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Guidance on the new European Standards for thermal insulation materials

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British Standards

Committees responsible for this Published Document

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Association of Building Component Manufacturers

Association for the Conservation of Energy

Autoclaved Aerated Concrete Products Association

Brick Development Association

British Rigid Urethane Foam Manufacturers' Association

British Vermiculite Association

Concrete Block Association

Consumer Policy Committee of BSI

Eurisol (UK Mineral Wool Association)

European Phenolic Foam Association

Glass and Glazing Federation

Meteorological Office

National House-building Council

National Physical Laboratory

Office of the Deputy Prime Minister (British Board of Agrément)

Office of the Deputy Prime Minister (Building Regulations Division)

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Polyethylene Foam Insulation Association

Thermal Insulation Contractors' Association

Thermal Insulation Manufacturers' and Suppliers' Association (TIMSA)

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Contents

Foreword

This Published Document has been prepared by Subcommittee B/540/1. It supersedes PD 6621:1998, which is withdrawn.

This document explains the background to and application of new European Standards for thermal insulation materials and other standards which have been developed by the following European Technical Committees and organizations:

— CEN/TC 88, Thermal insulation products for buildings and industrial applications;

— CEN/TC 89, Thermal performance of buildings and building components;

— CEN/TC 128, Sandwich panels incorporating insulation;

— European Organization for Technical Approvals (EOTA), systems for mechanically fastened flexible roof waterproofing systems and external thermal insulation composite systems with rendering.

The UK has participated fully in the work of the Technical Committees, their working groups and EOTA.

To monitor progress of documents under preparation referred to in this Published Document visit www.cpd-tracker.com or www.safety.odpm.gov.uk/bregs/cpd/index.htm.

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This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

This Published Document is not to be regarded as a British Standard.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 17 and a back cover.

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1 Scope

This Published Document gives guidance on the content and application of new European Standards for thermal insulation materials.

2 Background

2.1 Construction Products Directive (CPD)

In common with most other construction products, thermal insulation materials are subject to the Construction Products Directive (CPD) 89/106/EEC [1]. The CPD was adopted into United Kingdom legislation by The Construction Products Regulations 1991, Statutory Instrument 1991 No. 1620 [2], [3] as amended by The Construction Products (Amendment) Regulations 1994 [4]. A manufacturer may apply CE marking to a product if, used correctly, it allows the construction works to satisfy the essential requirements of the CPD [1]. CE marking is achieved by compliance with a harmonized European Standard, developed by the European Committee for Standardization (CEN), or a European Technical Approval [5] developed by members of the European Organization for Technical Approvals (EOTA).

In England and Wales, and in Scotland enforcement of the provisions of the CPD and the correct application of the CE mark is the responsibility of the Trading Standards authorities. In Northern Ireland it is the responsibility of local Environmental Health Officers.

NOTE For a summary and overview of the CPD reference should be made to *CE marking under the Construction Products Directive*, ODPM, October 2001 [6]. This document is available on the Office of the Deputy Prime Minister (ODPM) website which gives other comprehensive information on the CPD including links to other useful web sites.

2.2 Benefit for consumers

For manufacturers and consumers the most obvious benefit of the CPD is that it requires Member States to remove technical and regulatory barriers for products that conform to the Directive and thus eases cross border trade.

To achieve this, it introduces for the first time common rules for the declaration of the thermal properties of products throughout the European Community.

The new European Standards for thermal insulation materials contain new ways of declaring values for thermal properties that ensure that the thermal properties correspond to 25 years' of use and that they are representative of 90 % of production.

2.3 The timing of CE Marking

The availability of specifications and the transitional arrangements agreed by the European Commission and the Member States determine the earliest opportunity for CE marking insulation products and systems and the latest date (end of the co-existence period) for withdrawal of conflicting national British Standards (see Table 1).

NOTE Following the date of availability of the harmonized European Standards from CEN, the European Commission publishes its reference in the "C" series of the Official Journal of the European Communities (OJEC) [7]. The reference will be accompanied by the date at which manufacturers across Europe may begin CE marking.

