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Composition cork — Expansion joint fillers — Test methods

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Composition cork — Expansion joint fillers — Test methods

Aggloméré composé de liège — Matériau pour le remplissage de joints de dilatation — Méthodes d'essai

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 87, *Cork*.

This third edition cancels and replaces the second edition (ISO 3867:2001), of which Clauses 4 and 6 have been technically revised.

Introduction

Some test methods specified in this document (e.g. compression resistance perpendicular to the faces, extrusion during compression and ability to recover after release of the load) are indicative of the ability of a joint filler to continuously fill a concrete expansion joint and thereby to prevent damage that might otherwise occur during thermal expansion. The resistance to water absorption is a relative measure of durability and life expectancy.

INTERNATIONAL STANDARD ISO 3867:2017(E)

Composition cork — Expansion joint fillers — Test methods

1 Scope

This document specifies test methods to determine the following characteristics of the composition cork intended to be used as a joint filler of expansion joints of concrete or other construction materials:

— apparent density;

— expansion in water;

— compression;

— recovery;

— extrusion;

— water absorption.

These test methods apply to agglomerated cork joint filler with a nominal thickness ranging from 6,3 mm to 25 mm.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 633, *Cork — Vocabulary*

ISO 3869:2017, *Agglomerated cork — Expansion joint fillers — Specifications, packaging and marking*

ISO 7322:2014, *Composition cork — Test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 633 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Apparatus

4.1 Balance, with resolution of 0,01 g.

4.2 Vernier gauge, with resolution of 0,1 mm.

4.3 Compression testing machine, with one fixed jaw and one mobile jaw which shall move unloaded at a speed of 1,3 mm/min, and having enough capacity to reduce the test specimen to 50 % of its initial thickness.

4.4 Load recorder, to indicate the load with a readability of 1 %.

4.5 Three-sided extrusion mould, to confine the lateral movement of test specimens under compression to one side only. The mould shall have internal dimensions equal to (100 ± 0,5) mm × (100 ± 0,5) mm and sides of such height as to extend at least 13 mm above the test specimens.

4.6 Steel template, measuring 100 mm × 100 mm, so that it fits the extrusion mould to within 0,13 mm in length and width, equipped with a dial comparator.

4.7 Dial gauge, with a resolution of 0,02 mm.

4.8 Metal plate, measuring (100 ± 2,5) mm × (100 ± 2,5) mm × 6 mm, with rectified parallel faces.

4.9 Cutting system.

4.10 Climatic chamber.

5 Sampling and preparation of test specimens

5.1 Sampling

5.1.1 The sample taken shall be approximately 0,2 m^2 from each lot of 100 m^2 and shall consist of sufficient material to provide at least five test specimens measuring 100 mm × 100 mm. Each test specimen shall be squarely cut using the cutting system (4.9).

5.1.2 The test specimens from self-expanding agglomerated cork (joint filler) shall be properly banded and wrapped in plastic at the factory immediately after cutting.

Samples shall be packaged for safe transportation to the testing laboratory so that there is no distortion or fissure of the material.

5.2 Preparation of test specimens

5.2.1 If necessary, squarely cut the test specimens immediately before testing so that the test specimens measure 100 mm × 100 mm. Each test specimen shall be cut using a metal plate (4.8) as cutting system.

5.2.2 The test specimens of self-expanding agglomerated cork shall be dried for 24 h at ambient air after boiling the test specimens (see 6.2.1). Then cut the samples to the dimensions indicated in 5.1.1.

6 Tests

6.1 Determination of dimensions

6.1.1 Determination of thickness

Determine the thickness in accordance with ISO 7322:2014, 6.1.

6.1.2 Determination of length and width

Determine the length and width in accordance with ISO 7322:2014, 6.2.1.

6.2 Expansion in water

6.2.1 Procedure

For self-expanding agglomerated cork, use the five test specimens delivered by the manufacturer, as described in 5.1.2.

Determine the thickness (d_1) of one test specimen, as described in 6.1. Immerse the test specimen in boiling water for 1 h. Remove the test specimen and allow to cool at room temperature for 15 min. Measure the final thickness to the nearest 0,1 mm.

6.2.2 Calculation and expression of results

Calculate the expansion, E, of composition cork using Formula (1):

$$E = \frac{d_2}{d_1} \times 100\,\% \tag{1}$$

where

d_1 is the thickness of each test specimen before immersion, expressed in millimetres, rounded to the nearest 0,1 mm;

d_2 is the thickness of each test specimen after immersion, expressed in millimetres, rounded to the nearest 0,1 mm.

The test result is the average value of individual results expressed as a percentage rounded to the nearest integer.

6.3 Recovery

6.3.1 Procedure

Place on the testing machine one test specimen prepared, as described in 5.2. Give the test specimen a single application of a load sufficient to reduce its thickness to 50 % of its initial thickness. Apply the load without shock and at such a rate that the test specimen is compressed approximately at 1,3 mm/min. Record this applied load (F).

Immediately release the load and allow the test specimen to recover for 10 min. Measure the new thickness (d_2), rounded to the nearest 0,1 N.

6.3.2 Calculation and expression of results

Calculate the recovery, R, using Formula (2):

$$R = \frac{d_1}{d_2} \times 100\,\% \tag{2}$$

where

d_1 is the thickness of the test specimen before compression, expressed in millimetres, rounded to the nearest 0,1 mm;

d_2 is the thickness of the test specimen after compression, expressed in millimetres, rounded to the nearest 0,1 mm.

