for test (from each manufacturing plant).

Audit testing shall be performed for the characteristics from Table A.1 and Table A.2 if they are declared.

Testing shall be carried out in accordance with the relevant European product specifications bearing in mind the number of tests necessary to achieve one test result.

Where appropriate a comparison shall be made between the manufacturer's surveillance test results, results of test performed by the manufacturer at his own facilities monitored by the inspection body so called witness testing, and the results of testing by the accredited body.

Table A.1 — Audit testing to be performed for each manufacturing plant – Building insulation products

Characteristic	Test method
Thermal resistance – Thermal conductivity	EN 12667:2001, *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* and EN 12939:2000, *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*
Thickness	EN ISO 29466:2022, *Thermal insulating products for building applications — Determination of thickness (ISO 29466:2022)* or EN ISO 29770:2022, *Thermal insulating products for building applications — Determination of thickness for floating-floor insulating products (ISO 29770:2022)*
Reaction to fire	EN 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*
Compressive stress or compressive strength (where relevant)	EN ISO 29469:2022, *Thermal insulating products for building applications — Determination of compression behaviour (ISO 29469:2022)*

Table A.2 — Audit testing to be performed for each manufacturing plant – Products for building equipment and industrial installations

Characteristic	Test method
Thermal resistance – Thermal conductivity	EN 12667:2001, *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 12939:2000, *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* and CEN/TS 15548-1:2014, *Thermal insulation products for building equipment and industrial installations — Determination of thermal resistance by means of the guarded hot plate method — Part 1: Measurements at elevated temperatures from 100 °C to 850 °C* or EN ISO 8497:1996, *Thermal insulation — Determination of steady-state thermal transmission properties of thermal insulation for circular pipes (ISO 8497:1994)*
Thickness	EN ISO 29466:2022, *Thermal insulating products for building applications — Determination of thickness (ISO 29466:2022)* or EN ISO 12628:2022, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation (ISO 12628:2022)*
Reaction to fire	EN 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*
Compressive stress or compressive strength (where relevant)	EN ISO 29469:2022, *Thermal insulating products for building applications — Determination of compression behaviour (ISO 29469:2022)*
Maximum service temperature (where relevant)	EN ISO 18097:2022, *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature (ISO 18097:2022)* or EN ISO 18096:2022, *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature for preformed pipe insulation (ISO 18096:2022)*
Trace quantity of chloride and pH (where relevant)	EN ISO 12624:2022, *Thermal insulating products for building equipment and industrial installations — Determination of trace quantities of water-soluble chloride, fluoride, silicate, sodium ions and pH (ISO 12624:2022)*
Water vapour diffusion resistance (where relevant)	EN ISO 12572:2016, *Hygrothermal performance of building materials and products — Determination of water vapour transmission properties — Cup method (ISO 12572:2016)* or EN ISO 12629:2022, *Thermal insulating products for building equipment and industrial installations — Determination of water vapour transmission properties of preformed pipe insulation (ISO 12629:2022)*

A.3.5.4 Actions in the case of non-conformity

Identified cases of non-conformity are:

a) defects that have been revealed by the accredited body in the factory production control;

b) the manufacturer has not met his commitments according to A.3.5.2, thus preventing the accredited body from performing its surveillance tasks properly;

c) a product tested has failed to achieve the declared performance in one or more of the characteristics listed by the certification body. For thermal resistance and thermal conductivity, a simplified statistical procedure shall be used, see Annex C.

In the case of non-conformity, the following actions are applied:

In the case of a) or b) the certification body shall ask the manufacturer to rectify the non-conformity and to report within a period set by the accredited body – normally not more than four weeks. The accredited body shall take further action depending on the particular circumstances. Such activities may include extraordinary inspection, in particular after failure of a surveillance inspection, or the accredited body may accept documentary evidence that the fault has been rectified. If such a rectification is not documented, A.4.3 applies.

In the case of c) the accredited body shall take a new sample of the product concerned within 4 weeks and retest all relevant characteristics without delay, for this particular product. If some characteristics by nature of the product are not influenced (no change in the declared performance) by changes in the characteristics that failed, those characteristics shall not be retested.

If retesting shows conformity with the European product specifications, the product shall be considered to be conform. If the product fails again in one of the follow up tests, it is deemed to be non-conform, see A.4.3.3.

A.3.5.5 Extraordinary inspection

Extraordinary inspections shall be carried out:

a) in the case of non-conformity (see A.3.5.4);

b) after production line/unit has been idle for a period of more than 6 months;

c) because of a significant change in the factory production control system, or process or product.