Table 1 — CE Marking: Timing for insulation products and systems

Insulation product/system	Earliest date for CE marking	Latest date for withdrawal of conflicting British Standards
General building products (CEN)	March 2002 (definite)	March 2003 (definite)
External thermal insulation composite systems with rendering (EOTA)	August 2000 (definite)	May 2003 (definite
Flat roof insulation (in mechanically fastened flexible roof waterproofing systems) (EOTA)	August 2000 (definite)	May 2003 (definite)
Internal partitions for non-loadbearing applications	March 2002 (definite)	March 2004 (definite)
In situ roofs and walls (CEN)	January 2004 (provisional)	January 2005 (provisional)
Sandwich panels (CEN)	August 2003 (provisional)	August 2004 (provisional)
Building equipment and industrial installations (CEN)	February 2004 (provisional)	February 2005 (provisional)
Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete (EOTA)	EU letter of endorsement awaited	

3 New European Standards for thermal insulating products

3.1 A general overview

The European standardization work has been carried out along two complementary tracks; one for horizontal methods and calculation procedures which apply to all thermal insulation products and the second for product specific specifications and test methods for a number of areas described in Table 2. The standards impose rules for the expression and calculation of the properties. In some cases progress has been slow because of the difficulty in achieving agreement whilst in other areas harmonized European Standards have been published.

Table 2 — Standards areas within CEN/TC 88

Standards areas	Comment
Factory made product specifications for buildings	10 product specifications published August 2001
Test methods standards	25 standards supporting the building product standards; all but two published
Terminology standard (prEN ISO 9229)	Finalized as a draft EN ISO standard but not yet published
Standard for evaluation of conformity (BS EN 13172)	Published August 2001
In situ product specifications	17 documents, several at an early stage of development; two have passed the enquiry stage; publication expected December 2002
Building equipment and industrial installations product specifications	9 product specifications sent for enquiry June 2001
Test methods standards	6 draft European Standards supporting building equipment and industrial installations

The product specification standards in Table 2 have been the subject of a Mandate on thermal insulation products from the European Commission to CEN and as such are harmonized standards (or candidate harmonized standards) and hence are (or will be) a suitable reference for CE marking these products.

Work is also well advanced on standards for external thermal insulation composite systems (ETICS) (see Table 3). It should be noted that the European Commission has awarded the mandate for ETICS specifications to EOTA and, therefore, at the current time external insulation composite systems cannot be CE marked based on harmonized European Standards.

Table 3 — Non-mandated standards in CEN

Standards areas	Documents
External thermal insulation composite systems (ETICS)	2 product specifications at the enquiry stage
Test methods supporting ETICS	5 standards supporting the ETICS applications

3.2 Factory made product standards for buildings

A complete list of the product standards for buildings is shown in Table 4. The standards are supported by 25 test method standards, a terminology document prEN ISO 9229 and a further standard, BS EN 13172, dealing with the evaluation of the conformity of the products to the standards.

Table 4 — Standards for factory made thermal insulating products for buildings

Standard: Thermal insulation products for buildings	Document identfier
Factory made **mineral wool (MW)** products — Specification	BS EN 13162
Factory made products of **expanded polystyrene (EPS)** — Specification	BS EN 13163
Factory made products of **extruded polystyrene foam (XPS)** — Specification	BS EN 13164
Factory **made rigid polyurethane foam (PUR)** products — Specification	BS EN 13165
Factory made products of **phenolic foam (PF)** — Specification	BS EN 13166
Factory made **cellular glass (CG)** products — Specification	BS EN 13167
Factory made products of **wood wool (WW)** — Specification	BS EN 13168
Factory made products of **expanded perlite (EPB)** — Specification	BS EN 13169
Factory made products of **expanded cork (ICB)** — Specification	BS EN 13170
Factory made **wood fibre (WF)** products — Specification	BS EN 13171

3.3 Test methods supporting the factory made product standards for buildings

The test methods supporting the factory made product standards are given in Table 5. Additional guidance on the differences between these test methods and corresponding British Standards is given in Annex A.

Table 5 — Test methods supporting the factory made product standards for buildings

Standard: Thermal insulating products for building applications	Document identifier
Determination of **length and width**	BS EN 822
Determination of **thickness**	BS EN 823
Determination of **squareness**	BS EN 824
Determination of **flatness**	BS EN 825
Determination of **compression behaviour**	BS EN 826
Determination of **apparent density**	BS EN 1602
Determination of **dimensional stability** under normal laboratory conditions	BS EN 1603
Determination of **dimensional stability** under specified temperature and humidity conditions	BS EN 1604
Determination of **deformation** under specified compressive load and temperature conditions	BS EN 1605
Determination of **compressive creep**	BS EN 1606
Determination of **tensile strength** perpendicular to the faces	BS EN 1607
Determination of **tensile strength** parallel to the faces	BS EN 1608
Determination of short term **water absorption** by partial immersion	BS EN 1609
Determination of **linear dimensions** of the test specimens	BS EN 12085
Determination of **water vapour transmission** properties	BS EN 12086
Determination of long term **water absorption** by immersion	BS EN 12087
Determination of long term **water absorption** by diffusion	BS EN 12088
Determination of **bending** behaviour	BS EN 12089
Determination of **shear** behaviour	BS EN 12090
Determination of **freeze thaw resistance**	BS EN 12091
Conditioning to a specified **moisture content**	BS EN 12429
Determination of behaviour under **point load**	BS EN 12430
Determination of **thickness** for floating floor products	BS EN 12431
Determination of behaviour under **cyclic loading**	prEN 13793[a]
Determination of **organic content**	prEN 13820[a]
[a] Documents ready for submission for Formal Vote.	

