

English version

Methods of test for mortar for masonry - Part 3: Determination of  
consistence of fresh mortar (by flow table)

Méthodes d'essai des mortiers pour maçonnerie - Partie 3:  
Détermination de la consistance du mortier frais (à la table  
à secousses)

Prüfverfahren für Mörtel für Mauerwerk - Teil 3:  
Bestimmung der Konsistenz von Frischmörtel (mit  
Ausbreittisch)

This European Standard was approved by CEN on 4 September 1998.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 125 "Masonry", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by August 1999, and conflicting national standards shall be withdrawn at the latest by December 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

Fresh mortar is brought to a defined level of consistence as measured using the flow table prior to the assessment of those properties which are used to characterise it.

Consistence is a measure of the fluidity and/or wetness of the fresh mortar and gives a measure of the deformability of the fresh mortar when subjected to a certain type of stress. The consistence however is not directly associated with the manner in which the fresh mortar handles when used by a craftsman.

Normally there will be a linear correlation between flow value, measured in accordance with this test method, and the plunger penetration value measured in accordance with EN 1015-4, for the same type of mortar with increasing water content, but the slope will differ with different type of mortars.

### 1 Scope

This European Standard specifies a method for determining the consistence of freshly mixed mortars (in the following briefly referred to as fresh mortars) including those containing mineral binders and both normal weight and lightweight aggregates, which is by means of the flow value.

### 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 998-1	Specification for mortar for masonry - Part 1: Rendering and plastering mortar with inorganic binding agents
prEN 998-2	Specification for mortar for masonry - Part 2: Masonry mortar
EN 1015-2	Methods of test for mortar for masonry - Part 2: Sampling of mortars and preparation of test mortars

### 3 Principle

The flow value is measured by the mean diameter of a test sample of the fresh mortar which has been placed on a defined flow table disc by means of a defined mould, and given a number of vertical impacts by raising the flow table and allowing it to fall freely through a given height.

## 4 Apparatus

4.1 A **flow table**, as described in annex A, consisting of the following main parts:

stand

rigid table plate and disc

horizontal shaft and lifting cam

lifting spindle

4.2 A **truncated conical mould** made of stainless steel or brass,  $60 \text{ mm} \pm 0,5 \text{ mm}$  in height and with internal diameter of  $100 \text{ mm} \pm 0,5 \text{ mm}$  at the bottom and  $70 \text{ mm} \pm 0,5 \text{ mm}$  at the top. The inside surface and the edges of the mould are smooth. The planes containing the top and bottom edges are at right angles to its axis. The minimum thickness of the mould wall is 2,0 mm.

4.3 A **tamper** consisting of a rigid, non-absorptive rod of circular cross-section, approximately 40 mm in diameter and approximately 200 mm long. The tamping face is flat and at right angles to the length of the tamper. The mass of the tamper is  $0,250 \text{ kg} \pm 0,015 \text{ kg}$ .

4.4 **Calipers** capable of measuring diameters up to 300 mm with an accuracy of 1 mm.

4.5 **Trowel**

4.6 **Palette knife**

## 5 Sampling, preparation and storage of test samples

The fresh mortar for this test shall have a minimum volume of 1,5 l and shall be obtained by reduction of the bulk test sample (see EN 1015-2) using a sample divider or by quartering.

Ready to use mortars (factory-made wet mortars which are retarded), and pre-batched air-lime/sand wet mortars when not gauged with hydraulic binders, shall be tested within their specified workable life.

Mortars that are made from dry constituents and water shall be mixed in accordance with EN 1015-2 unless otherwise specified.

The length of mixing period shall be measured from the moment all the constituents are introduced into the mixer.

Before testing, the batch shall be gently stirred by hand using a trowel or palette knife in 5 -10 seconds to counteract any false setting etc., but without any additional mixing of the batch.

Any deviation from the mixing procedure shall be noted.

Two test samples shall be tested.

