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Testing hardened concrete - Part 6: Tensile splitting strength of test specimens

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English Version

Testing hardened concrete - Part 6: Tensile splitting strength of test specimens

Essais sur béton - Partie 6 : Détermination de la résistance en traction par fendage d'éprouvettes

Prüfung von Festbeton - Teil 6: Spaltzugfestigkeit von Probekörpern

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Foreword

This document (EN 12390-6:2009) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

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 12390-6:2000.

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).

This standard is one of a series concerned with testing concrete.

EN 12390, *Testing hardened concrete* consists of the following parts:

- *Part 1: Shape, dimensions and other requirements of specimens and moulds*
- *Part 2: Making and curing specimens for strength tests*
- *Part 3: Compressive strength of test specimens*
- *Part 4: Compressive strength — Specification for testing machines*
- *Part 5: Flexural strength of test specimens*
- *Part 6: Tensile splitting strength of test specimens*
- *Part 7: Density of hardened concrete*
- *Part 8: Depth of penetration of water under pressure*

The main change from the previous edition of this European Standard has been to provide an alternative specification for packing strips and requires the selected loading rate to be applied after the initial load does not exceed approximately 20 % of the anticipated failure load.

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, 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 the United Kingdom.

Introduction

This test method was one of a number examined in a laboratory inter-comparison part-funded by the EC under Measurement and Testing programme, contract MAT1-CT94-0043. The programme and other references showed the following:

- a) Tensile splitting strengths measured between the normal plane platens of testing machines gave the same results as those using the special curved platens, originally described in ISO 4018. Although, therefore these curved platens have been optionally retained in this standard, they are not necessary for the measurement.
- b) The material used for the packing strips affects the apparent tensile strength measured. This has led to the decision to standardize on hardboard strips, since they provided the lowest standard deviations.
- c) The apparent tensile strength measured depends upon the shape and size of the test specimen used:
 - 1) cubes gave higher measured tensile strengths than cylinders, by approximately 10 %;
 - 2) 150 mm cubes gave lower measured tensile strengths than 100 mm cubes;
 - 3) the effect of cylinder size on measured tensile strength was not found to be significant, possibly due to the variability of the data.

As a result of these conclusions from the laboratory programme, this standard restricts the measurement of tensile splitting strength to cylindrical specimens used with hardboard packing strips, which is the reference method. However, as some countries still test cubical or prismatic specimens, their use has been retained in a normative annex. In cases of dispute, the reference method is the use of cylinders of 150 mm diameter and 300 mm length.

It is recognized good practice to include measurement of density prior to the determination of tensile splitting strength, as a check on compaction.

1 Scope

This European Standard specifies a method for the determination of the tensile splitting strength of cylindrical test specimens of hardened concrete. A method using cubic or prismatic specimens is included in normative Annex A.

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 12350-1, *Testing fresh concrete — Part 1: Sampling*

EN 12390-1, *Testing hardened concrete — Part 1: Shape, dimensions and other requirements of specimens and moulds*

EN 12390-2, *Testing hardened concrete — Part 2: Making and curing specimens for strength tests*

EN 12390-4, *Testing hardened concrete — Part 4: Compressive strength — Specification for testing machines*

EN 316, *Wood fibre boards — Definition, classification and symbols*

3 Principle

A cylindrical specimen is subjected to a compressive force applied to a narrow region along its length. The resulting orthogonal tensile force causes the specimen to fail in tension.

4 Apparatus

4.1 Testing machine, conforming to EN 12390-4, curved steel loading pieces may be used in place of conventional plane platens, when tests are carried out on cubic or prismatic specimen.

4.2 Jig (optional), for positioning the specimen and the packing strips. The jig shall not restrict the deformation of the specimen during the test.

NOTE Suitable jig for cylindrical specimens is shown in Figure 1.

4.3 Packing strips, conforming to EN 316, made of hardboard, of density equal or greater than 900 kg/m^3 and dimensions, width (a) = $(15 \pm 1) \text{ mm}$; thickness (t) = $(4 \pm 1) \text{ mm}$ and a length greater than the length of the line of contact of the test specimen.

Alternatively, packing strips may be used if they meet the following hardness criterion:

When submitted to a punching test by means of a rod of circular cross section, having a diameter of $(16 \pm 0,5) \text{ mm}$ and applying a force at a rate of $(48 \pm 10) \text{ kN/min}$, the instantaneous penetration when the force of $(20 \pm 5) \text{ kN}$ is achieved shall be equal to $(1,2 \pm 0,4) \text{ mm}$.

Packing strips shall be used only once.

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