BS EN 12859:2011

BSI Standards Publication

Gypsum blocks — Definitions, requirements and test methods

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National foreword

This British Standard is the UK implementation of EN 12859:2011. It supersedes BS EN 12859:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/544/1, Gypsum plasters, cast gypsum and ancillaries.

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

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

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Gypsum blocks - Definitions, requirements and test methods

Carreaux de plâtre - Définitions, spécifications et méthodes d'essai

Gips-Wandbauplatten - Begriffe, Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 2 January 2011.

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Foreword

This document (EN 12859:2011) has been prepared by Technical Committee CEN/TC 241 “Gypsum and gypsum based products”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

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 12859:2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard includes:

— A normative annex concerning sampling for independent test;

— An informative annex recommending requirements and test method for measuring surface hardness.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Diagram 1 shows the relationship between this standard and the package of standards prepared to support the family of gypsum products.

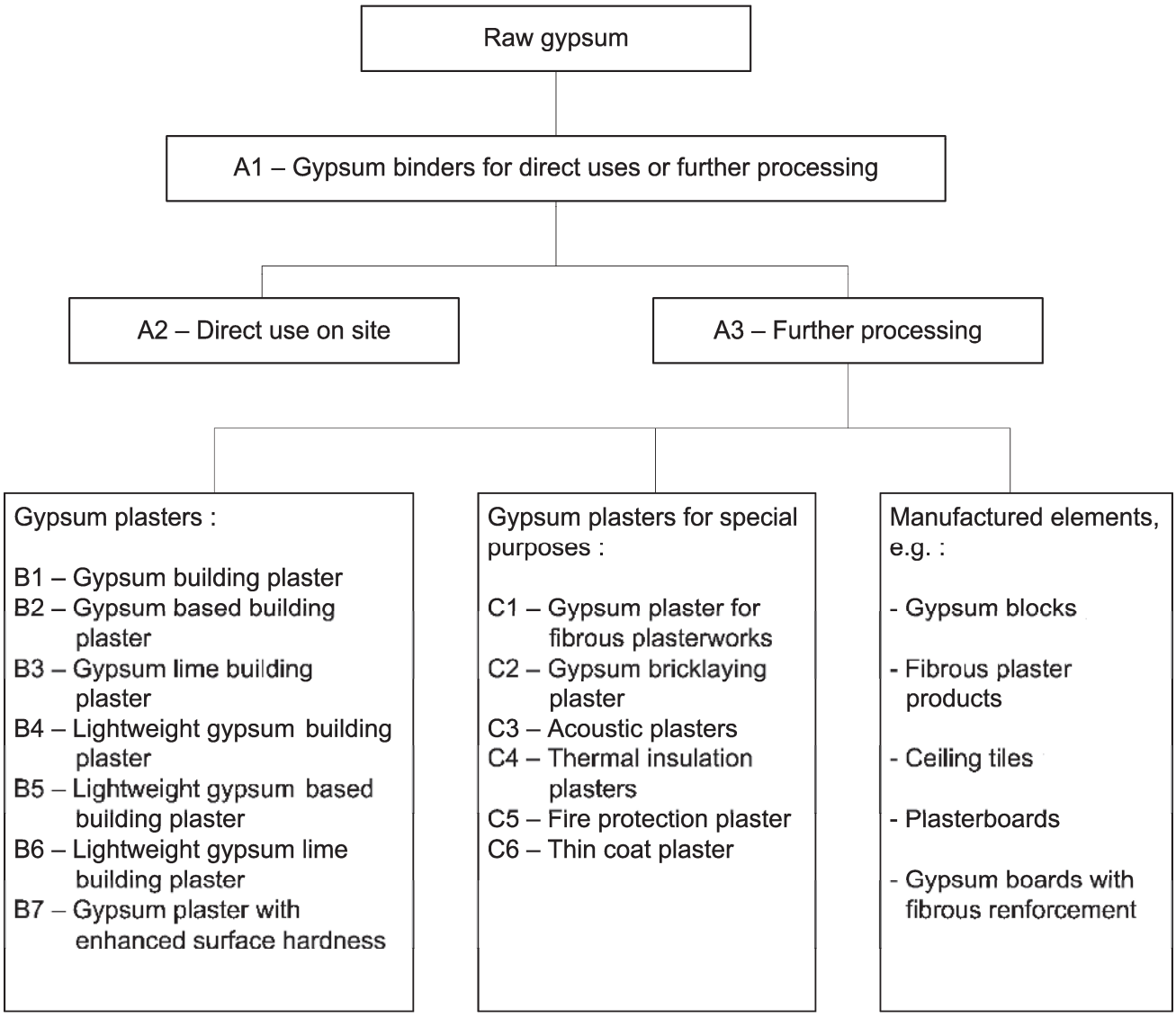


Figure 1 — Family of gypsum binders and gypsum products

1 Scope

This European Standard specifies the characteristics and performance of gypsum blocks with smooth faces for which the main intended uses are construction of non-load bearing partitions or independent wall linings and the fire protection of columns, lift shafts, shafts for services, etc. Gypsum blocks are not used to build ceilings.

It covers the following performance characteristics related to the essential requirements:

— reaction to fire;

— resistance to fire;

— direct airborne sound insulation;

— release of dangerous substances;

to be measured according to the corresponding European test methods, as well as:

— thermal resistance

to be calculated from the thermal conductivity values given in 4.3.2.

It describes the reference tests for technical specifications.

This European Standard covers also additional technical characteristics that are of importance for the use and acceptance of the product by the construction industry:

— convenience classes for density;

— convenience classes for pH.

It provides for the evaluation of conformity of the product to this European Standard.

This European Standard does not cover gypsum blocks of thickness less than 50 mm or gypsum storey height units.

2 Normative references

The following referenced documents are indispensable for the application 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 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN ISO 717-1, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation (ISO 717-1:1996)*[1)]

1) This reference is impacted by the stand-alone amendment EN ISO 717-1:1996/A1:2006.

EN ISO 6946:2007, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method (ISO 6946:2007)*

EN ISO 10140-3, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 3: Measurement of impact sound insulation (ISO 10140-3:2010)*

EN ISO 10456:2007, *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1
gypsum block
factory-made building element that is produced from calcium sulphate and water, that may incorporate fibres, fillers, aggregates and other additives as far as they are not classified as dangerous substances in accordance with European regulations, and that may be coloured by pigmentation in accordance with the provisions of this standard

NOTE The gypsum block is a rectangular parallelepiped with tongues and grooves on at least two of their opposite edges.