The scope, type, and timing of an extraordinary inspection will depend on the particular circumstances (e.g. product concerned and/or production conditions).

A.4 Conformity mark

A.4.1 General

For each product where conformity has been established:

a) the manufacturer is entitled to use the conformity mark as soon as the certificate of conformity has been issued by the certification body (see A.4.2);

b) the validity of the certification scheme shall be confirmed every year;

c) the manufacturer is no longer entitled to use the conformity mark, if the certificate of conformity is withdrawn for any reason (see A.4.3);

d) the manufacturer is not entitled to make any published statement to the effect that he has applied for conformity mark for a product.

NOTE This conformity mark is not affiliated with the CE marking. For CE marking refer to Annex ZA of the relevant harmonised standards or the relevant European Assessment Documents.

A.4.2 Issuance of certificate of conformity

When the manufacturing plant and the product have passed the initial inspection, sampling for initial testing and initial testing in accordance with A.3.2, A.3.3 and A.3.4 respectively, the certification body shall issue a certificate of conformity for the product.

The validity of the certificate shall be confirmed every year or continuously verified at the website of the accredited body.

NOTE This certificate is neither the certificate of constancy of performance nor the Declaration of Performance under Construction Product Regulation (EU) No 305/2011 (CPR).

A.4.3 Restriction, suspension or withdrawal of certificate

A.4.3.1 General

The restriction, suspension or withdrawal of the certificate of conformity shall be decided on the basis of partially or totally unsuccessful outcomes of the assessments and verifications carried out according to A.3.

In case of restriction, suspension or withdrawal of a certificate of conformity, the certification body shall inform the manufacturer about this and publish the information in an appropriate way.

A.4.3.2 Factory production control failure

If an extraordinary inspection, performed in response to cases a) or b) of A.3.5.4, has not been passed, or the manufacturer has, in spite of the procedures in accordance with A.3.5.4, not met the certification scheme, the certification body shall withdraw all certificates of conformity issued for the entire production under this certification scheme.

A.4.3.3 Product failure

If a product has not passed the retesting performed in response to case c) of A.3.5.4, the certification body shall withdraw the certificate of conformity for the product family represented by the product tested without delay.

A full initial testing is not needed in case of withdrawal of the certificate for a product family where some of the products in the family (with unchanged declaration) are re-submitted for certification as a new family within two months. The initial testing shall consist of only one test result of the characteristics subject to audit testing for the product.

If some characteristics by nature of the product are obviously not influenced (no change in the declared performance) by changes in the characteristics that failed, those characteristics shall not be retested.

Annex B
(informative)

Guidance for common evaluation of products under AVCP system

B.1 General

This annex supports the harmonised technical specifications for thermal insulation products. When used in the assessment and verification of constancy of performance of these products its use is mandatory. For this reason, the text of the annex, where appropriate, is written in the imperative form.

B.2 Bodies involved in the assessment and verification of constancy of performance (AVCP)

In addition to the manufacturer, the following external bodies may be involved in the AVCP of products with this document:

a) product certification body: a body notified, in accordance with Chapter VII of the CPR, to carry out constancy of performance certification;

b) factory production control certification body: a body notified, in accordance with Chapter VII of the CPR, to carry out factory production control certification;

c) laboratory: a body notified, in accordance with Chapter VII of the CPR, to measure, examine, test, calculate or otherwise assesses the performance of construction products.

NOTE 1 The abbreviated term CPR refers to Regulation (EU) No 305/2011 for the European parliament and of the council of 9 March 2011 laying down harmonised conditions for the marketing of construction products.

NOTE 2 The functions of these three bodies can be performed by the product certification body or by different bodies. If different bodies are involved, the factory production control certification body and/or the laboratory carry out their functions as subcontractors of the product certification body.

Only notified bodies in accordance with CPR Article 47 are considered. For all certification activities, the notified product certification body shall comply with EN ISO/IEC 17065:2012. For all testing activities, EN ISO/IEC 17025:2017 shall be complied with.

B.3 Tasks for the notified body

B.3.1 General

Annex V of the CPR specifies the tasks for the notified body according to the AVCP system and also the manufacturer's duties arising in connection with them.

If a quality management system certified to a quality management system standard, such as EN ISO 9001:2015, is used, this certification may be taken into account by the product certification body for those elements that are common with this document.

