BS EN 13472:2012

BSI Standards Publication

Thermal insulating products for building equipment and industrial installations — Determination of short term water absorption by partial immersion of preformed pipe insulation

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National foreword

This British Standard is the UK implementation of EN 13472:2012. It supersedes BS EN 13472:2001 which is withdrawn.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 secretary.

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

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Compliance with a British Standard cannot confer immunity from legal obligations.

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EN 13472

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English Version

Thermal insulating products for building equipment and industrial installations - Determination of short term water absorption by partial immersion of preformed pipe insulation

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Détermination de l'absorption d'eau à court terme par immersion partielle des coquilles isolantes préformées

Wärmedämmstoffe für die Haustechnik und für betriebstechnische Anlagen - Bestimmung der Wasseraufnahme bei kurzzeitigem teilweisem Eintauchen von vorgeformten Rohrdämmstoffen

This European Standard was approved by CEN on 24 August 2012.

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Foreword

This document (EN 13472:2012) 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of an identical text or by endorsement, at the latest by April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

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

This document supersedes EN 13472:2001.

The following main technical changes have been done on this new edition of EN 13472:

a) Figure 1 has been corrected;

b) Subclause 5.3, Tap water has been supplemented.

This European Standard has been prepared for products used to insulate building equipment and industrial installations, but it may also be applied to products used in other areas.

This European Standard is one of a series of standards which specify test methods for determining dimensions and properties of thermal insulating materials and products. It supports a series of product standards for thermal insulating materials and products which derive from the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (Directive 89/106/EEC) through the consideration of the essential requirements.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the equipment and procedures for determining the short term water absorption of preformed pipe insulation by partial immersion in water. It is applicable to thermal insulating products.

NOTE It is intended to simulate the water absorption caused by exposure to rain for 24 h during product installation.

If the pipe insulation is cut from a flat product, then the short term water absorption by partial immersion can be obtained from tests carried out on the flat product with similar properties in accordance with EN 1609, providing the test is carried out in the direction giving the highest water uptake.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13467, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation*

3 Terms and definitions

This European Standard contains no terms and definitions.

4 Principle

The short term water absorption by partial immersion is determined by measuring the change in mass of a test specimen, the lower part of which is in contact with water for a period of 24 h.

The excess water adhering to the surface and not absorbed by the test specimen is drained off in method A, or calculated in method B, from the initial water uptake.

5 Apparatus

5.1 Balance capable of determining the mass of a test specimen to an accuracy of 0,1 g or 0,5 %, whichever is less.

5.2 Water tank with a device for keeping the water level constant to within ± 2 mm, and a device to keep the test specimen in the required position during the test (see examples in Figures 1a) and 1b)).

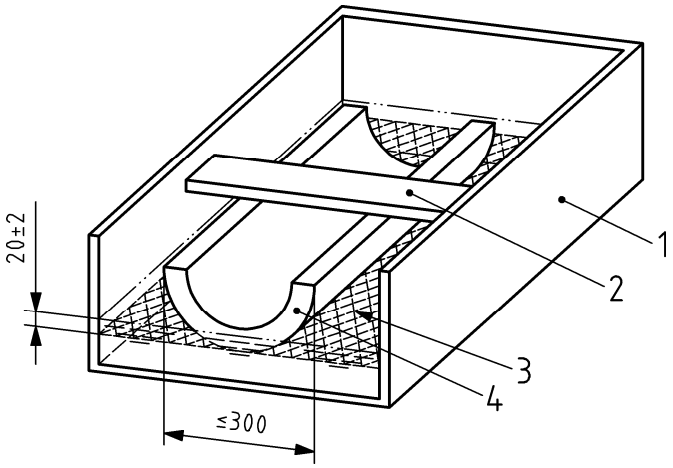
The supporting device shall be such that the test specimen contact area with water shall be at least 85 % and such that the original form of the test specimen is maintained.