## 6 Procedure

Before each test, wipe the disc and the inner surface and edges of the mould (4.2) clean with a damp cloth, let dry and lightly lubricate the surfaces with very low viscosity non-resin mineral oil. If the table has not been used within the last 24 h, operate for ten revolutions before use.

Place the mould centrally on the disc of the flow table (4.1) and introduce the mortar in two layers, each layer being compacted by at least 10 short strokes of the tamper (4.3) to ensure uniform filling of the mould. During filling, hold the mould firmly on the disc, using one hand.

Skim off the excess mortar with a palette knife and wipe the free area of disc clean and dry, being especially careful to remove any water from around the bottom edge of the mould. After approximately 15 s, slowly raise the mould vertically and spread out the mortar on the disc by jolting the flow table 15 times at a constant frequency of approximately one per second.

Measure the diameter of the mortar in two directions at right angles to one another using calipers (4.4). State the results in mm to the nearest mm.

## 7 Calculation and expression of results

Calculate the mean value of the two measurements. This mean value is the flow value for the test sample. If the individual flow values from the two test samples deviate from their mean value by less than 10 %, use this mean value as the flow value of the mortar. If the two individual flow values deviate from their mean value by more than 10 %, repeat the test using further mortar from the reduced bulk test sample (see Clause 5) and if the results deviate from the mean value by less than 10% use the mean value from the repeat test as the flow value of the mortar. If the results differ by more than 10% consider the measurements unsatisfactory and take fresh test samples from the bulk test sample or laboratory prepared mortar and repeat the test.

## 8 Test report

The test report shall include the following information :

- a) the number, title and date of issue of this European Standard;
- b) the place, date and time of taking the bulk test sample <sup>1</sup>;

Note : This is the sample taken from the bulk supply that is to be used for all of the tests in EN 1015.

- c) the method used for taking the bulk test sample (if known) and the name of the organization that took it;
- d) the type, origin and designation of the mortar by reference to the relevant part of prEN 998;

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<sup>1</sup> This information is contained on the certificate of sampling (see EN 1015-2)

e) preparation (mixing, casting) and storage (curing) conditions;

f) the date and time of preparing test samples for test (i.e. date and time of any mixing, casting, moulding, or demoulding procedure, if appropriate);

g) the date and time of testing;

h) test results (individual measurements and the flow values in mm for each test sample)

i) remarks, if any;

## Annex A (normative)

### Details of flow table

Details of the flow table defined in this European Standard are shown in figure 1.

The **stand** for the flow table shall be made of steel or cast iron. The flow table shall be mounted without any other support directly on a horizontal, non sprung and non plastic, stable base.

NOTE 1 : A concrete pedestal with a mass of more than 25 kg is suitable.

The **horizontal shaft** with the mounted **lifting cam** when turned at a constant velocity shall raise the **lifting spindle** and the **flow table** by  $10 \text{ mm/s} \pm 0,2 \text{ mm/s}$ .

The **lifting cam** shall be an even steady rising spiral constructed such that it will resume permanent contact with the **lifting spindle** from  $120^\circ$  after the impact has occurred and through the following  $240^\circ$  rotation up to the next impact.

The vertical **lifting spindle** shall be fastened at top in the middle of a **rigid table plate**. Both of these shall be made of steel or cast iron. The lifting spindle shall be stabilised by bearings spaced minimum 60 mm vertical in the stand, the bearings having a tolerance in diameter of 0,05 mm to 0,1 mm.

NOTE 2 : The contact faces of the lower end of the lifting spindle and of the lifting cam should be constructed to ensure long term performance. A rotatable roller in the lower end of the lifting spindle is suitable. The edge of the lifting cam and the lower end of the lifting spindle may alternatively be hardened to a Brinell hardness of  $500 \text{ kg/mm}^2$ .

The **rigid table plate** shall carry a **disc**  $300 \text{ mm} \pm 1 \text{ mm}$  in diameter and  $4 \text{ mm} \pm 0,1 \text{ mm}$  in thickness centrally attached to the supporting table plate by means of suitable fixing devices uniformly spaced along the periphery of the disc. The disc shall be made of a material resistant to corrosion by mortar and with a smooth surface of maximum 0,005 mm coarseness, the surface cleaned and lightly lubricated with very low viscosity non resin mineral oil prior to testing.