3.4 Factory made product standards for building equipment and industrial installations

With the exception of factory made polyethylene foam (PEF) products, committee draft specifications for building equipment and industrial installations are available (see Table 6).

Table 6 — Draft standards for factory made thermal insulating products for building equipment and industrial installations

Standard: Thermal insulation products for building equipment and industrial applications
Factory made **mineral wool (MW)** products — Specification
Factory made **flexible elastomeric foam (FEF)** products — Specification
Factory made **cellular glass (CG)** products — Specification
Factory made **calcium silicate (CS)** products — Specification
Factory made **phenolic foam (PF)** products — Specification
Factory made **extruded polystyrene foam (XPS)** products — Specification
Factory made **rigid polyurethane (PUR) foam and polyisocyanurate foam (PIR)** products — Specification
Factory made **expanded polystyrene (EPS)** foam — Specification
Factory made **polyethylene foam (PEF)** products — Specification

3.5 Test methods supporting the standards for building equipment and industrial installations

The test methods supporting the standards for building equipment and industrial installations are given in Table 7.

Table 7 — Test methods supporting the standards for building equipment and industrial installations

Standard: Thermal insulation products for building equipment and industrial installations
Determination of **dimensions**, squareness and linearity of pre-formed pipe insulation
Determination of **trace quantities** of water soluble chloride, fluoride, silicate and sodium ions and pH
Determination of **water vapour** transmission properties of pre-formed pipe insulation
Determination of the **apparent density** of pre-formed pipe insulation
Determination of the coefficient of **thermal expansion**
Determination of short term **water absorption** by partial immersion of pre-formed pipe insulation
Determination of maximum **service temperature**
Determination of maximum **service temperature** for pre-formed pipe insulation
Determination of minimum **service temperature**
Dimensional stability under specified temperature conditions of pre-formed pipe insulation (draft not yet available)

3.6 In situ made product standards for buildings

It is intended that all the draft in situ product standards (see Table 8) should be published by December 2002.

Table 8 — Draft standards for in situ made thermal insulating products for buildings

Standard: Thermal insulation products for buildings	Document identifier
In situ formed loose-fill **mineral wool** products — Part 1: Specification for the loose-fill products before installation	prEN 14064-1[a]
In situ formed loose-fill **mineral wool** products — Part 2: Specification for the installed products	prEN 14064-2[a]
In situ formed **expanded clay** lightweight aggregate products — Part 1: Specification for the loose fill products before installation	prEN 14063-1[a]
In situ formed **expanded clay** lightweight aggregate products — Part 2: Specification for the installed products	prEN 14063-2[a]
In situ formed dispensed **PUR foam** products — Part 1: Specification for the foam system before installation	Not yet available
In situ formed dispensed **PUR foam** products — Part 2: Specification for the installed products	Not yet available
In situ formed sprayed **PUR foam** products — Part 1: Specification for the foam system before installation	Not yet available
In situ formed sprayed **PUR foam** products — Part 2: Specification for the installed products	Not yet available
Dispensed **PUR foam** for industrial installations — Part 1: Specification for the foam system before installation	Not yet available
Dispensed **PUR foam** for industrial installations — Part 2: Specification for the installed products	Not yet available
Sprayed **PUR foam** for industrial installations — Part 1: Specification for the foam system before installation	Not yet available
Sprayed **PUR foam** for industrial installations — Part 2: Specification for the installed products	Not yet available
In situ formed **expanded perlite** products — Part 1: Specification for the foam system before installation	Not yet available
In situ formed **expanded perlite** products — Part 2: Specification for the installed products	Not yet available
In situ formed **exfoliated vermiculite** (EV) products — Part 1: Specification for the bonded and loose-fill products before installation	Not yet available
In situ formed **exfoliated vermiculite** (EV) products — Part 2: Specification for the installed products	Not yet available
In situ formed **urea formaldehyde foam** products –Part 1: Specification for the foam system before installation	Not yet available
In situ formed **urea formaldehyde foam** products –Part 2: Specification for the installed products	Not yet available
In situ formed blown, sprayed or poured **cellulose** products — Part 1: Specification for the loose-fill products before installation	Not yet available
In situ formed blown, sprayed or poured **cellulose** products — Part 2: Specification for the installed products	Not yet available
[a] Sent for CEN enquiry in March 2001.	