5.3 Tap water adjusted to a temperature of (23 ± 5) °C.

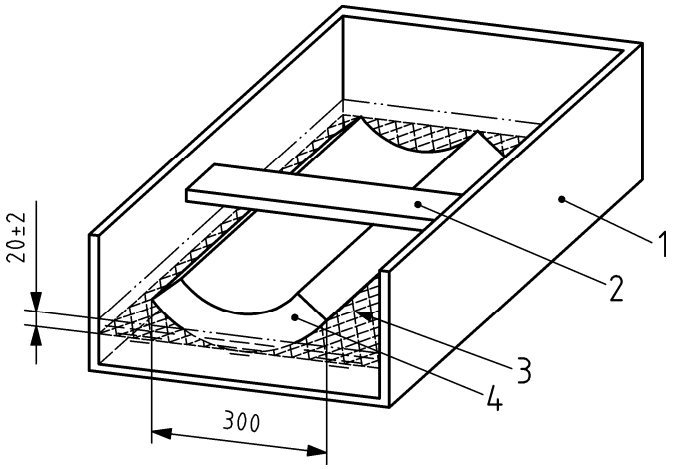
In case of dispute, deionised water shall be used.

5.4 Equipment for drainage (see examples in Figures 2a) and 2b)).

Dimensions in millimetres



a) Example for $D_0 \leq 300$ mm

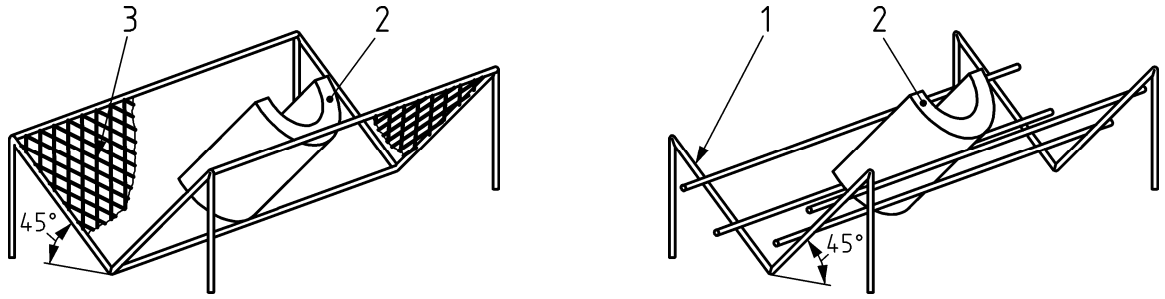


b) Example for $D_0 > 300$ mm

Key

1 water tank
2 load to keep the test specimen in position
3 stainless steel mesh
4 test specimen

Figure 1 — Examples of partial immersion test devices



a) **b)**

Key

1 stainless steel mesh
2 test specimen
3 perforated stainless steel

Figure 2 — Examples of equipment for drainage

6 Test specimens

6.1 Dimensions of test specimens

Test specimens shall be prepared from the product without reducing the original thickness. In the event that the outside diameter of the product is ≤ 300 mm, the test specimen shall have one face with an area equal to the full cross sectional area of the product or half the original cross sectional area. For products with outside diameters > 300 mm, the face shall be a segment of the cross section with an outside chord length of (300 ± 10) mm.

The length of the test specimen shall be adjusted so that the area of the immersed cylindrical surface will be (40 000 ± 400) mm².

6.2 Preparation of test specimens

The test specimens shall be cut so that they do not include product ends.

The test specimens shall be prepared by methods that do not change the original structure of the product. Any skins, facings and/or coatings shall be retained.

NOTE Special methods of preparation, when needed, are specified in the relevant product standard.

For products with a thickness < 25 mm, the ends shall be closed to avoid water pickup on the inner main surface of the test specimen (e.g. by use of glued aluminium foil on the ends).

6.3 Number of test specimens

The number of test specimens shall be as specified in the relevant product standard. If the number is not specified, then at least three test specimens shall be used.

In the absence of a product standard or any other European Technical Specification, the number of test specimens may be agreed between parties.

6.4 Conditioning of test specimens

The test specimens shall be stored for at least 6 h at (23 ± 5) °C. In case of dispute, they shall be stored at (23 ± 2) °C and (50 ± 5) % relative humidity for the time specified in the relevant product standard.

7 Procedure

7.1 Test conditions

The test shall be carried out at (23 ± 5) °C. In case of dispute it shall be carried out at (23 ± 2) °C and (50 ± 5) % relative humidity.

