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Metode preskušanja dodatnih komponent zidovine - 6. del: Ugotavljanje natezne in tlačne nosilnosti ter lastnosti sila-pomik zidnih veznih stremen (enostranski preskus)

Methods of test for ancillary components for masonry - Part 6: Determination of tensile and compressive load capacity and load displacement characteristics of wall ties (single end test)

Prüfverfahren für Ergänzungsbauteile für Mauerwerk - Teil 6: Bestimmung der Zug- und Drucktragfähigkeit sowie der Steifigkeit von Mauerankern (Einseitige Prüfung)

Méthodes d'essai pour composants accessoires e maçonnerie - Partie 6: Détermination de la résistance de traction et en compression et de la rigidité d'attaches murales (essai d'extrémité simple)

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91.080.30	Zidane konstrukcije	Masonry

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EUROPEAN STANDARD
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This European Standard was approved by CEN on 11 February 2012.

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

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Foreword

This document (EN 846-6:2012) 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of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.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 846-6:2000.

The principal changes in this document form the previous edition relate to the number of ties to be tested, the location of the clamp during testing and the treatment of slope and movement tolerant ties. Ties are to now be placed at the minimum declared embedment length rather than a length calculated from the tie length and design cavity width. Ten ties are tested in tension and ten in compression. In the compression tests the ties are loaded over an extended cavity, or alternatively provision is made for evaluating the cavity section by calculation. Where ties are designed to tolerate either an induced slope or movement then prior to test they are cycled fifty times through the slope or movement for which they have been designed.

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 a method for determining the tensile and compressive load capacity and load displacement characteristics of wall ties screwed, nailed, grouted or otherwise attached to frame elements or to inner leaf materials. The test is intended for ties for connecting masonry leaves to frame structures and to the inner leaves of cavity walls other than by embedding the inner connection in a mortar joint.

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 300, *Oriented Strand Boards (OSB) — Definitions, classification and specifications*

EN 338, *Structural timber — Strength classes*

EN 771-1, *Specification for masonry units — Part 1: Clay masonry units*

EN 771-2, *Specification for masonry units — Part 2: Calcium silicate masonry units*

EN 771-3, *Specification for masonry units — Part 3: Aggregate concrete masonry units (Dense and lightweight aggregates)*

EN 771-4, *Specification for masonry units — Part 4: Autoclaved aerated concrete masonry units*

EN 771-5, *Specification for masonry units — Part 5: Manufactured stone masonry units*

EN 771-6, *Specification for masonry units — Part 6: Natural stone masonry units*

EN 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*

EN 845-1, *Specification for ancillary components for masonry — Part 1: Ties, tension straps, hangers and brackets*

EN 206-1, *Concrete — Specification performance, production and conformity*

3 Principle

The tie is screwed, nailed, grouted or attached using other devices such as keys in slots, to a representative section of the frame element or inner leaf material using normal site techniques. The tie is then subjected to tension or compression until failure occurs.

4 Materials

4.1 Timber frame elements (studs)

Timber sections shall be of coniferous timber as specified in accordance with strength class C24 of EN 338 and with a density of not greater than 600 kg/m³ and a moisture content of 9 – 15 % by mass or as specified.

4.2 Timber frame sheathing

Timber frame sheathing shall be of oriented strand board (OSB) in accordance with EN 300 or an acceptable structurally equivalent alternative material as specified and should be 400 mm ± 10 mm square and at least 8 mm thick.

4.3 Metal frame or stud elements and concrete elements including lightweight aggregate concrete

Representative sections of metal frame or stud elements or representative concrete samples shall be used as specified.

4.4 Masonry units

4.4.1 Sampling

Masonry units shall be as specified in accordance with EN 771. All of the masonry units for individual tests shall be taken from the same consignment. Masonry units shall be in an air dry condition, unless otherwise specified.

4.4.2 Testing

Determine the compressive strength of a sample of masonry units using the method given in EN 772-1.

Measure the moisture content by mass of AAC or calcium silicate units in accordance with EN 772-10. For other types of units, record the method of conditioning. Record the age of non-autoclaved concrete units at the time of testing the masonry specimens.

4.5 Screws, nails, grouts, plugs, slot sections or other fixing ancillary items

Fixing materials shall be in a clean dry uncontaminated state, either as supplied by the manufacturer or supplier for use with the tie system or as specified.

4.6 Sheathing nails

Sheathing nails for timber frame sheathing shall be as specified.

4.7 Concrete for slot type anchors

Concrete shall comply with EN 206-1 and have a minimum compressive strength class of C 20/25 or as specified.

5 Apparatus

5.1 A simple support for the frame/wall element specimen such that the reactions are no closer to the tie than twice the depth of embedment or 100 mm whichever is the greater.