A proposed new work item exists for expanded clay for in situ insulation of foundations of buildings.

3.7 External thermal insulation composite systems (ETICS) standards

The development of ETICS standards cannot be the basis for CE marking because at the current time these products have not been mandated to CEN by the European Commission (see **3.1**). At the present time these products may have CE marking based on ETAGs.

The draft specifications and test methods for ETICS standards are given in Table 9 and Table 10. These documents are currently being prepared for Formal Vote.

Table 9 — ETICS standards

Standard: External thermal insulation composite systems	Document identifier
External thermal insulation composite systems (ETICS) based on **expanded polystyrene foam** — Product specification	prEN 13499
External thermal insulation composite systems (ETICS) based on **mineral wool** — Product specification	prEN 13500

Table 10 — Test methods supporting the ETICS standards

Standard: Thermal insulation products for building applications	Document identifier
Determination of the **tensile bond strength** of the adhesive and of the base coat to the thermal insulation material	prEN 13494
Thermal insulation products for building applications — Determination of the **pull-off resistance** of external thermal insulation composite systems (ETICS) (foam block test)	prEN 13495
Thermal insulation products for building applications — Determination of the **mechanical properties** of glass fibre meshes	prEN 13496
Thermal insulation products for building applications — Determination of the **resistance to impact** of external insulation composite systems (ETICS)	prEN 13497
Thermal insulation products for building applications — Determination of the **resistance to penetration** of external insulation composite systems	prEN 13498

4 Content of the new European building product standards BS EN 13162 to BS EN 13171 (see Table 4)

4.1 General

The new European Standards for thermal insulation materials do not specify levels of performance but instead offer the manufacturer a choice of levels and classes to declare where relevant.

The levels have been derived from requirements and recommendations contained in European national building regulations, codes and standards.

For some properties it is sufficient to declare “no performance determined”. This is most likely to be relevant when the property concerned is not subject to regulations for the intended use of the product in the country of destination.

All of the product standards contain an informative Annex ZA which creates the link between the content of the standard and the requirements of CE Marking.

4.2 Requirements of the product standards

4.2.1 *General*

To conform to the standards, the manufacturer is obliged to make measurements on all of the properties shown in **4.2** of the product standards. However, purely for CE marking purposes, only the performance characteristics relevant to the intended use in the chosen market need to be measured and declared.

In addition, the manufacturer is required to select and make tests on the properties shown in **4.3** of the product standards that are relevant to specific applications.

4.2.2 *Thermal properties*

The method in which the thermal properties of materials are expressed in the new product standards is very different from the method traditionally used in the United Kingdom. The new product standards are more closely based on procedures that have been in common use in Scandanavia and Germany.

The manufacturer will still be required to give a value for thermal resistance and wherever possible a value for thermal conductivity. These values will be derived from a statistical analysis of the past performance of the product.

A good example of the derivation of the values is given in BS EN 13162:2001, Annex D. The declared thermal conductivity value will be the mean value for the product from the results of one year's production plus an increment related to the number of results used to derive the mean value and the statistical dispersion (standard deviation) within the results.

The numerical end result of this mathematical operation is rounded up to the nearest whole number.

Ageing procedures are necessary for products made of extruded polystyrene foam (XPS) (BS EN 13164), rigid polyurethane foam (PUR) (BS EN 13165) and phenolic foam (PF) (BS EN 13166) prior to the calculation of the declared value of thermal conductivity because they contain blowing agents which have a lower thermal conductivity than air and which stay in the foam for an appreciable time. The ageing procedure is intended to represent a time average value of approximately 25 years of use.

Values for declared thermal conductivity, λ, and declared thermal resistance, R, are used in the Scope of each standard to limit and define its applicability.

4.2.3 *Compressive stress and compressive strength*

In order to achieve compatibility and comparability between thermal insulating materials the method in which the product properties are expressed has been harmonized where possible. A good example of this is for compressive stress/strength. BS EN 13162 to BS EN 13171 (see Table 4) call up BS EN 826 as the test method but the options for the expression of the levels, as can be seen from Table 11, are considerable.