7.2 Test procedure

7.2.1 General

The choice of the method A or B shall be as specified in the relevant product standard.

In the absence of a product standard or any other European Technical Specification, the method A or B may be agreed between parties.

The dimensions of the test specimens shall be measured in accordance with EN 13467.

7.2.2 Method A (drainage)

Weigh the test specimen to the nearest 0,1 g or 0,5 %, whichever is less, to determine its initial mass m_0.

Place the test specimen with the outside surface downwards in the empty water tank and apply a sufficient load to keep the test specimen partially immersed when water is added. Carefully adjust the water added to the tank until the lowest point of the outside face of the test specimen is (20 ± 2) mm below the surface of the water (see examples in Figures 1a) and 1b)). Ensure that the water level remains constant during the test.

Remove the test specimen after 24 h and drain it for (10 ± 0,5) min by placing it supported on the exterior surface on a mesh, inclined at 45°, as shown in Figure 2a) or 2b). Weigh the test specimen again to determine the mass m_{24}.

7.2.3 Method B (deduction of initial water uptake)

Weigh the test specimen to the nearest 0,1 g or 0,5 %, whichever is less, to determine its initial mass m_0.

Place the test specimen with the outside surface downwards in the water tank in such position that it is partially immersed in water with the lowest point of the outside face of the test specimen (20 ± 2) mm below the water level. Remove the test specimen after 10 s holding it horizontally and place it within 5 s in a plastic tray of known mass. Reweigh this tray with the test specimen to determine the mass of the test specimen including the initial water uptake m_1.

Replace the test specimen in the water tank in the same position and apply a sufficient load to keep the test specimen partially immersed in water, with the lowest point of the outside face of the test specimen (20 ± 2) mm below the water level (see examples in Figures 1a) and 1b)). Ensure that the water level remains constant during the test.

Remove the test specimen after 24 h, holding it horizontally and place it within 5 s in the plastic tray of known mass to determine the mass m_{24}.

Method B is only applicable if the initial water uptake is:

$$\frac{m_1 - m_0}{A_p} \leq 0{,}5 \text{ kg/m}^2 \quad (1)$$

where

m_1 is the mass of the test specimen including the initial water uptake in method B, in kilograms;

m_0 is the initial mass of the test specimen as determined in method B, in kilograms;

A_p is the immersed cylindrical surface area of the test specimen, in square metres.

8 Calculation and expression of results

The test result shall be the mean value of the individual values.

NOTE Results obtained with test specimens of different outside diameters and thicknesses might not be comparable.

Calculate the short term water absorption by partial immersion, W_p, in kilograms per square metre using the following formulae:

— **Method A (drainage)**

$$W_p = \frac{m_{24} - m_0}{A_p} \quad (2)$$

— **Method B (deduction of initial water uptake)**

$$W_p = \frac{m_{24} - m_1}{A_p} \quad (3)$$

The calculation of A_p, necessary for both method A and B, is as follows:

$$A_p = \arccos\left[\frac{\frac{D_0}{2} - 0{,}02}{\frac{D_0}{2}}\right] \times D_0 \times l \quad (4)$$

where

D_0 is the outside diameter, in metres;

l is the length of the test specimen, in metres;

m_0 is the initial mass of the test specimen as determined in method A, in kilograms;

m_1 is the mass of the test specimen including the initial water uptake in method B, in kilograms;

m_{24} is the mass of the test specimen after partial immersion for 24 h (method A and B), in kilograms;

A_p is the immersed cylindrical surface area of the test specimen, in square metres.

The calculated arc cos angle shall be in radians (not in degrees).

W_p shall be rounded to the nearest 0,01 kg/m^2.

9 Accuracy of measurement

NOTE It has not been possible to include a statement on the accuracy of the method in this edition of the standard, but it is intended to include such a statement when the standard is next revised.