3.1.2
solid gypsum block
gypsum block manufactured without cavities

3.1.3
cavity gypsum block
gypsum block which incorporates preformed cavities

3.1.4
preformed cavity
formed cavity parallel to the faces which may or may not pass completely through the block and which may run parallel with the height or the length

NOTE See example on Figure 2.

3.1.5
face
plain and smooth surface intended to provide the finish of a partition

NOTE See Figure 2.

3.1.6
edge
extreme side of the gypsum block having tongues and grooves

NOTE See Figure 2.

3.1.7
thickness
distance between the two faces of a gypsum block

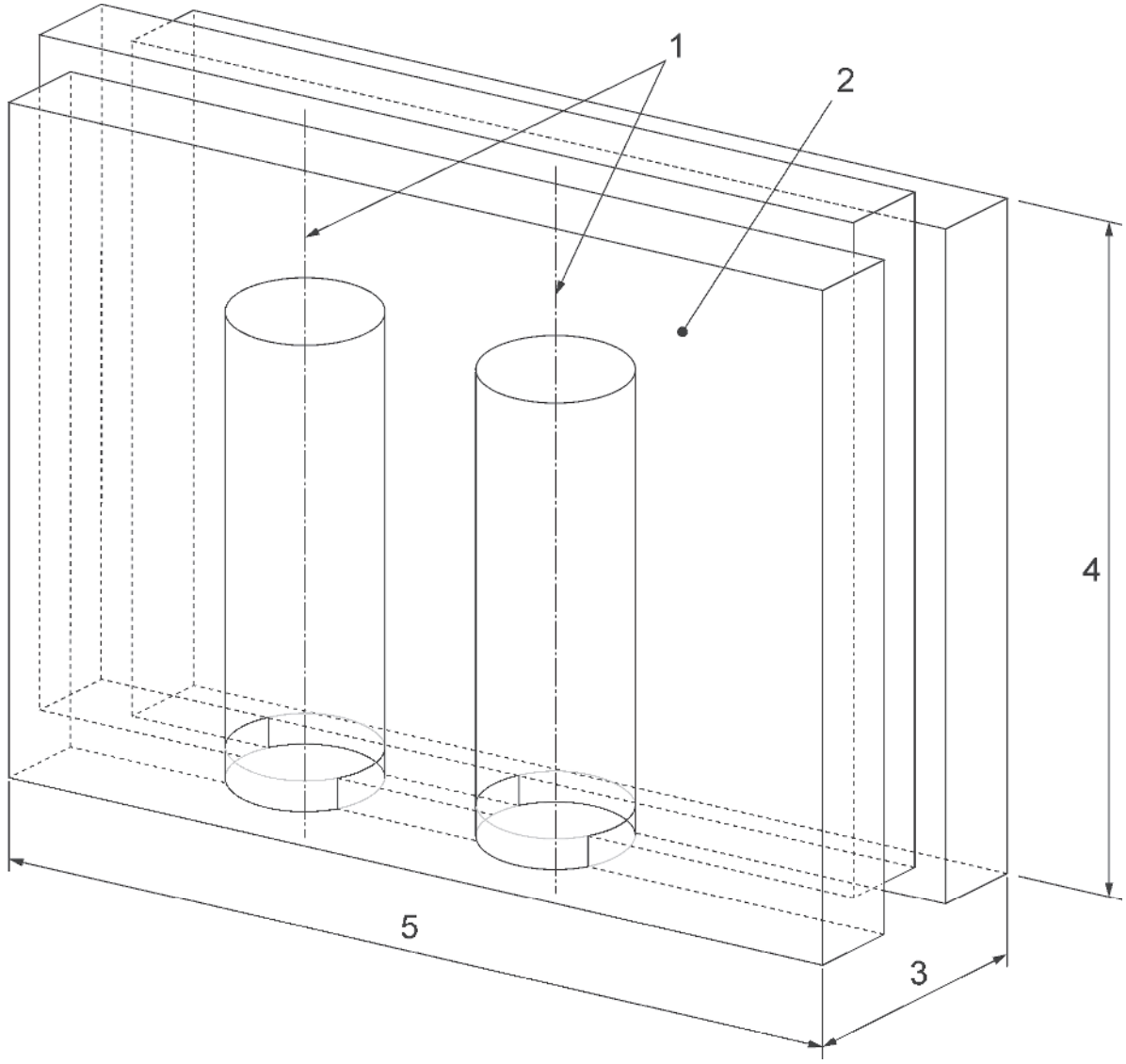
NOTE See Figure 2.

3.1.8
length
greatest distance between two edges of a gypsum block

NOTE See Figure 2.

3.1.9
height
smaller distance between two edges of a gypsum block

NOTE See Figure 2.



Key

1 Preformed cavities
2 Face
3 Thickness
4 Height
5 Length

Figure 2 — Gypsum block

3.2 Symbols

For the purposes of this document, the following symbols apply:

ρ gross dry density, in kilograms per cubic metre (kg/m^3)

λ thermal conductivity, in Watts per metre per Kelvin (W/m·K)

$\lambda_{23\text{-}50}$	thermal conductivity of the hardened plaster when in equilibrium at 23 °C and 50 % relative humidity, in Watts per metre per Kelvin (W/m·K)
M	mass of the gypsum block in kilograms (kg)
R2F	reaction to fire
FR	fire resistance
R	direct airborne sound insulation

4 Requirements

4.1 Fire behaviour

4.1.1 Reaction to fire

Gypsum blocks are classified in Euroclass A.1 (no contribution to fire) without testing when they contain less than 1 % by weight or volume (whichever is the more onerous) of organic material.

Gypsum blocks with 1 % or more, by weight or volume of organic material, shall be tested and classified in accordance with EN 13501-1.

4.1.2 Fire resistance

Resistance to fire is a property of an assembled system and not of the product itself.

When relevant, the fire resistance of a system including gypsum blocks assembled with adhesive for gypsum blocks shall be determined and classified in accordance with EN 13501-2.