The support system shall not apply any restraint against splitting or bowing of the specimen, apart from the friction generated at the reaction due to the applied load. For ties designed for large differential movements (e.g. timber frame ties) the clamp system shall allow a simulated vertical differential movement to be applied. (A typical arrangement is shown in Figure 1).

5.2 A clamp for gripping the free end of the tie and applying a tensile or compressive load. (Typical clamps are shown in Figure 2.)

NOTE Clamping failures will invalidate the deformation measurement and therefore specially designed clamps may be needed for particular tie forms. The use of low melting point alloys to act as chucks is recommended for complex pressing. Some frame ties will require special clamps to deal with the nailing/screwing tab.

5.3 A test machine capable of applying the load without distortion such that the maximum load reading occurs above 20 % of the full scale reading.

The load shall be measured using a load cell device having a digital or analogue readout with a maximum error of 2 % of the full scale reading. The system shall apply an axial force to the specimen. The system or universal test machine shall be fitted with a rigid connection between the clamp which is used to apply tension or compression loads and the machine cross-head or loading device, i.e. any pivot ball joint or universal joint connections to the load cells shall be locked.

5.4 A means of measuring the displacement of the specimen in relation to the clamp using at least two symmetrically placed dial gauges or electrical linear displacement transducers (as shown in Figure 1).

Displacement shall be measured to the nearest 0,01 mm.

5.5 For polymer-based (plastic) products only, a controlled temperature and humidity chamber or room which may be a chamber which fits over the specimen.

6 Preparation and storage of test specimens

6.1 General

Ten specimens each for compression and tensile testing shall be prepared for testing at the declared minimum embedment length. The number of specimens for each shall be doubled where both ends of asymmetrical ties are tested separately.

NOTE The fastening or tie should be installed approximately perpendicular to the face of the supporting material. Where the design of the tie precludes this, the manufacturer's fixing instructions should be followed.

6.2 Timber frame

Cut or manufacture timber frame squares consisting of a piece of sheathing material fixed centrally to a length of stud by sheathing nails at 150 mm centres. None of the nails shall be closer to the centre of the stud than 20 mm. Fix ties to these timber frame squares using the fastenings provided with the ties and following the tie manufacturer's instructions. Ties shall be located to within ± 10 mm of the centre of the timber frame square. (A typical specimen is shown in Figure 3.)

6.3 Other support materials

Cut representative sections of studs, rails, columns or walls such that the length is at least 215 mm. Fix ties or surface-mounted slot devices to them using the fastenings provided and using normal site practice or follow the tie manufacturer's instructions. Ties shall be located to within ± 10 mm of the centre of the specimen.

6.4 Ties installed into cast in slots

Install lengths of the slot section flush against one face of a wall mould of suitable dimensions using nails or proprietary clips. The slot should be a minimum of 150 mm from any edge of the wall and from any adjacent slot section. Fill the whole slot section with foam plastic or use some other reliable technique to exclude concrete and laitance during setting. The wall should be a minimum of 100 mm thick. Fill the mould with concrete complying with the specifications given in 4.7 using vibration to ensure good compaction. (Figure 4 shows a typical slot wall specimen.)

6.5 Masonry units

Use either whole or part masonry units having at least one dimension of 215 mm or greater. Fix ties to them using the fastenings provided with the ties following the tie manufacturer's instructions. Ties shall be located to within ± 10 mm of the centre of the unit. If the units are perforated or hollow, the ties shall be secured in the area of the perforated or hollow section.

6.6 Storage

If fresh concrete or mortar are used take appropriate steps to prevent the test specimen from drying out during the first three days after construction, e.g. by covering it with a polyethylene sheet and then leave it uncovered in a laboratory environment until tested.

7 Procedure

7.1 Setting specimen in test machine

a) Load the specimen into the test system or test machine such that the tie body axial and aligned at the centre of action of the test machine where no movement tolerance or slope tolerance is specified for the particular tie system; or

b) In the case where slope tolerant or movement tolerant ties are required to be tested, offset one end of the specimen over a distance which gives the maximum slope or half the maximum movement specified by the manufacturer and repeat this in both directions for fifty times; after this, offset one end of the specimen from the centre of action of the test machine or test system by a distance which gives the maximum slope or half the maximum movement specified by the manufacturer.

When testing in tension, the clamp may be applied to the tie at a distance from the frame, concrete or masonry equal to the cavity width at which the tie is intended to be used. When testing in compression, the clamp may be applied to the tie at a distance from the frame, concrete or masonry equal to the cavity width at which the tie is intended to be used plus 15 mm. Alternatively where the resistance of the anchorage is to be determined separately from the section which bridges the cavity, the clamp should be placed close to the face of the frame, concrete or masonry. In the case of compression, testing a gap of approximately 5 mm is required. The distance from the clamp to the frame, concrete or masonry should be measured and recorded.