BRITISH STANDARD

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846-2:2000

Methods of test for ancillary components for masonry —

Part 2: Determination of bond strength of prefabricated bed joint reinforcement in mortar joints

The European Standard EN 846-2:2000 has the status of a British Standard

ICS 91.080.30

National foreword

This British Standard is the official English language version of EN 846-2:2000 which is included in a package of new European Standards being prepared by CEN/TC 125 relating to ancillary components for masonry - bed joint reinforcement. No British Standard is being superseded.

The UK participation in its preparation was entrusted by Technical Committee B/519, Masonry and associated tests, to Subcommittee B/519/3, Ancillary components, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover and a back cover.

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Methods of test for ancillary components for masonry - Part 2: Determination of bond strength of prefabricated bed joint reinforcement in mortar joints

Méthodes d'essai des composants accessoires de maçonnerie - Partie 2: Détermination de la résistance de l'adhérence des armatures dans les joints

Prüfverfahren für Ergänzungsbauteile für Mauerwerk - Teil 2: Bestimmung der Verbundfestigkeit der vorgefertigten Lagerfugenbewehrung

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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of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

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.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports the essential requirements of the EU Construction Products Directive (89/106/EEC) and includes the performance requirements referred to in the Eurocode for masonry structures.

1 Scope

This European Standard specifies a method for determining the bond strength of prefabricated bed joint reinforcement in a masonry specimen made from specified units and mortar.

This test method is applicable to designed prefabricated bed joint reinforcement complying with prEN 845-3.

The method is not applicable to alternative forms of reinforcement which may be used in masonry, for example bars.

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 771-1	Specification for masonry units - Part 1: Clay masonry units.
prEN 771-2	Specification for masonry units - Part 2: Calcium silicate masonry units.
prEN 771-3	Specification for masonry units - Part 3: Aggregate concrete masonry units (dense and lightweight aggregates).
prEN 771-4	Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units.
prEN 771-5	Specification for masonry units - Part 5: Manufactured stone masonry units.
prEN 771-6	Specification for masonry units - Part 6: Natural stone masonry units.
prEN 772-1	Methods of test for masonry units - Part 1: Determination of compressive strength.
EN 772-10	Methods of test for masonry units - Part 10: Determination of moisture content of calcium silicate and autoclaved aerated concrete units.
prEN 845-3	Specification for ancillary components for masonry - Part 3: Bed joint reinforcement.
prEN 998-2	Specification for mortar for masonry units - Part 2: Masonry mortar.
EN 1015-3	Methods of test for mortar for masonry - Part 3: Determination of consistence of fresh mortar by flow table.

EN 1015-7 Methods of test for mortar for masonry - Part 7: Determination of air content of fresh mortar.

prEN 1015-11 Methods of test for mortar for masonry - Part 11: Determination of flexural and compressive strength of hardened mortar.

3 Principle

In this test, prefabricated bed joint reinforcement is embedded in mortar in a small wall of bonded masonry units. The reinforcement is then subjected to tension in order to determine its bond strength.

4 Symbols

F_{bk} is the characteristic load capacity of the bed joint reinforcement, (N);

F_{mean} is the mean load capacity of the bed joint reinforcement, (N);

$F_{x(1....n)}$ is the load capacity of individual bed joint reinforcement specimens, (N);

s is the standard deviation of the log normal values for n-1 degrees of freedom;

k is a numerical factor;

n is the number of specimens.

5 Materials

5.1 Masonry units

5.1.1 Conditioning

The conditioning of masonry units shall be as specified.

Record the method of conditioning the units prior to laying. Measure the moisture content by mass of autoclaved aerated concrete and calcium silicate masonry units in accordance with EN 772-10. Record the age of non-autoclaved concrete units at the time of testing the masonry specimens.

5.1.2 Testing

Determine the compressive strength of a sample of masonry units, using the method given in prEN 772-1. For non-autoclaved concrete units determine the compressive strength at the time of testing the masonry specimens.

5.2 Mortar

The mortar, its mixing procedure and its flow value shall conform to the requirements of prEN 998-2, unless otherwise specified, and these shall be reported in the test report.

Take representative samples of fresh mortar from the mason's board to make mortar prisms to determine the flow value in accordance with EN 1015-3, and to determine the air content in accordance with EN 1015-7. Use the prism specimens to determine the mean compressive strength at the time of testing of the masonry specimens in accordance with prEN 1015-11.