B.3.2 Initial inspection of manufacturing plant and of factory production control

Initial inspection of manufacturing plant and of FPC shall be carried out when the production process has been finalized and in operation. Initial inspection shall determine whether the prerequisites for staff and equipment, for regular and orderly manufacture and for the corresponding factory production control, are in accordance with Clause 4 and Clause 5.

All locations where final assembly and final testing of the relevant product is performed, shall be assessed.

All assessments, their evidences and their results shall be documented in the initial inspection report.

B.3.3 Sampling

Audit samples shall be taken to assess or verify the constancy of the performance of the product.

The sample shall be taken from products identified in accordance with 5.4.6 as conforming to the harmonised technical specifications (finished products ready to place on the market). The sample shall be taken at random and shall be representative of normal production and clearly identified to ensure that the sample is used for testing. The minimum quantity of products from which the sample is taken should be large enough to obtain a representative sample for the purpose of applicable tests. The following details shall be recorded:

a) manufacturing plant name and address;

b) description of the product;

c) how the product is identified;

d) marking of the product;

e) inspection lot size;

f) sample size;

g) location and date of sampling;

h) all necessary information about the product for testing, including shift or time of production and production line/unit or traceability code.

The record shall be signed.

B.3.4 Assessment of performance

Each product which is submitted for assessment shall be tested in accordance with the harmonised technical specifications. The tasks for AoP are defined in accordance with the harmonised technical specifications Annex ZA.

Unless otherwise specified the sample shall be taken from four different production dates and shall cover the range of thickness declared. One test result, as defined in the harmonised technical specification, shall be determined for each characteristics using test specimens from the different production dates. For characteristics where only one test result is needed test specimens from one or more of the four different production dates shall be used.

All test results for each characteristic shall be better than or equal to the declared performance.

NOTE For new production lines/units the normal AoP procedures apply. When starting a line/unit, identical in terms of product performance to an existing line/unit, and for existing products/product families, a special agreement can be established to handle the practical start of production and the performance of AoP where a duration of more than four months is needed by the testing standard. This agreement aims to ensure that all AoP can be finalised within a period not exceeding the test duration plus two months.

B.3.5 Continuing surveillance, assessment and evaluation of the factory production control

B.3.5.1 General

Factory production control regarding parameters, equipment, etc. related to all relevant characteristics shall be subjected to continuous surveillance, assessment and evaluation, consisting of surveillance inspections (see B.3.5.2), actions in the case of non-compliance (see B.3.5.3) and extraordinary inspections (see B.3.5.4).

Enter the manufacturing plant including the warehouse(s) shall be allowed, without announcement, at any time during the working hours in order to carry out the necessary works in connection with the continuing surveillance. All relevant information about the product in connection with the continuing surveillance shall be accessible and adequate assistance, particularly for sampling and testing shall be provided.

The significance of any changes in the FPC system shall be reported and assessed.

B.3.5.2 Surveillance inspections

Surveillance inspections shall be performed to assess the continued compliance of the factory production control system to the applicable Clause 5. Reference shall be made to the records of the initial inspection and/or previous surveillance inspections to ensure changes to the factory production control system are assessed.

Records of inspections shall include details of the status of the factory production control system as it exists on the date of the inspection.

During each surveillance inspection, the following shall be specifically examined:

a) results of tests and measurement made during the production process and to finished products to check:

   1) that tests have been performed at the specified frequency and

   2) that only products correspond with those submitted to the determination of the product-type have been released;

b) that proper corrective actions have been taken for removing non-compliance;

c) calibration and maintenance of test equipment;

d) marking and labelling of products.

The results of the surveillance inspections shall be documented in a record of the inspection.

The surveillance inspections shall be performed twice a year at each manufacturing plant, unless additional extraordinary inspections are carried out according to B.3.5.4.

The frequency of surveillance inspections may be reduced to once per year per manufacturing plant if all the following conditions are fulfilled:

a) the manufacturer does not produce the core insulating material itself;

b) the processes conducted by manufacturer are limited to cutting and/or addition of a surface layer (non-substantial component);

c) core materials are supplied by manufacturing plant of a supplier exercising factory production control in accordance with the relevant harmonised technical specifications and with this document and subject to surveillance in accordance with this document, either by the notified body itself or by a subcontractor to the notified body;

d) the agreement(s) with the manufacturer and the supplier allow(s) the product certification body to take into account the surveillance of the factory production control by the supplier of the core insulating material.

Similarly, for satellite plants at which the processes conducted are limited to cutting and/or addition of a surface layer (non-substantial component), product certification bodies shall normally reduce the surveillance frequency for each satellite plant to once per year. The main manufacturing plant shall be audited twice a year.