The test result is the average value of the individual results, expressed as a percentage rounded to the nearest integer.

6.3.3 Retest provision

6.3.3.1 The test specimen shall meet the requirements specified in ISO 3869:2017, 4.4. If the test specimen fails to comply with the requirements of the specification, test a new specimen in accordance with the following procedure.

6.3.3.2 Give the test specimen three applications of a load sufficient to reduce its thickness to 50 % of its initial thickness. Apply the load without shock and at such a rate that the test specimen is compressed approximately at 1,3 mm/min.

6.3.3.3 After the first and the second applications, release immediately the load and allow the test specimen to recover for 30 min before the load is applied again.

6.3.3.4 After the third application, release immediately the load and allow the test specimen to recover for 1 h; then measure the thickness again (d_3).

6.3.3.5 Calculate the recovery, R', using Formula (3):

$$R' = \frac{d_1}{d_2} \times 100\,\% \tag{3}$$

where

d_1 is the thickness of the test specimen before compression, expressed in millimetres, rounded to the nearest 0,1 mm;

d_3 is the thickness of the test specimen after the third compression, expressed in millimetres, rounded to the nearest 0,1 mm.

The test result is the average value of the individual results, expressed as a percentage, rounded to the nearest integer.

6.3.4 Calculation of compression

Calculate the pressure, p, to which the test specimen has been submitted during the recovery test, using Formula (4):

$$p = \frac{F}{S} \times 10^{-3} \tag{4}$$

where

F is the maximum force required to reduce the initial thickness of the test specimen to 50 % (see 6.3.1), expressed in newtons, rounded to the nearest 0,1 N;

S is the area of the test specimen (10 000 m^2), expressed in square metres, rounded to 0,000 1 m^2.

The test result is the average value of the individual results, expressed in kilopascals, rounded to the nearest integer.

6.4 Extrusion

6.4.1 Procedure

Place the test specimen in the mould with the steel template (4.6) mounted on the base of the compression machine.

Give the test specimen one application of a load sufficient to compress it to 50 % of its initial thickness. Apply the load without shock and at such a rate that the test specimen is compressed at approximately 1,3 mm/min.

Measure in the dial gauge the maximum movement of the free edge of the test specimen during its compression.

6.4.2 Calculation and expression of results

The extrusion, X, of the test specimen is given by Formula (5):

$$X = b_1 \tag{5}$$

where b_1 is the maximum distance reached during compression by the free edge of the test specimen, expressed in millimetres, rounded to the nearest 0,1 mm.

The test result is the average value of the individual results, expressed in millimetres, rounded to the nearest 0,1 mm.

6.5 Water absorption

6.5.1 Procedure

Use one of the test specimens prepared as described in 5.2 and determine its mass (m_1) to the nearest 0,1 g. Immerse the test specimen in water at a temperature of 18 °C to 25 °C for 24 h. Maintain the test specimen in a horizontal position on the bottom of the container. During the test, the water surface in the container shall be 25 mm above the test specimen.

Remove the test specimen from the water and remove excess surface water from all sides of the test specimen with a paper towel. Immediately determine the mass of the test specimen, to the nearest 0,1 g.

6.5.2 Calculation and expression of results

Calculate the water absorption, A, as a percentage by volume, using Formula (6) (and taking in account the volume in cubic centimetres and the specimen's mass in grams):

$$A = \frac{m_2 - m_1}{d_1 \times S \times 10^{-3}} \times 100 = \frac{m_2 \times m_1}{d_1 \times S \times 10^{-1}} = \frac{m_2 - m_1}{d_1 \times S} \times 10 \tag{6}$$

where

m_1 is the mass of the test specimen before immersion, expressed in grams, rounded to the nearest 0,1 g;

m_2 is the mass of the test specimen after immersion, expressed in grams, rounded to the nearest 0,1 g;

d_1 is the nominal thickness of the test specimen (see 6.1), expressed in millimetres, rounded to the nearest 0,1 mm.

S is the area of the test specimen (10 000 mm^2), expressed in square millimetres.

The test result is the average value of the individual results, expressed as percentage by volume, rounded to the nearest integer.

6.6 Apparent density

6.6.1 Procedure

Use one of the test specimens prepared as described in 5.2 and determine its mass (m) to the nearest 0,1 g.

Determine its mass (m) to the nearest 0,1 g, after air dry at a temperature of (20 ± 3) °C and a relative humidity (65 ± 1) % until it comes to a constant weight.

6.6.2 Calculation and expression of results

The apparent density (ρ) of the test specimen is given by Formula (7):

$$\rho = \frac{m}{l \times b \times d} \times 10^6 \qquad (7)$$

where

m is the mass of the test specimen, expressed in grams, rounded to the nearest 0,1 g;

l is the nominal length of the test specimen (see 6.1), expressed in millimetres, rounded to the nearest 0,1 mm;

b is the nominal width of the test specimen (see 6.1), expressed in millimetres, rounded to the nearest 0,1 mm;

d is the nominal thickness of the test specimen (see 6.1), expressed in millimetres, rounded to the nearest 0,1 mm.

The test result is the average value of the individual results, expressed in kilograms per cubic metre, rounded to the nearest integer.

7 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 3867;

b) the complete identification of the product tested, including the type, source and the manufacturer's references;

c) the sampling report;

d) the results obtained;

e) any deviation from this document that may have affected the results.

Bibliography

[1] ASTM D 545:2014, *Standard Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Nonextruding and Resilient Types)*

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