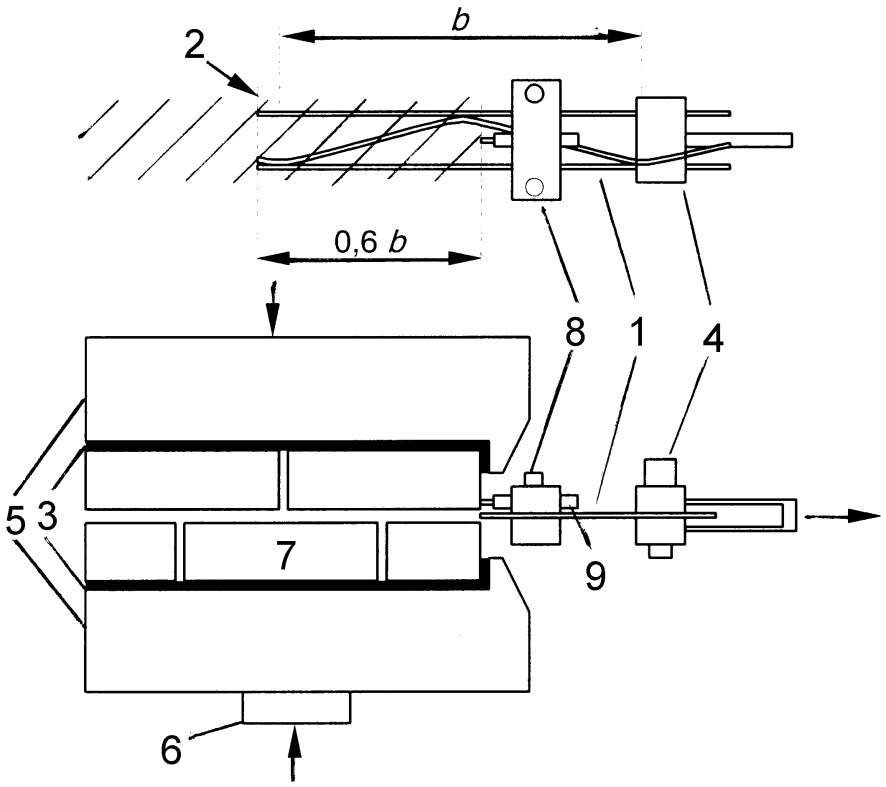
6 Apparatus

6.1 Simple support, for holding the test specimen such that the reaction is as close as possible to the centre line of the applied load.

6.2 Means of applying and maintaining on the test specimen a measured compressive load, providing a stress of between 0,05 N/mm^2 and 0,1 N/mm^2, accurate to ±10 %. The precompression platens shall be sufficiently stiff to distribute the applied load evenly.

6.3 Clamp, for gripping the free end of the prefabricated bed joint reinforcement and transmitting the load.

Note: A possible arrangement is shown in Figure 1. Ideally the clamp should have serrated grooves for the wires to lie in and the force should be applied using a small hydraulic ram.



Key

1 Specimen of reinforcement
2 Length of one cycle of the reinforcement
3 Packing mortar
4 Loading clamp
5 Precompression platens
6 Load cell to measure the precompression force
7 Small wall specimen
8 Clamp
9 Displacement measuring device