The surveillance inspections shall be planned to ensure that all relevant functions are assessed during a prescribed period. The inspections shall aim at reflecting the normal working manner of the manufacturing plant. Inspections may be carried out without any previous announcement.

B.3.5.3 Actions in the case of non-compliance

Identified cases of non-compliance are:

a) defects that have been revealed by the surveillance inspection in the factory production control;

b) the surveillance tasks that have not been carried out properly according to B.3.5.2.

In the case of non-compliance, the following actions applied:

In the case of a) or b) the non-compliance shall be rectified and to reported within a month. Further action depending on the particular circumstances shall be taken. Such activities may include extraordinary inspection, in particular after failure of a surveillance inspection, documentary evidence that the fault has been rectified may be accepted. If such a rectification is not documented, B.4.2 applies.

B.3.5.4 Extraordinary inspection

Extraordinary inspections shall be carried out:

a) in the case of non-compliance (see B.3.5.3);

b) after production line/unit has been idle for a period of more than 6 months;

c) because of a significant change in the factory production control system, or process or product.

The scope, type, and timing of an extraordinary inspection depend on the particular circumstances (e.g. product concerned and/or production conditions).

B.4 Certificate of constancy of performance

B.4.1 Issuance of certificate of constancy of performance

The issuing of the certificate of constancy of performance of the construction product shall be decided on the basis of the passed outcomes of the assessments and verifications carried out according to B.3 and to the AVCP system.

B.4.2 Restriction, suspension or withdrawal of the certificate of constancy of performance

B.4.2.1 General

The restriction, suspension or withdrawal of the certificate of constancy of performance of the construction product shall be decided on the basis of partially or totally unsuccessful outcomes of the assessments and verifications carried out according to B.3 and to the AVCP system.

In case of restriction, suspension or withdrawal of the certificate of constancy of performance the information shall be reported and published in an appropriate way.

B.4.2.2 Factory production control failure

If an extraordinary inspection, performed in response to cases a) or b) of B.3.5.3, has not been passed, all certificates of constancy of performance issued for the entire production under this certification scheme shall be withdrawn.

Annex C
(informative)

Criteria for assessing non-conformity – Procedures in case of a complaint

C.1 Complaint on the product declaration

C.1.1 General

Two different sets of procedures may apply. One for thermal characteristics declared on the basis of statistical evaluations and one for characteristics based on the declaration of performances.

A sampling procedure shall be agreed upon, respecting the following:

— for thermal resistance or thermal conductivity, four shall be taken from different production batches samples for testing purposes specified in C.1.2;

— for other characteristics, only one sample is to be considered in C.1.3.

Representative samples shall be taken, e.g. from the marketplace. A record shall be drawn up providing the identification of the product, where it was purchased, the date of purchased and to the identification number of the package.

The relevant sample shall be transported, without significant deterioration.

C.1.2 Complaint on the declared thermal resistance or thermal conductivity

Four tests of thermal resistance or thermal conductivity shall be conducted following the procedure described in the relevant European product specification.

If a failure is identified in the thickness measurement before determining the thermal characteristics, testing of thermal resistance or thermal conductivity may not be relevant and the procedure to be followed should be discussed.

If an ageing procedure is specified in the relevant European product specification, it should be followed. In case of more than one option in the European product specification the procedure to be used should be agreed upon. For test specimens older than specified in the relevant European product specification the ageing increments may be diminished. If the ageing procedure used for initial tests is known this should be applied.

The results of the four tests are expressed as R_1, R_2, R_3 and R_4 or λ_1, λ_2, λ_3 and λ_4. The average R_{mean} or $\bar{\lambda}$ and estimate standard deviation S_R or S_λ of these four measurements are calculated using the formulas with R or λ:

$$\bar{\lambda} = \frac{\sum_{1}^{4} \lambda_i}{4} \tag{C.1}$$

$$S_\lambda = \sqrt{\frac{\sum_{1}^{4} \left(\lambda_i - \bar{\lambda}\right)^2}{3}} \tag{C.2}$$

If $R_D > R_{mean} - 0{,}44 \cdot S_R$ or $\lambda_D < \bar{\lambda} + 0{,}44 \cdot S_\lambda$ the product is deemed to have failed.

NOTE 1 The value 0,44 has been determined by calculation based on the hypothesis that the manufacturer risk (for fractile 90 % declared) is less or equal to 5 %. Other values, for a larger number of tests, are available in ISO 12491:1997.