10 Test report

The test report shall include the following information:

a) reference to this European Standard (EN 13472);

b) product identification:

   1) product name, factory, manufacturer or supplier;

   2) production code number;

   3) type of product;

   4) packaging;

   5) the form in which the product arrived at the laboratory;

   6) other information as appropriate, e.g. nominal dimensions, nominal density;

c) test procedure:

   1) pre-test history and sampling, e.g. who sampled and where;

   2) conditioning;

   3) dimensions of the test specimens;

   4) deviation from Clauses 6 and 7, if any;

   5) date of testing;

   6) general information relating to the test including reference to methods A or B and if relevant initial water uptake;

   7) events which may have affected the results;

NOTE Information about the apparatus and identity of the technician should be available in the laboratory but it need not be recorded in the report.

d) results;

e) all individual values and the mean value.

Annex A
(informative)

Table with examples of calculation of the length of test specimens

Table A.1 below gives the length and other dimensions of test specimens necessary to achieve an immersed cylindrical surface area, A_p, of 0,040 m^2.

The values have been calculated from the formula for A_p given in Clause 8 and the following formula:

$$l = \frac{Ap}{D_0 \times \arccos\left[\frac{\frac{D_0}{2} - 0{,}02}{\frac{D_0}{2}}\right]} \qquad \text{(A.1)}$$

where

D_0 is the outside diameter, in metres;

l is the length of the test specimen, in metres;

The calculated arc cos angle shall be in radians (not in degrees).

Table A.1 — Examples of calculation of the length of test specimens

Dimensions in millimetres

Inner diameter	Nominal thickness	Outer diameter	Outer radius	Outer arc length	Length	Inner diameter	Nominal thickness	Outer diameter	Outer radius	Outer arc length	Length
17	20	57	28,5	72,3	553,5	21	20	61	30,5	74,4	537,8
17	30	77	38,5	82,4	485,7	21	30	81	40,5	84,2	474,8
17	40	97	48,5	91,4	437,4	21	40	101	50,5	93,2	429,4
17	50	117	58,5	99,7	401,0	21	50	121	60,5	101,3	394,8
17	60	137	68,5	107,4	372,4	21	60	141	70,5	108,9	367,3
17	70	157	78,5	114,6	349,0	21	70	161	80,5	116,0	344,9
17	80	177	88,5	121,4	329,6	21	80	181	90,5	122,7	326,1
27	20	67	33,5	77,5	516,4	34	20	74	37	80,9	494,4
27	30	87	43,5	87,0	459,7	34	30	94	47	90,1	443,8
27	40	107	53,5	95,7	418,1	34	40	114	57	98,5	405,9
27	50	127	63,5	103,6	385,9	34	50	134	67	106,3	376,3
27	60	147	73,5	111,1	360,1	34	60	154	77	113,6	352,3
27	70	167	83,5	118,0	338,9	34	70	174	87	120,4	332,3
27	80	187	93,5	124,6	321,0	34	80	194	97	126,8	315,4
42	20	82	41	84,7	472,2	48	20	88	44	87,5	457,4
42	30	102	51	93,6	427,4	48	30	108	54	96,1	416,3
42	40	122	61	101,7	393,3	48	40	128	64	104,0	384,5
42	50	142	71	109,3	366,1	48	50	148	74	111,4	359,0
42	60	162	81	116,3	343,9	48	60	168	84	118,4	337,9
42	70	182	91	123,0	325,2	48	70	188	94	124,9	320,2
42	80	202	101	129,3	309,3	48	80	208	104	131,2	305,0