4.2 Direct airborne sound insulation

Direct airborne sound insulation is a property of an assembled system and not of the product itself.

When relevant, the direct airborne sound insulation of a system including gypsum blocks assembled with adhesive for gypsum blocks shall be determined in accordance with EN ISO 10140-3 and EN ISO 717-1.

4.3 Thermal properties

4.3.1 Thermal resistance

When the intended use of gypsum blocks is to contribute to thermal resistance in building construction works, the thermal resistance is calculated using the formula given in EN ISO 6946:2007.

The values of thermal conductivity necessary for this calculation are given in 4.3.2 and thickness values to be used shall be measured according to 5.3.1.

4.3.2 Thermal conductivity

Design values of the thermal conductivity of hardened gypsum plaster used in the manufacture of gypsum blocks are given in Table 1.

Table 1 — Design values of thermal conductivity of gypsum plaster

ρ kg/m^3	$\lambda_{23\text{-}50}$ W/(m.K)
600	0,18
700	0,22
800	0,26
900	0,30
1 000	0,34
1 100	0,39
1 200	0,43
1 300	0,47
1 400	0,51
1 500	0,56

The values given in Table 1 are taken from EN ISO 10456:2007. Design values concern dry material used inside. When the material is wet, adjust these values using EN ISO 10456.

4.4 Types of gypsum blocks

4.4.1 General

Gypsum blocks are manufactured in two types of strength class A and R (see 4.10).

Gypsum blocks are manufactured in three types of density Low, Medium and Dense (see 4.8).

Gypsum blocks are manufactured in three classes of water absorption H1, H2 and H3 (See 4.13).

4.4.2 Visual identification of gypsum blocks by pigmentation

4.4.2.1 General

Visual identification of the different types of gypsum blocks follows the two driteria:

— density;

— water absorption.

4.4.2.2 Pigmentation of gypsum blocks following density classes

Gypsum blocks are manufactured in three classes of density (see 4.8).

Table 2 — Density classes, colour of gypsum blocks and designation

Colour	Density	Designation
Rosa [a]	High	D
Natural	Medium	M
Yellow [a]	Low	L
[a] The visual identification by colour of the class for the density applies for the class H3 only (Class of water absorption).		

4.4.2.3 Pigmentation of gypsum blocks following water absorption

Gypsum blocks are manufactured in three classes of water absorption (see 4.13).

Table 3 — Classes of water absorption, colour of gypsum blocks and designation

Colour	Water absorption	Designation
Natural	No requirement	H3 [a]
Blue	≤ 5 %	H2
Green	≤ 2,5 %	H1
[a] The visual identification by colour of the class for the density applies for the class H3 only (Class of water absorption).		

4.5 Release of dangerous substances

NOTE For CE marking purposes, see Annex ZA.1, Note.

4.6 Dimensions and tolerances

4.6.1 Dimensions

Gypsum block dimensions are determined by the thickness, the length and the height.

The thickness shall be at least 50 mm and shall not exceed 150 mm.

The length shall not exceed 1 000 mm.

The height shall be determined in conjunction with the length so that the surface area of a block is at least 0,10 m^2.

NOTE Preferred dimensions are for thickness: 50 mm, 60 mm, 70 mm, 80 mm, 100 mm, for length : 666 mm and for height: 500 mm.

In cavity gypsum blocks, the wall gypsum plaster shall be at least 15 mm thick throughout the block. The total cavity volume shall not exceed 40 %.

4.6.2 Tolerances

The dimensions of individual blocks, when measured in accordance with 5.3, shall have tolerances as follows:

— thickness: ± 0,5 mm;

— length: ± 5 mm;

— height: ± 2 mm.

4.7 Flatness of gypsum blocks

The flatness of individual blocks when measured in accordance with 5.4 shall have a deviation not greater than 1 mm.

4.8 Dry density and tolerance

4.8.1 Classes of density

The gross dry density of the hardened gypsum of the solid part of the block, which is the mean gross density of the specified number of samples in accordance with 5.1 and measured in accordance with 5.6, shall be as follows:

— High density (D)

$1\,100 \leq \rho \leq 1\,500$ kg/m^3

— Medium density (M)

$800 \leq \rho < 1\,100$ kg/m^3

— Low density (L)

$600 \leq \rho < 800$ kg/m^3

4.8.2 Tolerance

The average gross dry density within each class shall not deviate by more than 5 % from the average value measured in accordance with 5.6.

4.9 Surface mass of gypsum blocks and tolerance

The producer declares the surface mass (mass per square metre) of his gypsum blocks.

When the mass of gypsum blocks is determined in accordance with 5.5 and their surface calculated in accordance with 5.3.2 and 5.3.3, the average surface mass of gypsum blocks shall not deviate by more than 5 % from the declared surface mass.

4.10 Bending strength

Gypsum blocks of type A shall have a bending strength appropriate to their use, and for this, when tested in accordance with 5.7, they shall withstand the load given in Table 4a).

In special cases gypsum blocks may be required having an enhanced strength, gypsum blocks of type R. These gypsum blocks shall withstand the load given in Table 4b).

Table 4a) — Breaking loads of gypsum blocks of type A

Gypsum blocks equal or longer than 650 mm with a height of 500 mm [a]	**Minimum average breaking load** kN
Solid blocks (medium and high density) Thickness in mm:	
50	1,7
60	1,9
70	2,3
80	2,7
100	4,0
Cavity and low density blocks (all thicknesses)	1,7
[a] For gypsum blocks shorter than 650 mm and/or with a height different to 500 mm, the values in the second column shall be amended in the ratio of the spans and/or heights (see 5.7.4).	

Table 4b) — Breaking loads of gypsum blocks of type R

Gypsum blocks equal or longer than 650 mm with a height of 500 mm [a]	**Minimum average breaking load** kN
Thickness in mm:	Solid blocks and cavity blocks (medium or high density)
50	2,0
60	2,2
70	3,0
80	3,0
100	5,0
[a] For gypsum blocks shorter than 650 mm and/or with a height different to 500 mm, the values in the second column shall be amended in the ratio of the spans and/or heights (see 5.7.4).	

No individual value of the breaking load of a gypsum block of either type shall be more than 10 % below the average load.

The specimens shall be sampled in accordance with 5.1, prepared in accordance with 5.2 and tested in accordance with 5.7.