Table 11 — Options for the declaration of compressive stress/strength

Level kPa	MW EN 13162	EPS EN 13163	XPS EN 13164	PUR EN 13165	PF EN 13166	CG EN 13167	WW EN 13168	EPB EN 13169	ICB EN 13170	WF EN 13171
0.5	X									
5	X									X
10	X									X
15	X									
20	X						X			X
25	X			X						
30	X	X					X			X
40	X									
50	X	X		X	X		X			
60	X	X								
70	X	X								X
75							X			
80	X	X								
90	X	X							X	
100	X	X	X	X	X		X	X	X	X
110	X								X	
120	X	X		X	X					
125								X		
130	X			X						
140	X			X						
150	X	X		X	X		X	X		
175	X			X	X					
200	X	X	X	X	X		X	X		
225	X			X						
250	X	X	X	X						
300	X	X	X		X			X		
350	X	X		X						
400	X	X	X	X	X	X				
450								X		
500	X	X	X							
600			X							
700			X			X		X		
750							X			
800			X	X				X		
900						X				
1 000			X				X			
1 200						X				
1 600						X				

4.2.4 *Other declared characteristics*

Not all of the declared characteristics of thermal insulating materials have been harmonized to the same extent, e.g. different systems have been used for the expression of thickness tolerances.

EXAMPLE

— T1 for expanded cork means a tolerance of ±1 mm;

— T1 for wood fibre means a tolerance of between −5 mm and +15 mm;

— T1 for mineral wool means –5 mm and excess permitted.

The need for different systems is explained by the differences in the nature of the materials.

4.2.5 *Evaluation of conformity*

The evaluation of conformity is carried out in accordance with BS EN 13172. The building product standards provide tables describing the minimum frequency of tests that the manufacturer is required to carry out. They also specify the test methods to be used and define or qualify how the test is to be used. Two types of test are required:

— initial type tests (ITT) on some properties;

— routine tests on some of the other (but not all) properties.

4.2.6 *Marking*

Compliance with the new European Standards requires that the manufacturer gives the declared values for the properties of the product and information necessary to identify the product and its source either on the product, its packaging or its literature. The information has to be derived and declared in accordance with the European Standards and their supporting test methods.

4.3 Annex ZA

Most new European construction product standards contain an Annex ZA which identifies the performance characteristics required for CE marking and the clauses in the standard in which they are addressed.

Annex ZA also prescribes the level of attestation of conformity to be used for the product in particular applications.

For nearly all products, for any regulated intended use, but where fire regulations do not apply, attestation of conformity system 3 is required, i.e. an initial type test conducted by a notified test body, on the following characteristics (if relevant):

a) thermal resistance;

b) release of dangerous substances;

c) compressive strength (for load bearing applications);

d) water permeability (in practice, water absorption).

If the particular application is also subject to regulations on reaction to fire, the attestation system for fire is required to be 1, 3 or 4 depending on the declared reaction to fire classes.

For example, if system 1 is required, because of the reaction to fire declaration, system 1 will apply not only for the reaction to fire declaration but also more generally for the inspection and the evaluation of the factory production control (FPC) of the product.

Under system 1 the initial type test of the characteristics listed in a) to d) is also carried out under the responsibility of the notified body. Other characteristics are required to be tested by the manufacturer. The notified body is required to evaluate all of the test results, together with the inspection and the FPC.

NOTE 1 System 1 applies to products/materials for which a clearly identifiable stage in the production process results in an improvement in the reaction to fire classifications, e.g. an addition of fire retardants or a limiting of organic material.

NOTE 2 Regarding dangerous substances, attention is drawn to the note at the end of **ZA.1** in BS EN 13162:2001 to BS EN 13171:2001.

5 New European Standard on evaluation of conformity of thermal insulating products (BS EN 13172)

5.1 General

The new European Standard BS EN 13172 is used in conjunction with the Annex ZA of the product standards to define the tasks for the following notified bodies[1)]:

a) the certification body;

b) the inspection body;

c) the testing laboratory.

BS EN 13172:2001, Annex B is appropriate for products of reaction to fire classes under system 1 and BS EN 13172:2001, Annex C is appropriate for products with performance requirements under system 3.

5.2 Product grouping

Many manufacturers sell products that are differentiated only by name or by another aspect that has little or no effect on the performance of the product. BS EN 13172 allows the grouping of such products for the purposes of testing.

Products, which differ only in aspects that do not influence the properties of the relevant product standard, may be collected into product groups for the purposes of testing. This can greatly reduce the cost of testing and is the first step manufacturers should take when undertaking CE Marking.

Under system 1 the notified body is responsible for the sampling of the group of products. Normally the manufacturer and the certification body would agree the appropriate grouping and sampling procedures.

Provided that a product within the group meets the requirements of the product standard all products within the same group are deemed to conform to the product standard.

To assess the compliance of the manufacturer's claimed values in the ITT, the testing laboratory is required to conduct four tests on samples taken from different production dates (see BS EN 13172:2001, **B.2.3**). If more than one production line is in operation each line is treated separately.

NOTE Attention is drawn to the fact that a proposed amendment to EN 13172 is under discussion which would affect the testing of product groups.

[1)] An organization needs to apply to the Office of the Deputy Prime Minister (ODPM) in order to be nominated for notified body status. Further information is available on the ODPM website: www.odpm.gov.uk.