The upper surface of the **disc** shall have engraved a circle of 100 mm diameter and 0,5 mm deep to facilitate centring of the **mould**. The disc shall be kept horizontal during the test.

The total mass of the movable parts of the table, i.e. lifting spindle, rigid table and circular disc, shall be  $3,25 \pm 0,10 \text{ kg}$ .

*(M)*  
*4,25 kg ≤ 4,5 kg*

The flow table shall not be constructed in any way which inhibits its rotation, however the manufacturing precision of the movable parts of the flow table shall be such that the rotation is restricted to less than one revolution per 15 jolts.

The lifting spindle shall fall without hindrance. It shall be kept clean and lightly coated with very low viscosity non resin mineral oil.



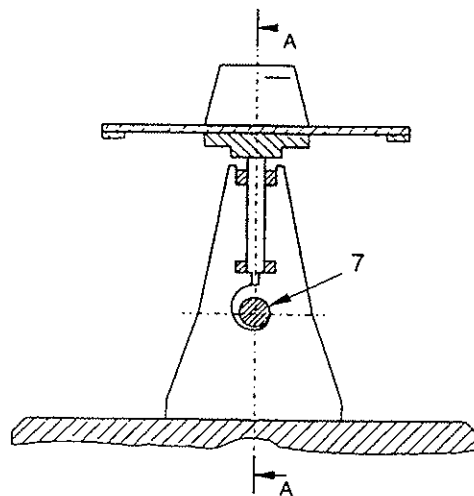
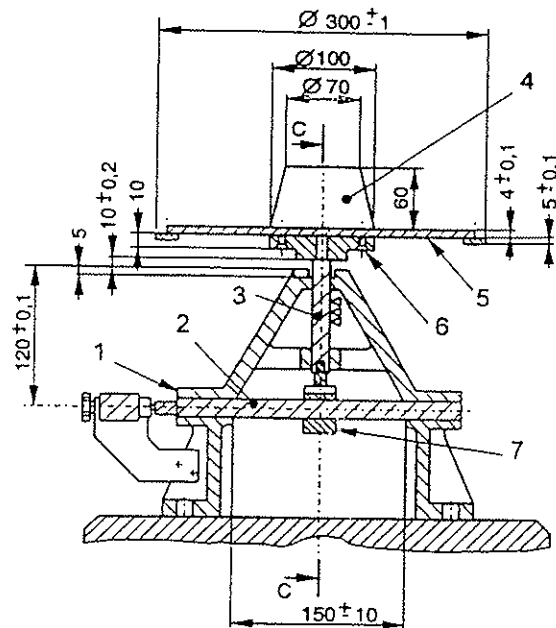
At the lowest point, the lifting cam shall clear the end of the lifting spindle such that the boss of the table plate firmly strikes the counter boss (8) of the table stand. The boss and the counter-boss shall have contact on the total circular ring, both kept free of any adhering dust or moisture (water, oil etc.).

NOTE 3 : A 45° slope with a width of 1 mm at the inner diameter of the counter-boss, and an enlargement of the diameter of the upper bearing of 1 mm with a depth of 3 mm is suitable.

## **Annex B Bibliography (informative)**

The following informative reference is made in this standard:

EN 1015-4	Methods of test for mortar for masonry - Part 4: Determination of consistence of fresh mortars (by plunger penetration)
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Key :	1	Stand	
2	Horizontal shaft	3	Lifting spindle
4	Truncated conical mould	5	Disc
6	Rigid table plate	7	Lifting cam

Figure 1: Flow table

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## Modification in annex A

Amend the 8th paragraph of annex A of EN 1015-3 to read:

'The total mass (M) of the movable parts of the table, i.e. lifting spindle, rigid table and circular disc, shall be  $4,2 \leq M \leq 4,5$  kg.'