4.11 Moisture content

The average moisture content of gypsum blocks shall be measured at the time of the departure from the plant.

The average moisture content shall not exceed 8 %.

The specimens shall be sampled in accordance with 5.1 and tested in accordance with 5.8.

4.12 pH

The surface pH of each gypsum block shall not deviate from the following prescribed values:

— block with standard pH: 6,5 ≤ pH ≤ 10,5;

— block with low pH: 4,5 ≤ pH < 6,5.

The specimens shall be sampled in accordance with 5.10.3 and tested in accordance with 5.10.

4.13 Water absorption capacity

4.13.1 Classification

Gypsum blocks are rated according to their water absorption as:

— Class H3: water absorption no requirement;

— Class H2: water absorption ≤ 5 %;

— Class H1: water absorption ≤ 2,5 %.

4.13.2 Requirement

No block from Class H2 shall absorb more than 5 % water relative to its dry weight when tested in accordance with 5.9.

No block from Class H1 shall absorb more than 2,5 % water relative to its dry weight when tested in accordance with 5.9.

The specimens shall be sampled in accordance with 5.1.

4.14 Surface hardness

When surface hardness is required, the performance and test method are given in Annex B.

5 Test methods

5.1 Sampling

A minimum of three gypsum blocks shall be subjected to the physical, chemical and mechanical tests (see 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.10). In the case of hydrophobic gypsum blocks, three further blocks shall be subjected to the water absorption test (see 5.9).

5.2 Preparation of test pieces

Weigh all the blocks and then dry them to constant mass[2)] for determination of the residual moisture content prior to undergoing the different tests according to this standard.

The drying to constant mass shall be carried out according to one of the following methods:

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2) Constant mass is defined as two successive weighings 24 h apart, differing by less than 0,1%.

— Method A - Storage in a ventilated room at (23 ± 2) °C and (50 ± 5) % relative humidity;

— Method B - Storage in a drying cabinet at (40 ± 2) °C prior to cooling to room temperature.

5.3 Measurement of dimensions

5.3.1 Thickness

5.3.1.1 Principle

The distance between the two faces is measured.

5.3.1.2 Apparatus

A vernier caliper permitting a reading to 0,1 mm.

5.3.1.3 Procedure

The thickness shall be measured on each gypsum block in the centre of each side and approximately 50 mm from the ends (see Figure 3a)).

5.3.1.4 Expression of results

The thickness is the average value of the three measurements.

5.3.2 Length

5.3.2.1 Principle

The longer dimension of the face is measured.

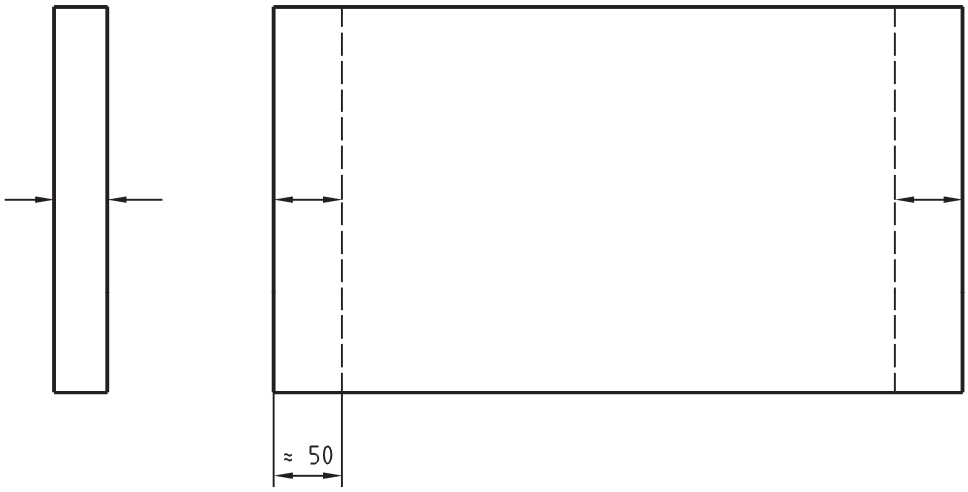
5.3.2.2 Apparatus

5.3.2.2.1 A metal rule or a metal tape graduated in millimetres and permitting a reading to 1 mm.

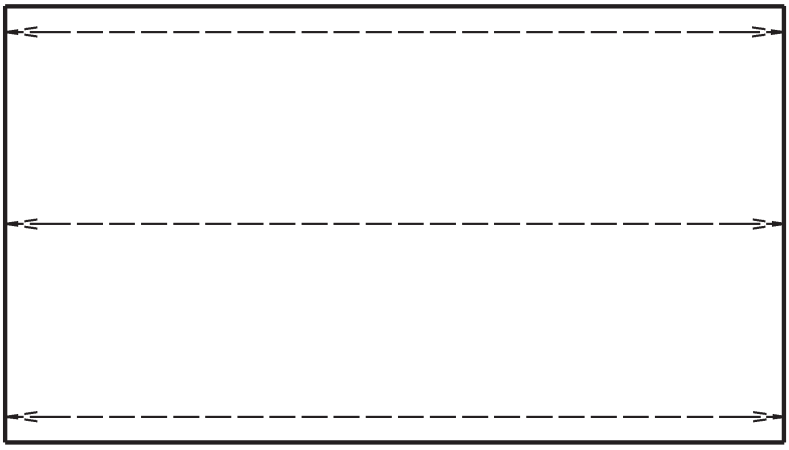
5.3.2.3 Procedure

The length shall be measured on each gypsum block parallel to the edges, on the ends and in the centre of the block, disregarding the tongues, grooves and slits (see Figure 3b)).

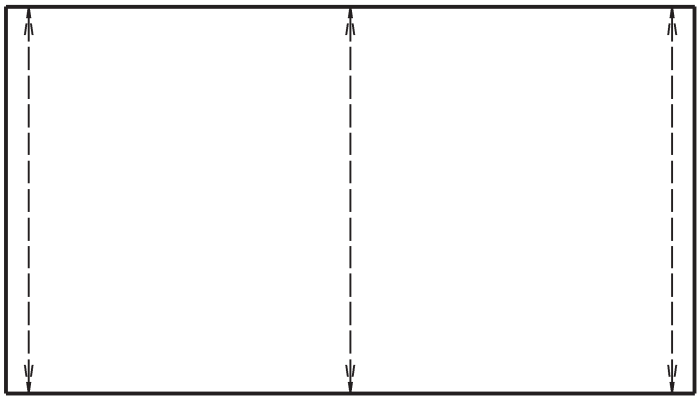
Dimensions in millimetres



a) Measurement of thickness



b) Measurement of length



c) Measurement of height

Figure 3 — Measurement of dimensions

5.3.2.4 Expression of results

The length is the average value of the measurements.