Annex A (informative)
Additional guidance on the test methods supporting the factory made product standards for buildings listed in Table 5

This annex provides additional guidance on the test method standards supporting the factory made product standards for buildings listed in Table 5. It gives guidance on the differences between these test methods and corresponding British Standards.

BS EN 822, *Thermal insulating products for building applications — Determination of length and width*

This European Standard is intended for use with full-sized thermal insulating products for building applications. For these products only, it should be used in place of BS EN ISO 1923 (which replaced BS 4370-1:1988, methods 1A, 1B and 1C) and the relevant tests in BS 2972.

NOTE The length and width of rigid or flexible cellular plastics and rubber products not intended for use as thermal insulating products for building applications are measured using BS EN ISO 1923. For rigid materials, BS EN ISO 1923 has superseded BS 4370-1:1988, methods 1A, 1B and 1C and for flexible materials, it has superseded BS 4443-1:1988, methods 1A, 1B and 1C.

BS EN 823, *Thermal insulating products for building applications — Determination of thickness*

This European Standard is intended for use with full-sized thermal insulating products for building applications. For these products only, it should be used in place of BS EN ISO 1923 (which replaced BS 4370-1:1988, methods 1A, 1B and 1C) and the relevant tests in BS 2972. Examples of alternative forms of test apparatus are included in order to extend the range of products for which this method is suitable.

For the mineral wool manufacturer, the most significant change in the tests of dimensions is contained in BS EN 823:1995, Annex A, which gives a method for the determination of thickness of compressed products, such as loft insulation rolls. In this test, the sample is held vertically and dropped from approximately 450 mm to the floor. This action releases the stresses in the product, causing it to expand. The thickness is measured after the drop.

The test replaces the method in BS 5803-1 in which the sample is unrolled and allowed to expand freely for 4 h before measurements of thickness are made.

BS EN 824, *Thermal insulating products for building applications — Determination of squareness*

This European Standard replaces the method described in BS 2972:1989, section 2. No method for the determination of squareness is given in BS 4370.

BS EN 825, *Thermal insulating products for building applications — Determination of flatness*

The method of test in this European Standard does not correspond to any test hitherto used for thermal insulation products in the UK.

BS EN 826, *Thermal insulating products for building applications — Determination of compression behaviour*

This European Standard provides a means for assessing the compressive stress of products at 10 % relative deformation, or their compressive strength where the yield point is below 10 %. A method for the determination of compressive modulus is also given.

Determination of compression behaviour was one of the more difficult tests to agree in the CEN working group. The main change compared with the test described in BS 2972:1989, section 7, is in the speed with which the load is applied to the test specimen. The method in BS EN 826 refers to a compression rate (millimetres per minute) which is equal to the specimen thickness in millimetres divided by 10.

A further difference from BS 2972 is the requirement to produce a flat surface (possibly by grinding) before the test takes place. This affects the initial deformation of mineral wool products.

The compressive strength of mineral wool products will be marginally higher as a result of the new procedures.

The loading rate is similar to that currently used in BS 4370-1:1998, method 3, for rigid cellular materials (10 % of the original thickness per minute).

BS EN 1602, ***Thermal insulating products for building applications — Determination of the apparent density***

This European Standard replaces the test procedures given in BS 2972:1989, section 3. For thermal insulating products for building applications it should be used in place of BS EN ISO 845 (which replaced BS 4370-1:1988, method 2). The method gives clear guidance on how to deal with attached facings, which is not given in BS 4370 or BS EN ISO 845.

NOTE The apparent density of cellular plastics and rubber products which are not intended for use as thermal insulating products for building applications is determined using BS EN ISO 845.

BS EN 1603, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)*

This European Standard may be used for full-sized products or for smaller test specimens cut from full-sized products. It is a long-duration test (28 days) under normal laboratory conditions. No direct British Standard equivalent exists for insulation materials.

BS EN 1604, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*

This European Standard contains tests for mineral wool which are unfamiliar to the UK manufacturer. No test is given in BS 2972 although a procedure is described in BS 4370:Method 5A, for rigid cellular materials, which is similar to BS EN 1604 in that various temperatures may be used with a choice of humidity conditions. The method in BS EN 1604 requires the specimens to have minimum linear dimensions of 200 mm and to be representative of the full-sized product, with facings and skins retained.

BS EN 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*

The method of test in this European Standard does not correspond to any test hitherto used for thermal insulation products in the UK.

BS EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

The test procedure in this European Standard is new for insulation manufacturers in the UK.