Figure 1- Specimen format and test arrangement for truss-type reinforcement

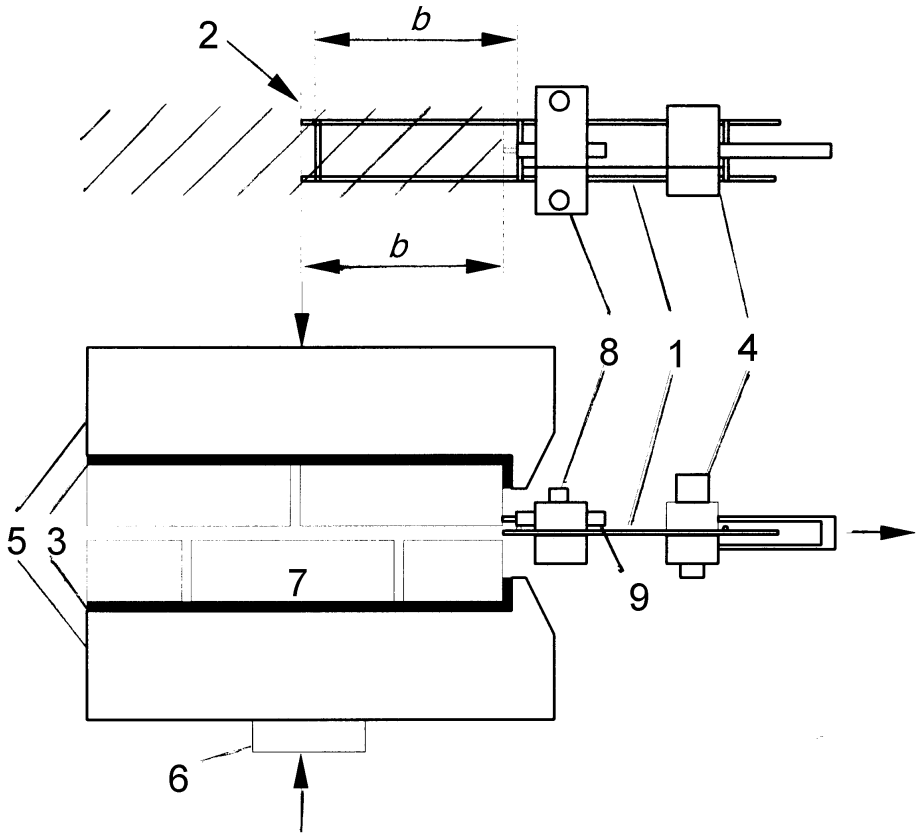


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Figure 2 - Specimen format and test arrangement for ladder-type reinforcement

6.4 Test system, with a suitable load capacity. The load shall be measured using a device having a maximum error of 2 % of the full scale reading. The read-out shall be such that the maximum load reading or the reading at a specimen displacement of 0,1 mm, whichever is the lesser, occurs above 20 % of the full scale reading.

6.5 Displacement measuring device, with a range of 10 mm and a maximum measuring error of 0,01 mm.

7 Preparation and storage of test specimens

7.1 General

At least five specimens of prefabricated bed joint reinforcement shall be tested.

7.2 Preparation

Masonry specimens shall be constructed as specified incorporating a representative length of the prefabricated reinforcement. The representative length shall be taken to be:

(1) for truss-type reinforcement, one complete length of the diagonal cross wire of the reinforcement (0,5 b) plus 0,05 b additional embedment at either end;

(2) for ladder-type reinforcement, a length containing one cross wire of the reinforcement as shown in Figure 2.

The width of the specimen shall be chosen so as to allow a minimum of 10 mm and a maximum of 50 mm lateral cover to both longitudinal wires.

Products designed to be used in cavity or shell bedded masonry shall be tested in an appropriate specimen as shown in Figure 3.

The specimen shall be constructed in and mortared up to a jig with a flat horizontal base surface and an upstand such that the reaction faces are flat and perpendicular to the axis of the reinforcement. Measure and record the thickness of the mortar joint.

7.3 Storage

Take appropriate steps to prevent the test specimen from drying out during the first three days after construction, e.g. by covering with polyethylene sheets, and then leave uncovered in a laboratory environment until tested. Use a curing period of 7 days for thin layer mortars and 28 days for general purpose mortars.

