SLOVENSKI STANDARD
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Metode preskušanja za zidovje – 5. del. Ugotavljanje sprijemne trdnosti z metodo „bond wrench“

Methods of test for masonry - Part 5: Determination of bond strength by the bond wrench method

Prüfverfahren für Mauerwerk - Teil 5: Bestimmung der Biegehaftzugfestigkeit

Méthodes d'essai de la maçonnerie - Partie 5 : Détermination de la résistance a la rupture d'un joint de muret selon la méthode du moment de flexion en tete de muret

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Foreword

This document (EN 1052-5:2005) 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of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

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

1 Scope

This document specifies a method for determining the bond strength of horizontal bed joints in masonry using a bond wrench.

Guidance is given on the preparation of the specimens, the conditioning required before testing, the testing equipment, machine, the method of test, the method of calculation and the contents of the test report.

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 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 998-2, *Specification for mortar for masonry — 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*

EN 1015-11, *Methods of test for mortar for masonry — Part 11: Determination of flexural and compressive strength of hardened mortar*

3 Principle

The bond strength of masonry by the bond wrench method is derived from the strength of small masonry specimens tested to destruction. The specimen is rigidly held and a clamp is applied to the top unit. A bending moment is applied to the clamp by a lever until the top unit is pulled from the remainder. The characteristic value, calculated from the maximum stresses achieved by the samples is considered to be the bond strength of the masonry.

4 Terms, definitions and symbols

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

4.1

masonry
assemblage of masonry units laid in a specified pattern and jointed together with mortar

4.2

bond strength
strength of a masonry specimen when subjected to a locally applied normal force and bending moment so as to remove a single unit from the specimen

4.3

hydraulic cement mortar
mortar with cement or cement and air-lime as the binder where the mass of air lime does not exceed 50 % of the total binder mass

4.4

lime based mortar
mortar with cement and air-lime as the binder where the mass of cement does not exceed 50 % of the total binder mass

4.5

air-lime
limes mainly consisting of calcium oxcide or hydroxide which slowly harden in air by reacting with atmospheric carbon dioxide. Generally they do not harden under water as they have no hydraulic properties

4.6 Symbols

e_1 distance from the applied load to the tension face of the specimen in mm

e_2 distance from the centre of gravity of the lever and upper clamp from the tension face of the specimen in mm

W weight of masonry unit pulled of the specimen and any adherent mortar in N

F_1 applied load in N

F_2 weight of the bond wrench in N

f_{wi} individual bond strength in N/mm^2

f_w mean bond strength in N/mm^2

f_{wk} characteristic bond strength in N/mm^2

d mean depth of the specimen in mm

b mean width of the bed joint tested in mm

Y_i logarithm of the individual bond strength (f_{wi})

Z section modulus of the projected plan area of the failure surface in mm^3

n number of individual values

s standard deviation of the logarithmic values

k numerical factor

5 Materials

5.1 Masonry units

5.1.1 Conditioning of the units

Record the method of conditioning the masonry units prior to laying. Measure the moisture content by mass of autoclaved aerated concrete and calcium silicate units in accordance with EN 772-10. For other types of masonry unit, record the method of conditioning the units prior to laying. 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 test method given in EN 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 EN 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 prism specimens, to determine the flow value in accordance with EN 1015-3 and to determine the air content in accordance with EN 1015-7. Determine the mean compressive strength at the time of testing the masonry specimens in accordance with EN 1015-11.

6 Apparatus

A support frame and clamp which holds in place the unit beneath the top bed joint of the stack bonded specimen without applying any significant bending moment to any lower units.

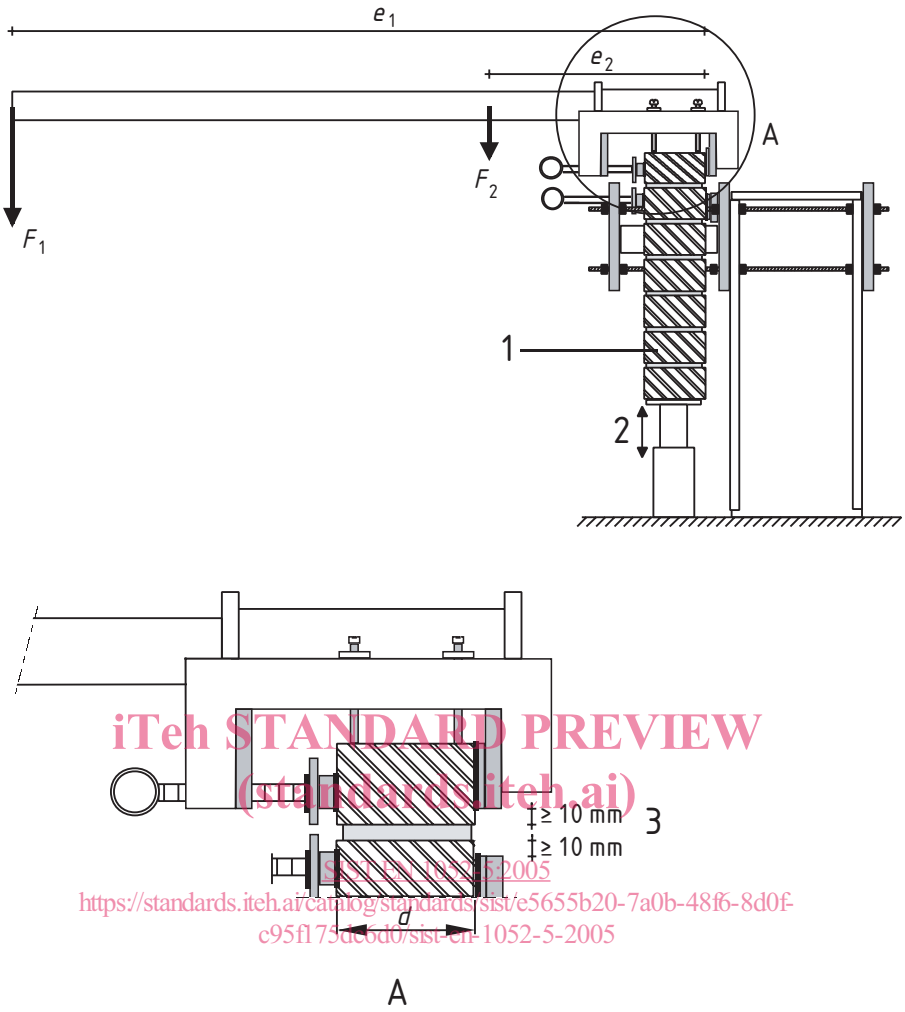
A lever which has a clamp at one end which can be applied to the top unit of the stack bonded specimen. The lever arm should be at least 1 m in length. The tensile stress applied to a specimen due to the weight of the lever and clamp should not exceed 0,05 N/mm^2.

A means of applying downward force to the lever arm without shock and a means of measuring this force with an accuracy of ± 1 %.

An example of a suitable clamping arrangement is shown in Figure 1. The specimen should not be subjected to any torsional stress, either from the weight of the lever or the applied force. Where highly perforated bricks with thin shells are to be tested, the faces of the clamp will need to be as large as is practicable so as to avoid local crushing of the units under the action of the clamping force.

Weighing device capable of weighing a masonry unit to an accuracy of ± 1 %.

Apparatus capable of measuring the dimensions of the specimens to an accuracy of ± 1 mm.



Key

1 Specimen

2 Height adjustable

3 Enlargement of area A

Figure 1 — Example of a suitable support frame and clamps