BS EN 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

The method of test in this European Standard differs from the test described in BS 2972, in that the speed of the crosshead moves at 5 mm/min in BS 2972, but at 10 mm/min in BS EN 1607. For inorganic thermal insulating materials, some differences between the test results from the two procedures might be expected. No equivalent test exists in BS 4370.

BS EN 1608, *Thermal insulating products for building applications — Determination of tensile strength parallel to faces*

BS 2972 does not contain a test for the determination of tensile strength parallel to faces, although a comparable test is given in BS 4370-2:1993, method 9. It is apparent, however, from the size of the test specimen (minimum length 500 mm), that the new test method in BS EN 1608 is more appropriate for mineral wool products than for rigid cellular plastics.

BS EN 1609, *Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion*

The method of test in this European Standard is new for manufacturers in the UK. The test method in BS 2972:1989, section 12, for partial immersion is similar to the short-term test given in BS EN 1609 using method A, which involves draining the test specimen after an initial immersion. BS EN 1609:1997, method B requires that the water absorption of the specimen be determined without draining. As far as short-term tests are concerned, the greatest effects for the mineral wool industry are the change from the frequently used total immersion test of BS 2972 (section 12) to the partial immersion test of BS EN 1609. No equivalent test methods are given in BS 4370.

BS EN 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

Until the publication of this European Standard, no clear differentiation existed between the methods for full-sized products and those for test specimens.

In contrast to BS EN 822 and BS EN 823, which refer to full-sized products, BS EN 12085 is intended for use with test specimens of thermal insulating products for building applications. For these products only, it should be used in place of BS EN ISO 1923 (which replaced BS 4370-1:1998, methods 1A, 1B and 1C) and the relevant tests in BS 2972.

The dimensions of test specimens cut from rigid or flexible cellular plastics and rubber products not intended for use as thermal insulating products for building applications are measured using BS EN ISO 1923. For rigid materials, BS EN ISO 1923 should be used in place of BS 4370-1:1998, methods 1A, 1B and 1C and for flexible materials, it should be used in place of BS 4443-1:1988, methods 1A, 1B and 1C.

BS EN 12086, *Thermal insulating products for building applications — Determination of water vapour transmission properties*

A test method for the measurement of water vapour permeance is briefly described in BS 2972:1989, section 13. The method is more fully described in BS 3177. Unlike the method in BS 2972 and BS 3177, the test method in BS EN 12086 contains no direct reference to temperate or tropical conditions, but the condition it describes could be appropriate for measurements which stimulate performance under these conditions.

The method replaces BS 4370-2:1993, method 8 but with a choice of test assemblies which allow measurement of specimens over a wider thickness range up to 100 mm.

BS EN 12087, *Thermal insulating products for building applications — Determination of long-term water absorption by immersion*

BS EN 12087 gives procedures for long-term water absorption (both partial and total immersion). Both require an immersion period of 28 days. In contrast to this method, the test in BS 2972:1989 (section 12) for total immersion requires an immersion period of only 2 h. No methods comparable to those of BS EN 12087 have previously been used for insulation products in the UK.

BS EN 12088, *Thermal insulating products for building applications — Determination of long-term water absorption by diffusion*

No equivalent test for the determination of long-term water absorption by diffusion is given in BS 4370 or BS 2972. The method in BS EN 12088 requires that the specimen be turned over at weekly intervals during the test.

The method is one of two methods specified in BS EN 12091 for the conditioning of specimens to be evaluated for freeze-thaw resistance. (The other method is that given in BS EN 12087.) A method for long-term water absorption by diffusion is given for rigid cellular materials in BS 3837-2.

BS EN 12089, *Thermal insulating products for building applications — Determination of bending behaviour*

BS EN 12089 describes alternative methods for the measurement of flexural strength which replace the method described in BS 2972:1989, section 18. Method A uses a full-sized test specimen and method B uses a test specimen of approximately the same size as that described in BS 2972.

Method A is for full-sized products and has no equivalent within BS 4370. Method B is for test specimens and partially replaces BS 4370-4:1991, method 14. However, because of the uncertainty of the length dimension, caused by the specimen “rolling” round the support anvils, the method is not intended for the calculation of the bending modulus of elasticity. Method B can be used in place of method 4 (cross-breaking strength test) of BS 4370-1 provided that an appropriate note is made in the test report of the number of test specimens tested simultaneously.

BS EN 12090, *Thermal insulating products for building applications — Determination of shear behaviour*

The method given in BS EN 12090 replaces the method in BS 4370. It offers double test specimen assemblies for improved control over torsional forces.

BS EN 12091, *Thermal insulating products for building applications — Determination of freeze-thaw resistance*

The freeze-thaw resistance of insulation materials is not currently included in the British Standard tests for thermal insulation products. If the method in BS EN 12091 is used, care should be taken to select an appropriate conditioning procedure for specimens with attached facings.