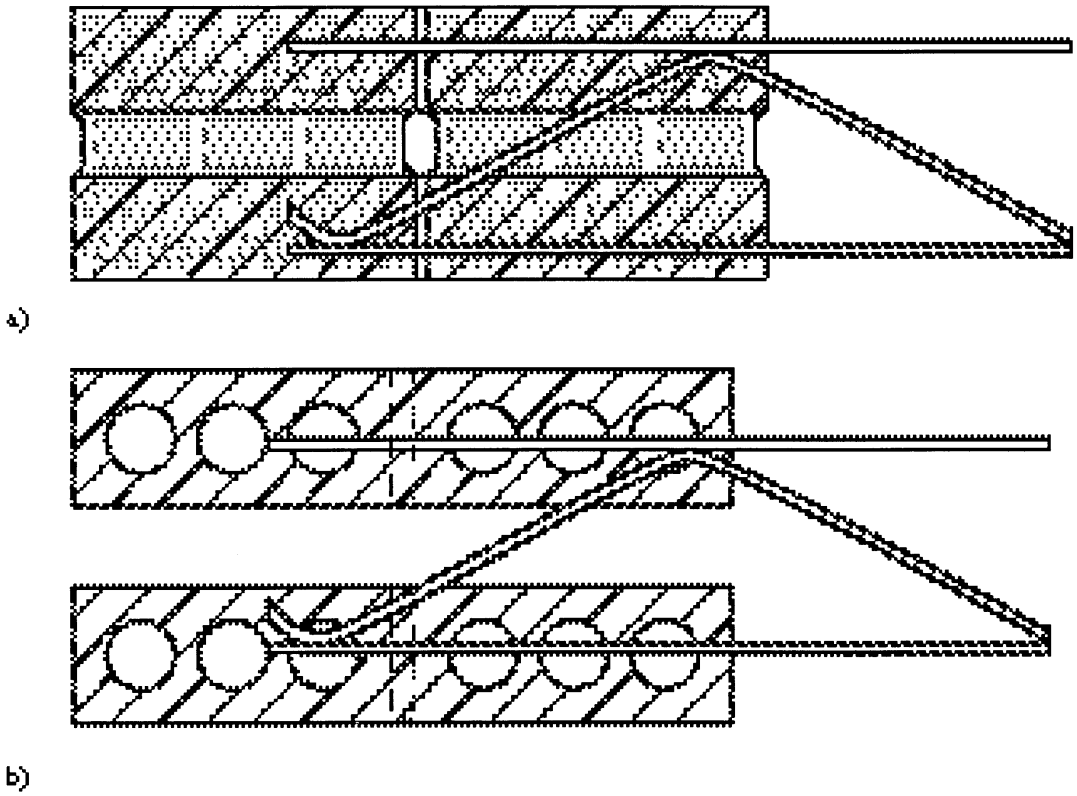

Figure 3 - Specimens for (a) divided joints and (b) cavity walls, showing only the lower layer of units and the position of the mortar layer (hatched).

8 Test procedure

8.1 Placing the specimen in the test machine

At the end of the curing period place the specimens in the test machine such that the wire is axial and aligned at the centre of action of the test system.

8.2 Test environment

Carry out the tests at ambient laboratory temperature.

8.3 Loading

Apply the specified precompression load. Apply the tensile load smoothly, at the rates given in Table 1. Record the complete load displacement curve, the maximum load and the mode of failure. Acceptable modes of failure are: (1) one wire breaks, (2) both wires break, (3) wires pull out. If the mortar pulls out or the masonry splits the result shall be discarded and further specimens shall be tested until at least five results are obtained.

Table 1 - Maximum loading rates and increments

Anticipated minimum failure load (N)	Maximum rate of load increase (N/min)
500	200
2 000	800
5 000	2 000

Record the load capacity of each specimen, being the maximum load achieved or the load to cause a 1 mm deflection, whichever is the lesser.

9 Expression of results

Calculate the mean load capacity (F_{mean}) as the arithmetic mean of the individual load capacities. Calculate the characteristic load capacity (F_{bk}) using either method (a) or method (b).

a) For samples of 5 individual specimens:

$$F_{bk} = \frac{F_{mean}}{1{,}2}$$

b) For samples of more than 5 individual specimens:

For each value of load capacity $F_{x1} \ldots F_{x2} \ldots F_{x3} \ldots F_{xn}$ determine the $\log_{10} F_{xn}$ value $= Y_1 \ldots Y_2 \ldots Y_3 \ldots Y_n$

Calculate $Y_{mean} = \frac{\sum Y_n}{n}$ and $Y_c = Y_{mean} - ks$

where:

s is the standard deviation for the n log values;
k is a function of n, given in Table 2;
n is the number of individual specimens.

Table 2 - Relation between *k* and *n*

n	*k*
6	2,18
7	2,08
8	2,01
9	1,96
10	1,92

Take the characteristic load capacity (F_{bk}) to be:

$$F_{bk} = \text{antilog}_{10}(Y_c) \text{ N to the nearest 10 N.}$$

10 Test report

Test reports shall include the following information:

a) the number, title and date of issue of this European Standard;

b) the name of the test laboratory;

c) a description of the prefabricated bed joint reinforcement to prEN 845-3;

d) a description of the type of masonry units to the relevant part of prEN 771 and the dimensions and bonding of the masonry prism;

e) a description of the mortar to include details of the mixing procedure, flow value, air content and compressive strength, preferably consisting of the appropriate test reports or extracts from these reports;

f) the curing conditions and period for the specimens;

g) the embedment length of the prefabricated bed joint reinforcement in the test specimens;

h) the thickness of the mortar joint;

i) the value of the precompressive load applied to the masonry;

j) the load-deflection curves;

k) the load capacity to the nearest 10 N for each specimen;

l) the mode of failure for each specimen;

m) the mean load capacity to the nearest 10 N;

n) the characteristic value of load capacity to the nearest 10 N;

o) remarks, if any.

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