If the product fails notification shall be provided.

If the product has failed and, in case of agreement, the procedure described in A.4.3 shall be repeated, with the sampling conducted for the product or product family, by applying for a new initial test within 4 weeks.

If the product has failed, and if there is no agreement to conduct a new initial test then A.4.1 3) applies.

NOTE 2 The procedure although based on a simplified approach for checking the declaration by a manufacturer follows the 90/90 statistical approach in principle.

For building equipment and industrial insulation products the procedures for thermal conductivity declaration described in EN ISO 13787:2003, *Thermal insulation products for building equipment and industrial installations — Determination of declared thermal conductivity (ISO 13787:2003)*, shall be used.

C.1.3 Complaint on other characteristics

One test of the relevant characteristic(s) shall be carried out. If the result do not meet the declared performance, the product is deemed to have failed.

If the product fails, notification shall be provided.

If the product has failed and, in case of agreement, the procedure described in A.3.3 shall be repeated, with the sampling, conducted for the product or product family, by applying for a new initial test within 4 weeks.

If the product has failed, and if there is no agreement to conduct a new initial test then A.4.1 3) applies.

C.2 Complaint on a lot

The sample shall be taken from the lot as agreed and shall be transported, without significant deterioration.

The procedures in C.1.1 and C.1.2 shall be used for lot testing.

A lot failure on thermal characteristics will normally only relate to the specific lot.

Bibliography

CEN/TS 15548-1:2014, *Thermal insulation products for building equipment and industrial installations — Determination of thermal resistance by means of the guarded hot plate method — Part 1: Measurements at elevated temperatures from 100 °C to 850 °C*

EN 13163:2012+A2:2016, *Thermal insulation products for buildings — Factory made expanded polystyrene (EPS) products — Specification*

EN 13167:2012+A1:2015, *Thermal insulation products for buildings — Factory made cellular glass (CG) products — Specification*

EN 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 14303:2015, *Thermal insulation products for building equipment and industrial installations — Factory made mineral wool (MW) products — Specification*

EN 14305:2015, *Thermal insulation products for building equipment and industrial installations — Factory made cellular glass (CG) products — Specification*

EN 14309:2015, *Thermal insulation products for building equipment and industrial installations — Factory made products of expanded polystyrene (EPS) — Specification*

EN 14313:2015, *Thermal insulation products for building equipment and industrial installations — Factory made polyethylene foam (PEF) products — Specification*

EN 14314:2015, *Thermal insulation products for building equipment and industrial installations — Factory made phenolic foam (PF) products — Specification*

EN ISO 8497:1996, *Thermal insulation — Determination of steady-state thermal transmission properties of thermal insulation for circular pipes (ISO 8497:1994)*

EN ISO 9001:2015, *Quality management systems — Requirements (ISO 9001:2015)*

EN ISO 12572:2016, *Hygrothermal performance of building materials and products — Determination of water vapour transmission properties — Cup method (ISO 12572:2016)*

EN ISO 12624:2022, *Thermal insulating products for building equipment and industrial installations — Determination of trace quantities of water-soluble chloride, fluoride, silicate, sodium ions and pH (ISO 12624:2022)*

EN ISO 12628:2022, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation (ISO 12628:2022)*

EN ISO 12629:2022, *Thermal insulating products for building equipment and industrial installations — Determination of water vapour transmission properties of preformed pipe insulation (ISO 12629:2022)*

EN ISO 13787:2003, *Thermal insulation products for building equipment and industrial installations — Determination of declared thermal conductivity (ISO 13787:2003)*

EN ISO 17034:2016, *General requirements for the competence of reference material producers (ISO 17034:2016)*

EN ISO 18096:2022, *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature for preformed pipe insulation (ISO 18096:2022)*

EN ISO 18097:2022, *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature (ISO 18097:2022)*

EN ISO 29466:2022, *Thermal insulating products for building applications — Determination of thickness (ISO 29466:2022)*

EN ISO 29469:2022, *Thermal insulating products for building applications — Determination of compression behaviour (ISO 29469:2022)*

EN ISO 29770:2022, *Thermal insulating products for building applications — Determination of thickness for floating-floor insulating products (ISO 29770:2022)*

EN ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017)*

EN ISO/IEC 17065:2012, *Conformity assessment — Requirements for bodies certifying products, processes and services (ISO/IEC 17065:2012)*

ISO 12491:1997, *Statistical methods for quality control of building materials and components*

ISO 16269-6:2014, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals*

Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

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