5.3.3 Height

5.3.3.1 Principle

The shorter dimension of the face is measured.

5.3.3.2 Apparatus

A metal rule or a metal tape graduated in millimetres and permitting a reading to 1 mm.

5.3.3.3 Procedure

The height shall be measured on each gypsum block parallel to the edges, on the ends and in the centre of the block, disregarding the tongues, grooves and slits (see Figure 3c)).

5.3.3.4 Expression of results

The height is the average values of the measurements.

5.3.4 Cavity gypsum blocks

For this kind of gypsum blocks, the procedures defined in 5.3.1 to 5.3.3 shall be applied and, in addition, measurement of the distances between cavities and between the cavity and the face shall be measured at their narrowest point (see Figure 4).

Dimensions in millimetres

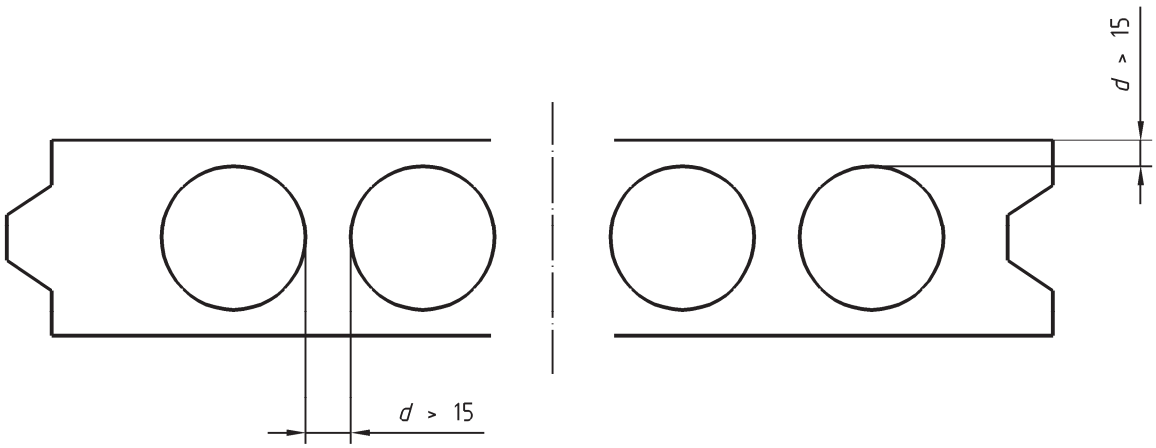


Figure 4 — Measurement of the distance between cavities and between the cavity and the face

5.4 Flatness of gypsum blocks

5.4.1 Principle

The gypsum block is placed on a flat surface and the maximum distance between the faces of the block and the flat surface is measured.

5.4.2 Apparatus

5.4.2.1 A flat and smooth surface.

5.4.2.2 A metal rule.

5.4.2.3 Feeler gauges.

5.4.3 Procedure

Place the gypsum block on the flat and smooth surface. Apply the rule parallel to the flat surface on the diagonals of the block and introduce the gauges in the gap between the rule and the block surface.

Turn over the gypsum block and repeat the measure on the other face.

5.4.4 Expression of results

The deviation from flatness is the average of the measured values expressed in millimetres.

5.5 Mass of gypsum blocks

5.5.1 Principle

The gypsum blocks are weighed prior to conditioning (mass M_1) and after conditioning (mass M_2).

5.5.2 Apparatus

A balance with an accuracy of 0,1 % with regard to the mass to weigh.

5.5.3 Procedure

Weigh the gypsum blocks, note the mass (M_1) and then submit them to conditioning according to 5.2. Weigh again and note the mass (M_2).

5.5.4 Expression of results

The average mass of the gypsum blocks is the arithmetic average of the measured masses M_2.

5.6 Density of gypsum blocks

5.6.1 Principle

The dimensions of a weighed gypsum block or a test piece, are measured and used to calculate its volume.

5.6.2 Apparatus

5.6.2.1 A balance with an accuracy of 0,1 % with regard to the mass to weigh.

5.6.2.2 An oven permitting the control of the temperature to 40 °C ± 2 °C.

5.6.2.3 A sealed container.

5.6.3 Procedure

5.6.3.1 If gypsum blocks were conditioned according to Method A of 5.2, measure the density on test pieces cut from the block fragments resulting from the bending test.

Each test piece shall correspond to a different gypsum block.

Dry the test pieces in an oven to constant mass at 40 °C ± 2 °C, and then cool them in a sealed container and weigh to within 0,1 %. Measure the dimensions of the test piece.

5.6.3.2 If gypsum blocks were conditioned according to Method B of 5.2, determine the mass of each block according to 5.5.

This method does not apply to cavity gypsum blocks (see 5.6.3.3).

Weigh the gypsum blocks according to 5.5 and measure the dimensions according to 5.3.

5.6.3.3 In the case of cavity gypsum blocks, measure the density on test pieces cut from the gypsum block fragments resulting from the bending test.

Each test piece shall correspond to a different gypsum block.

Dry the test pieces in an oven to constant mass at 40 °C ± 2 °C, and then cool them in a sealed container and weigh to within 0,1 %. Measure the dimensions of the test piece.

5.6.4 Expression of results

Calculate the density of the gypsum blocks by taking the average mass/volume ratios of the whole blocks or of the test pieces.

The volumes shall be found by calculation based on the measured dimensions of the gypsum blocks or of the test pieces.

5.7 Bending strength

5.7.1 Principle

The bending strength is determined from the flexural breaking load measured on gypsum blocks using three point loading.

