INTERNATIONAL STANDARD

ISO 3867

Second edition
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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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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3867 was prepared by Technical Committee ISO/TC 87, *Cork*, using the standard ASTM D 545:1984 as the basis for the work.

This second edition cancels and replaces the first edition (ISO 3867:1982), which has been technically revised.

Introduction

Some test methods specified in this International Standard (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.

Composition cork — Expansion joint fillers — Test methods

1 Scope

This International Standard 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 normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 633, *Cork — Vocabulary*

ISO 3869:2001, *Composition cork — Expansion joint fillers — Specifications, packaging and marking*

ISO 7322:2000, *Composition cork — Test methods*

3 Terms and definitions

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

4 Apparatus

4.1 Balance, with resolution of 0,01 g.

4.2 Convection oven, capable of maintaining (105 ± 6) °C.

4.3 Desiccators, of sufficient size to accommodate the test specimens and containing an efficient desiccant.

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

4.5 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.

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

4.7 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 $(100 \pm 0{,}5)$ mm $\times$ $(100 \pm 0{,}5)$ mm and sides of such height as to extend at least 13 mm above the test specimens.

4.8 Steel template, to fit the extrusion mould to within 0,13 mm in length and width, equipped with a dial comparator.

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

4.10 Metal plate, having dimensions of $(100 \pm 2{,}5)$ mm $\times$ $(100 \pm 2{,}5)$ mm $\times$ 0,6 mm, with parallel faces machined.

4.11 Cutting system.

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 $\times$ 100 mm. Each test specimen shall be squarely cut using the cutting system (4.11).

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

Samples shall be packaged for safe transportation to the testing laboratory so that there will be no distortion or breakage.

5.2 Preparation of test specimens

5.2.1 If necessary, squarely cut the test specimens immediately before testing to obtain test specimens with a side length of 100 mm.

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

6 Tests

6.1 Determination of dimensions

6.1.1 Determination of thickness

See ISO 7322:2000, 6.1.

6.1.2 Determination of length and width

See ISO 7322:2000, 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 the following formula:

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

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 mean value of individual results expressed as a percentage rounded to the nearest integer.

6.3 Recovery

6.3.1 Procedure

Place one test specimen prepared as described in 5.1.1 or 5.1.2 on the testing machine. 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).

6.3.2 Calculation and expression of results

Calculate the recovery, R, from the following formula:

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

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 mean value of individual results expressed as a percentage rounded to the nearest integer.

6.3.3 Retest provision

6.3.3.1 If the test specimen fails to comply with the requirements of the specification (see ISO 3869:2001, 4.5), 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 the load immediately 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 the load immediately and allow the test specimen to recover for 1 h; then measure the thickness again.

6.3.3.5 Calculate the recovery, R', from the following formula:

$$R' = \frac{d_1}{d_3} \times 100\ \%$$

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 mean value of individual results, expressed as a percentage rounded to the nearest integer.

6.4 Calculation of compression

Calculate the pressure, p, to which the test specimen has been submitted during the recovery test, using the following formula:

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

where

F is the maximum force required to reduce the initial thickness of the test specimen to 50 % (see 6.1), expressed in newtons, rounded to the nearest 0,1 N;

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

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

6.5 Extrusion

6.5.1 Procedure

Place the test specimen in the mould with the template placed in the base of the testing 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 comparator the maximum movement of the free edge of the test specimen during its compression.

6.5.2 Calculation and expression of results

The extrusion, X, of the test specimen is given by the following formula:

$$X = b_2 - b_1$$

where

b_1 is the side length of the test specimen before the test, expressed in millimetres rounded to the nearest 0,1 mm;

b_2 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 mean value of individual results, expressed in millimetres rounded to the nearest 0,1 mm.

6.6 Water absorption

6.6.1 Procedure

Use one of the test specimens prepared as described in 5.1 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 supported from the bottom of the container, with 25 mm of water 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. Quickly weigh the test specimen to the nearest 0,1 g.

6.6.2 Calculation and expression of results

Calculate the water absorption, A, as a percentage by volume using the following formula:

$$A = \frac{m_2 - m_1}{d_1} \times 10^{-2}$$

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 test specimen (see 6.1), expressed in millimetres rounded to the nearest 0,1 mm.

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

6.7 Apparent density

6.7.1 Procedure

Use one of the test specimens prepared as defined in 5.1. Determine its mass (m) to the nearest 0,1 g.