BS EN 12429, *Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*

This European Standard provides sophisticated procedures for the conditioning of test specimens to an equilibrium moisture content at (23 ± 2) °C and (50 ± 5) % r.h. or other relative humidities. This conditioning may be necessary before other tests are carried out. Generally, the procedures are useful where data is in dispute between a manufacturer and client. The possibility of such dispute is referred to in the test methods.

BS EN 12429 replaces the corresponding conditioning procedure given in BS 2972:1989, section 11. No equivalent procedure exists in BS 4370.

BS EN 12430, *Thermal insulating products for building applications — Determination of behaviour under point load*

A test procedure for the determination of the behaviour under point load of insulation materials is not given in BS 2972 or BS 4370. BS EN 12430 may allow compression resistance to be determined under more realistic conditions than those currrently associated with the compression test of BS EN 826. It also allows for the same size of indentor to be used on products of different thickness.

BS 1105, for wood wool cement slabs, describes a static load test which follows an impact test. In this test, the load of 1.32 kN is applied over an area not exceeding 300 mm. Compared with the method in BS EN 12430, which uses an indentor of 79.9 mm and analyses the results from force/deformation curves, the test in BS 1105 is more straightforward.

BS EN 12431, *Thermal insulating products for building applications — Determination of thickness for floating floor insulating products*

In this test in BS EN 12431, the product thickness is first determined under a low load, which represents the thickness as supplied, and then under a high load, which represents the in-use condition. No equivalent test procedures are given in either BS 2972 or BS 4370.

prEN 13793, *Thermal insulating products for building applications — Determination of behaviour under cyclic loading*

Behaviour under cyclic loading is not referenced in any of the European building product standards published in August 2001. No equivalent British Standard tests exist.

prEN 13820, *Thermal insulating materials for building applications — Determination of organic content*

A test method for the determination of organic content is described in BS 2972. It will be replaced by the test described in prEN 13820. The purpose of the test is to provide guidance for the European fire classification of products containing only a small quantity of organic binder (European decision 96/603EC [8]).

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Bibliography

Standards publications

BS 1105:1981, *Specification for wood wool cement slabs up to 125 mm thick*.

BS 2972:1989, *Methods of test for inorganic thermal insulating materials*.

BS 3177:1959, *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*.

BS 3837-2:1990, *Expanded polystyrene boards — Part 2: Specification for extruded boards*.

BS 4370-1:1988, *Methods of test for rigid cellular materials — Part 1: Methods 1 to 5*.

BS 4370-2:1993, *Methods of test for rigid cellular materials — Part 2: Methods 7 to 9*.

BS 4370-4:1991, *Methods of test for rigid cellular materials — Part 4: Method 14 — Determination of flexural properties*.

BS 4443-1:1988, *Methods of test for flexible cellular materials — Part 1: Method 4 — Measurement of cell count*.

BS 5803-1:1985, *Thermal insulation for use in pitched roof spaces in dwellings — Part 1: Specification for man-made mineral fibre thermal insulation mats*.

BS EN ISO 845:1995, *Cellular plastics and rubbers — Determination of apparent (bulk) density*.

BS EN ISO 1923:1995, *Cellular plastics and rubbers. Determination of linear dimensions*.

Other documents

[1] EUROPEAN COMMUNITIES. 89/106/EEC. Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products Construction Products Directive (CPD). Luxembourg: Office for Official Publications of the European Communities, 1989.

[2] GREAT BRITAIN. The Construction Products Regulations 1991, Statutory Instrument 1991 No. 1620, London: The Stationery Office.

[3] GREAT BRITAIN. Joint Circular on the Construction Products Directive, 23 August 1991. London: The Stationery Office.

[4] GREAT BRITAIN. The Construction Products (Amendment) Regulations 1994, Statutory Instrument 1994 No. 3051. London: The Stationery Office.

[5] EUROPEAN ORGANIZATION FOR TECHNICAL APPROVALS (EOTA). European Technical Approval Guidelines. Brussels: EOTA. www.eota.be.

[6] OFFICE OF THE DEPUTY PRIME MINISTER. *CE marking under the Construction Products Directive*, ODPM, October 2001. www.safety.odpm.gov.uk/bregs/cpd/index.htm.

[7] EUROPEAN COMMUNITIES. "C" series of the Official Journal of the European Communities (OJEC). Luxembourg: Office for the Official Publications of the European Communities.

[8] EUROPEAN COMMUNITIES. 96/603/EC. Commission Decision of 4 October 1996 establishing the list of products belonging to Classes A "No contribution to fire" provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products. Luxembourg: Office for Official Publications of the European Communities, 1996.

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