5.7.2 Apparatus

A testing device consisting of two parallel supports (one support fixed, the other one capable of being inclined in the plane parallel to the load) which are positioned on a level base and a loading device capable of being inclined in the plane parallel to the supports. The loading device is centered with respect to the supports (see Figure 5). Supports and loading device are rounded with a radius of 9,5 mm to 10,5 mm. The distance between the supports may be modified according to the length of the blocks:

— the distance between the supports is 566 mm;

— if the length of the gypsum block is less than 650 mm, the supports shall be positioned at 50 mm from the edges of the block.

The device shall allow loading at a rate of approximately 20 N/s.

Dimensions in millimetres

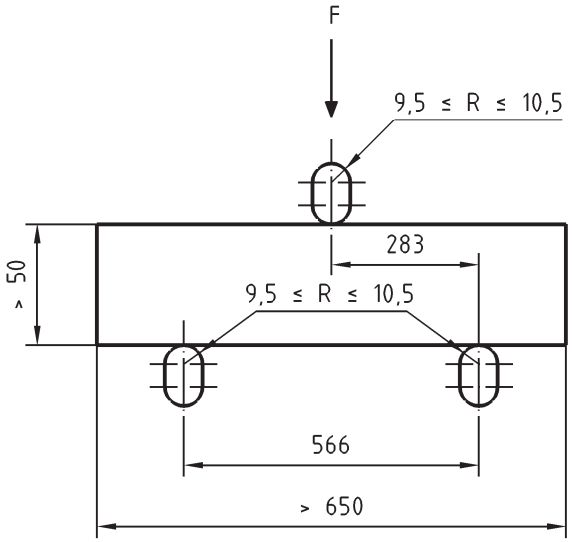


Figure 5 — Bending strength testing device

5.7.3 Procedure

The test gypsum blocks shall be individually in the horizontal position. They shall be mounted on the two parallel supports and then loaded centrally via the roller.

Apply the loading continuously at a rate of approximately 20 N/s until the gypsum block ruptures.

5.7.4 Expression of results

When gypsum blocks are shorter than 650 mm, the span equals the length minus 50 mm on each side; in that case values given in Table 4a) or 4b) are to be amended in the ratio of the distance between the supports to 566 mm.

When the height of gypsum blocks is different from 500 mm, values given in Table 4a) or 4b) are to be amended in the ratio of the height.

The bending strength is the average of the measured values.

5.8 Moisture content

5.8.1 Principle

The mass of a gypsum block is measured before and after drying to constant mass in accordance with 5.5.

5.8.2 Expression of results

The moisture content M_c of gypsum blocks shall be calculated as a percentage of the mass M_2 on the basis of the values M_1 and M_2 measured as indicated in 5.5 by the formula:

$$M_c = \frac{(M_1 - M_2)}{M_2} \times 100$$

5.9 Water absorption capacity (hydrophobic gypsum blocks only)

5.9.1 Principle

The mass of a hydrophobic gypsum block is measured before and after immersion in water for 2 h.

5.9.2 Apparatus

5.9.2.1 A balance with an accuracy of 0,1 % with regard to the mass to weigh.

5.9.2.2 An oven permitting the control of the temperature to 40 °C ± 2 °C.

5.9.2.3 A sealed container.

5.9.2.4 A tank filled with water.

5.9.2.5 Two supports.

5.9.3 Preparation of the test pieces

Use three further gypsum blocks than those used for physical, chemical and mechanical tests in this test.

Dry the gypsum blocks to constant mass by one of the methods (A or B) described in 5.2 and weigh them (mass M_2).

For cavity gypsum blocks, the cavities shall be closed with polyurethane expanded foam before placing gypsum blocks in water.

5.9.4 Procedure

Place the gypsum blocks in a tank filled with water at 23 °C ± 2 °C, resting flat on two supports forming a ridge so that the bottom surface does not touch the bottom of the tank and the gypsum blocks are covered with 50 mm ± 10 mm of water.

After immersion for 120 min remove the gypsum blocks from water, drain them for 5 min and weigh again (mass M_3).

5.9.5 Expression of results

The water absorption A in percent shall be expressed by the formula:

$$A = \frac{(M_3 - M_2)}{M_2} \times 100$$

The water absorption of gypsum blocks is the average of the three measured values.

5.10 pH measurement

5.10.1 Principle

pH is measured on a dispersion in water of a sample of a gypsum block.

5.10.2 Apparatus

pH-meter, coloured reagent or pH paper permitting a reading to 0,5 pH unit.

5.10.3 Sampling

Obtain a sample of about 1 g by scraping the surface of the gypsum block to a depth of approximately 1 mm on the fragments of gypsum blocks from the tests, at the rate of one fragment per block sample.

5.10.4 Procedure

For each sampling operation disperse the powder obtained in 10 g of demineralised or distilled, boiled and cooled water.

After 5 min measure the pH.

5.10.5 Expression of results

Record the result obtained.

The pH of gypsum blocks is the average of the three measurements.

5.11 Test reports

All tests shall be the subject of a test report that will include the following:

— Description of the product (see Clause 7);

— Date, hour, place of the sampling;

— Identification of the production batch;

— Date of the tests;

— Procedure references;

— Results of tests.

6 Evaluation of conformity

6.1 General

Evaluation of conformity is carried out in order to demonstrate conformity to the gypsum blocks with the requirements of this standard on the basis of:

a) Initial type testing;

b) Factory production control.

The purpose of the factory production control is to ensure that gypsum blocks placed on the market conform to their technical specifications specified in Clause 4.

6.2 Initial type testing

The technical specifications and properties specified in this standard are defined in terms of European Standard reference test methods (see Clause 5) and/or in other normative references which have to be used in the initial type testing/calculation to show the conformity of the product to this standard.

6.3 Factory production control

Factory production control means the permanent internal control of production exercised by the producer or his agent on the responsibility of the producer himself. All the elements, requirements and provisions adopted by the producer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of quality assurance and enable the achievement of the required product characteristics and the effective operation of the production control system to be checked.

For factory production control, other test methods may be used provided that:

a) they can show a relationship to exist between the results from European Standard reference test and those from the alternative test;

b) the information on which the relationship is based is available for inspection.

The producer shall record the results of production control (producer's record). These records shall include at least the following:

— The identification of the product tested;

— The date of sampling;

— The test methods;

— The tests and inspection results;

— The date of tests;

— The identification of the responsible authority within the producer;

— The calibration records.