Table A.1 *(continued)*

Dimensions in millimetres

Inner diameter	Nominal Thickness	Outer diameter	Outer radius	Outer arc length	Length	Inner diameter	Nominal thickness	Outer diameter	Outer radius	Outer arc length	Length
60	20	100	50	92,7	431,4	76	20	116	58	99,3	402,7
60	30	120	60	100,9	396,3	76	30	136	68	107,0	373,7
60	40	140	70	108,5	368,6	76	40	156	78	114,3	350,1
60	50	160	80	115,6	345,9	76	50	176	88	121,0	330,5
60	60	180	90	122,3	327,0	76	60	196	98	127,5	313,8
60	70	200	100	128,7	310,8	76	70	216	108	133,6	299,5
60	80	220	110	134,8	296,8	76	80	236	118	139,4	286,9
89	40	169	84,5	118,7	337,0	102	40	182	91	123,0	325,2
89	50	189	94,5	125,2	319,4	102	50	202	101	129,3	309,3
89	60	209	104,5	131,5	304,3	102	60	222	111	135,4	295,5
89	70	229	114,5	137,4	291,1	102	70	242	121	141,1	283,4
89	80	249	124,5	143,1	279,5	102	80	262	131	146,7	272,7
108	20	148	74	111,4	359,0	114	20	154	77	113,6	352,3
108	30	168	84	118,4	337,9	114	30	174	87	120,4	332,3
108	40	188	94	124,9	320,2	114	40	194	97	126,8	315,4
108	50	208	104	131,2	305,0	114	50	214	107	133,0	300,8
108	60	228	114	137,1	291,7	114	60	234	117	138,8	288,1
108	70	248	124	142,8	280,1	114	70	254	127	144,5	276,8
108	80	268	134	148,3	269,7	114	80	274	137	149,9	266,8
133	20	173	86,5	120,0	333,2	140	20	180	90	122,3	327,0
133	30	193	96,5	126,5	316,2	140	30	200	100	128,7	310,8
133	40	213	106,5	132,7	301,5	140	40	220	110	134,8	296,8
133	50	233	116,5	138,6	288,7	140	50	240	120	140,6	284,6
133	60	253	126,5	144,2	277,4	140	60	260	130	146,1	273,7
133	70	273	136,5	149,7	267,3	140	70	280	140	151,5	264,0
133	80	293	146,5	154,9	258,2	140	80	300	150	156,7	255,3
159	20	199	99,5	128,4	311,6	168	20	208	104	131,2	305,0
159	30	219	109,5	134,5	297,5	168	30	228	114	137,1	291,7
159	40	239	119,5	140,3	285,1	168	40	248	124	142,8	280,1
159	50	259	129,5	145,9	274,2	168	50	268	134	148,3	269,7
159	60	279	139,5	151,2	264,5	168	60	288	144	153,6	260,4
159	70	299	149,5	156,4	255,7	168	70	308	154	158,7	252,0
159	80	319	159,5	161,5	247,7	168	80	328	164	163,7	244,4
194	20	234	117	138,8	288,1	219	20	259	129,5	145,9	274,2
194	30	254	127	144,5	276,8	219	30	279	139,5	151,2	264,5
194	40	274	137	149,9	266,8	219	40	299	149,5	156,4	255,7
194	50	294	147	155,2	257,8	219	50	319	159,5	161,5	247,7
194	60	314	157	160,2	249,6	219	60	339	169,5	166,3	240,5
194	70	334	167	165,1	242,2	219	70	359	179,5	171,1	233,8
194	80	354	177	169,9	235,4	219	80	379	189,5	175,7	227,7
245	20	285	142,5	152,8	261,7	273	20	313	156,5	160,0	250,0
245	30	305	152,5	158,0	253,2	273	30	333	166,5	164,9	242,6
245	40	325	162,5	162,9	245,5	273	40	353	176,5	169,7	235,7
245	50	345	172,5	167,8	238,4	273	50	373	186,5	174,3	229,5
245	60	365	182,5	172,5	231,9	273	60	393	196,5	178,9	223,6
245	70	385	192,5	177,1	225,9	273	70	413	206,5	183,3	218,3
245	80	405	202,5	181,5	220,4	273	80	433	216,5	187,6	213,2

Table A.1 *(continued)*

Dimensions in millimetres

Inner diameter	Nominal Thickness	Outer diameter	Outer radius	Outer arc length	Length	Inner diameter	Nominal thickness	Outer diameter	Outer radius	Outer arc length	Length
324	40	404	202	181,3	220,6	356	40	436	218	188,2	212,5
324	50	424	212	185,7	215,5	356	50	456	228	192,4	207,9
324	60	444	222	189,9	210,6	356	60	476	238	196,5	203,5
324	70	464	232	194,1	206,1	356	70	496	248	200,6	199,4
324	80	484	242	198,2	201,9	356	80	516	258	204,5	195,6
406	20	446	223	190,3	210,2						
406	30	466	233	194,5	205,7						
406	60	526	263	206,5	193,7						
406	70	546	273	210,3	190,2						
406	80	566	283	214,1	186,9						

Bibliography

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

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