7 Designation of gypsum blocks

Gypsum blocks shall be designated as follows:

a) The wording "Gypsum block";

b) Reference to this European Standard;

c) Dimensions in millimetres, in the following order:

   1) Thickness, length, height;

   2) Or, if applicable, thickness in millimetres and number of gypsum blocks per square metre;

d) Types:

   1) Solid or cavity;

   2) Density Class (D, M or L); voluntarily indexed by strength class (A or R): (D, D_A, D_R, M, M_A, M_R or L);

   3) Declared surface mass;

   4) Hydrophobic (when appropriate, Class H2 or H1);

e) pH : standard or low.

EXAMPLE OF DESIGNATION:

Gypsum block EN ZZZ 70-666-500, solid, M, 60 kg/m^2, H2, pH standard.

8 Marking, labelling and packaging

Gypsum blocks complying with this European Standard shall be clearly marked on the block or label or on the packaging or delivery note or certificate supplied with the blocks with the following items:

a) Reference to this European Standard;

b) The name, trademark or other means of identification of the producer of the gypsum block;

c) Date of production;

d) The means of identifying gypsum blocks and relating them to their designation as defined in Clause 7.

NOTE For CE marking purposes, when relevant, only marking and labelling requirements of ZA.3 are of application.

Annex A
(normative)

Sampling for independent acceptance testing carried out by a third party

A.1 General

In the event that there is a requirement on site for a check on product compliance, the following sampling procedure is recommended.

The required number of units to determine the compliance with specification shall be sampled from a delivered consignment of blocks.

The appropriate consignment size shall be agreed between representatives of both parties who shall have the opportunity to be present at the time of sampling.

A.2 Sampling procedure

A.2.1 General

The choice of the method of sampling as defined in A.2.2 and A.2.3 shall be decided between the two parties.

A.2.2 Random sampling[3)]

Whenever possible, the random sampling method shall be used, in which every block in the consignment has an equal chance of being selected for the sample.

Three blocks shall be selected (six in the case of hydrophobic gypsum blocks) from positions throughout the consignment without any consideration given to the condition or quality of the selected blocks.

A.2.3 Representative sampling

A.2.3.1 General

When random sampling is impracticable or not convenient, e.g. when the blocks form a large stack or stacks with ready access to only a limited number of blocks, a representative sampling procedure shall be used.

A.2.3.2 Sampling from a stack

The consignment shall be divided into at least three real or imaginary sections, each of a similar size. One block shall be selected at random from within each section in order to give the required number of samples as indicated in 5.1.

It will be necessary to remove some sections of the stack or stacks in order to gain access to blocks within the body of such stacks when taking samples.

---

3) In practice, random sampling is normally only convenient either when the blocks forming the consignment are being moved in a loose (unpacked) form from one place to another of when they have been split into a large number of small stacks awaiting laying.

A.2.3.3 Sampling from a consignment formed of banded packs

At least three packs shall be selected at random from the consignment. The packaging around each of the selected packs shall be removed and one block shall be sampled at random from within each pack in order to give the required number of samples without any consideration given to the condition or quality of the selected blocks.

Annex B
(informative)

Surface hardness

B.1 General

Where surface hardness of gypsum blocks is required, the following requirements and test method apply.

B.2 Requirements

B.2.1 Blocks of high density shall have a minimum hardness of 80 Shore C units.

B.2.2 Blocks of medium density shall have a minimum hardness of 55 Shore C units.

B.2.3 Blocks of low density shall have a minimum hardness of 40 Shore C units.

B.3 Test method

B.3.1 Principle

Measurement of the penetration of a specified indenter forced into the material under specified conditions.

B.3.2 Apparatus

B.3.2.1 Shore durometer C consisting of the following components:

— Presser foot with a hole of diameter 3,2 mm ± 0,1 mm, centred at least 6 mm from any edge of the foot;

— Indenter, formed from a hardened steel root of diameter 1,3 mm ± 0,1 mm to the shape and dimensions shown in Figure B.1;

— Calibrated spring for applying force to the indenter; the nominal value of the spring characteristics is 44,5 N for 100 hardness units;

— Indicating device for reading the extent of intrusion of the point of the indenter beyond the face of the presser foot; this may be read in terms of units ranging from 0 to 100 hardness units, 0 representing the lowest, 100 the highest hardness value.

The hardness is inversely related to the penetration. The shape of the indenter, the force applied to it and the duration of its application influence the results so that there may be no simple relationship between the results obtained with one type of durometer and those obtained with either another type of durometer or another instrument for measuring hardness.

B.3.3 Procedure

Dry the blocks to constant mass by one of the methods (A or B) (see 5.2).

Place the test specimen on a hard, horizontal, plane surface. Hold the durometer in a vertical position and apply the presser foot to the test specimen without shock, keeping the foot parallel to the surface of the test

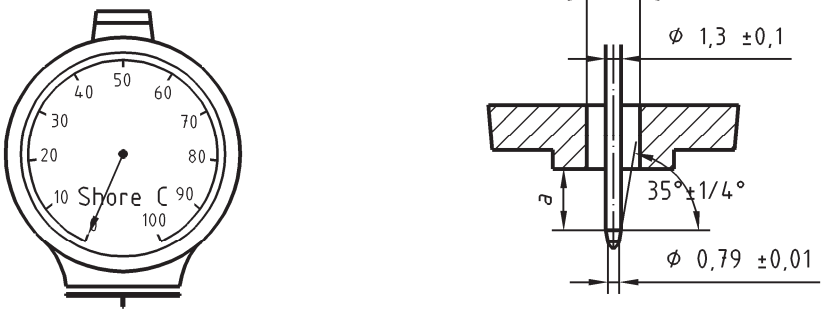
specimen. Apply just sufficient pressure to obtain firm contact between the presser foot and test specimen. Record the maximum value given by the indicating device.

12 measurements distributed across the faces are made on each block.

B.3.4 Expression of results

The surface hardness is the average of the 10 highest measured values.

Dimensions in millimetres



Key

a = (2,5 ± 0,04) mm

Figure B.1 — Shore durometer C

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a Mandate (M/106 "Gypsum products") given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard, shown in the Table ZA.1 below, meet the requirements of the Mandate given under EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the construction product covered by this European Standard for its intended use(s).

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended use(s), can be applicable to the construction products falling within the scope of this European Standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu/enterprise/construction/internal/dangsub/dangmain_en.htm

Table ZA.1 — Scope and requirement clauses relevant for CE marking

Products: Gypsum blocks **Intended use(s):** See Clause 1.			
Requirements/Characteristics from the mandate	**Requirements/Clause(s) in this European standard**	**Mandated level(s) and/or class(es)**	**Notes**
Reaction to fire (for exposed situations)	4.1.1	Euroclass	
Fire resistance E and I	4.1.2	Any	
Direct airborne sound insulation (in end use conditions)	4.2	None	Declared value
Thermal resistance (in end use conditions)	4.3.1	None	Declared value
Release of dangerous substances	4.5 (see Note above)	None	See ZA.3

The requirement on a certain essential characteristic is not of application in those Member States where there are no regulations for such characteristic. In this case, producers willing to place their products in the market of these Member States are not obliged to determine nor to declare the performance of their products with regard to this characteristic and the option "no performance determined" in the information accompanying the CE mark may be used.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements.

ZA.2 Procedure for attestation of conformity of gypsum blocks

The system of attestation of conformity of the products indicated in Table ZA.1, in accordance with the decision of the Commission of 95/467/EC as given in Annex III of the mandate M106 "Gypsum products", is shown in the Table ZA.2 for the indicated intended use(s):

Table ZA.2 — Systems of attestation of conformity

Products	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Blocks, including relevant ancillary products	In walls and partitions as relevant, intended for fire protection of structural elements and/or fire compartmentation in buildings	(Resistance to fire) Any	3 [a]
	In walls and partitions as relevant, for situations and uses not mentioned above	--	4 [b]
[a] System 3 : See CPD Annex III.2(ii), second possibility. [b] System 4 : See CPD Annex III.2(ii), third possibility .			

The evaluation of conformity of the products in Table ZA.1. shall be based on the evaluation of conformity procedure resulting from application of the clauses of Clause 6 of this standard indicated in Tables ZA.3a) and ZA.3b).

Table ZA.3a) — Assignment of tasks for the evaluation of conformity of gypsum blocks made to be used in partitions, intended for the fire protection of structural elements and/or fire compartmentation in buildings (for products under system 3)

Tasks		Content of the task	Clauses of this standard to apply
Tasks for the producer	Factory production control (F.P.C)	Parameters related to all characteristics of Table ZA.1	6.3
	Initial type testing	Airborne sound insulation Thermal resistance Release of dangerous substances	6.2
Tasks for the notified test laboratory	Initial type testing	Reaction to fire Resistance to fire	6.2

When compliance with the system of attestation of conformity is achieved, the producer shall draw up a declaration of conformity (EC Declaration of conformity) including the following information:

— Name and address of the producer, or his authorised representative established in the EEA and place of production,

— Description of the product (type, identification, use...),

— Provisions to which the product conforms (Annex ZA of this European Standard),

— Particular conditions applicable to the use of the product,

— Name and address of the notified laboratory(ies),

— Name of, and position held by, the person empowered to sign the declaration on behalf of the producer or of his authorised representative.

This EC Declaration of conformity entitles the producer to affix the CE marking, as described in ZA.3.

This declaration shall be presented in the official language or languages of the Member State of the EU in which the product is to be used.

Table ZA.3b) — Assignment of tasks for the evaluation of conformity of gypsum blocks not to be used in partitions, intended for the fire protection of structural elements and/or fire compartmentation in buildings (for products under system 4)

Tasks		Content of the task	Clauses of this standard to apply
Tasks for the producer	Factory production control (F.P.C)	Parameters related to all relevant characteristics of Table ZA.1	6.3
	Initial type testing	All relevant characteristics of Table ZA.1	6.2

When compliance with the system of attestation of conformity is achieved, the producer shall draw up a declaration of conformity (EC Declaration of conformity) including the following information:

— Name and address of the producer, or his authorised representative established in the EEA and place of production,

— Description of the product (type, identification, use...),

— Provisions to which the product conforms (Annex ZA of this European Standard),

— Particular conditions applicable to the use of the product,

— Name of, and position held by, the person empowered to sign the declaration on behalf of the producer or of his authorised representative.

This EC Declaration of conformity entitles the producer to affix the CE marking, as described in ZA.3.

This declaration shall be presented in the official language or languages of the Member State of the EU in which the product is to be used.

ZA.3 CE Marking and labelling

The CE conformity marking, the identification number of the producer and the further information as given below shall be affixed either on the product itself or on a label attached to it or on its packaging or on the accompanying commercial documents.

The CE conformity symbol to affix shall be in accordance with Directive 93/68/EEC and shall be accompanied by the following information :

a) Name or identifying mark of the producer;

b) Registered address of the producer;

c) The last two digits in which the marking is affixed;

d) Reference to this European Standard with the date of the version;

e) Description of the product: generic name, material, dimensions, and intended use;

f) Information on the mandated characteristics:

   1) Values and, where relevant, level or class to declare for each mandated characteristic as indicated in "Notes" in Table ZA.1;

   2) As an alternative, where possible, standard designation may be given. This designation should give information on all the characteristics, if all are not covered, then values for those not covered shall be additionally given.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

Figure ZA.1 gives an example of the information to be given on the product, label, packaging and/or commercial documents.

CE	*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC.*
Gypsum block Y	*Name or identifying mark and registered address of the producer*
01	*Last two digits of the year in which the marking was affixed*
EN 12859:2011	*No. of European Standard with the date of the version*
Gypsum block intended to be used in partitions intended for fire protection of structural elements and/or fire compartmentation in buildings	*Description (identification or definition) of the gypsum block (incl. the intended uses)*
Reaction to fire: A.1 **Fire resistance: E60; EI60 (test report number…)** **Direct airborne sound insulation: NPD** **Thermal resistance: NPD** **Release of dangerous substances: (**See Note)	*and* *information on regulated characteristics*

Figure ZA.1 — Example of CE marking information

NOTE 1 In addition to the specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 2 European legislation without national derogations need not be mentioned.

NOTE 3 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

Bibliography

[1] EN 12860:2001, *Gypsum based adhesives for gypsum blocks — Definitions, requirements and test methods*

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