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Composition cork — Gasket material — Test methods

Aggloméré composé de liège — Joints pour industries mécaniques — Méthodes d'essai

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Contents

Page

Foreword ..... **iv**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Apparatus **2**

5 Reagents **2**

6 Sampling and preparation of test specimens **2**
6.1 Sampling 2
6.2 Preparation of the test specimens 2
6.3 Conditioning 3

7 Tests **3**
7.1 Determination of thickness 3
7.2 Determination of apparent density 3
7.3 Determination of tensile strength 3
7.4 Determination of compressibility and recovery 3
7.5 Resistance to boiling water 3
7.6 Flexibility 4
7.6.1 Method A 4
7.6.2 Method B 4
7.7 Behaviour of composition cork and rubbercork in fluids 4
7.7.1 Behaviour in ASTM IRM 903 oil 4
7.7.2 Behaviour in ASTM IRM 901 oil 5
7.7.3 Behaviour in ASTM Fuel A (or equivalent) 5

8 Test report **6**

Annex A (normative) **Reagents' characteristics** **7**

Bibliography **8**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html

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

This fourth edition cancels and replaces the third edition (ISO 4078:2015), of which it constitutes a minor revision. The change compared to the previous edition is as follows: in Table 1 the line “Sealing behaviour” was deleted.

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Composition cork — Gasket material — Test methods

1 Scope

This document specifies test methods to determine the characteristics of agglomerated composition cork and rubbercork to be used as gaskets in the mechanical industry. The following characteristics are considered:

— thickness,

— apparent density,

— tensile strength,

— compressibility and recovery,

— flexibility,

— resistance to boiling water,

— behaviour in fluids.

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 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

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 and the following 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/

3.1
composition cork
product obtained from the agglutination of cork granules with the addition of a binder generally not derived from corkwood cells

3.2
rubbercork
product manufactured as a compound of cork granules and rubber, which can be used either in the form of granules or as a binder

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3.3
failure
appearance of any crack, break or surface separation

3.4
disaggregation
substantial loss of particles and/or splitting open of a test specimen during the test

4 Apparatus

Material specified in ISO 7322, and the following.

4.1 **Series of mandrels**, with diameters ranging from 8 mm to 25 mm, in steps of 1 mm.

4.2 **Air circulation oven**, capable of being maintained at (100 ± 2) °C.

4.3 **Open containers**.

4.4 **Oven** or **climatic room**, capable of being maintained at (23 ± 5) °C and (50 ± 5) % relative humidity.

4.5 **Absorbent paper**, of analysis type.[1)]

4.6 **Aluminium foil**.

4.7 **Cutting system**, to cut the test specimens.

5 Reagents

5.1 **ASTM IRM 903 oil**, or equivalent oil meeting the specifications given in Annex A.

5.2 **ASTM IRM 901 oil**, or equivalent oil meeting the specifications given in Annex A.

5.3 **ASTM Fuel A**, or equivalent fuel meeting the specifications given in Annex A.

6 Sampling and preparation of test specimens

6.1 Sampling

The number of packages from each lot (at least three packages) and the quantity of material to be taken from the sample shall be in accordance with ISO 2859-1 for the inspection level agreed between the interested parties.

6.2 Preparation of the test specimens

6.2.1 From each sheet of material and using the cutting system (4.7), take test specimens at a distance of at least 100 mm from the edges. The number and dimensions of the test specimens shall be as specified in Table 1. Each test specimen shall be squarely cut with the edges perpendicular to its surface, and shall not show any cracks or folds.

1) Paper Whatman No. 4 has demonstrated proper absorptive properties for oils. This is an example of a suitable product available commercially. This information is given for the convenience of users of this document and should not be taken as an endorsement by ISO of this product.

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6.2.2 The minimum and the maximum thicknesses of the test specimens for testing flexibility are specified in Table 2.

6.3 Conditioning

Prior to testing, the test specimens shall be conditioned for 48 h at 23 °C in the oven or climatic room (4.4). In case of dispute, the test specimens shall be conditioned for 48 h at a temperature of (23 ± 5) °C and (50 ± 5) % relative humidity. Unless otherwise specified, all tests shall be carried out under the same temperature and humidity conditions.

Table 1 — Number and dimensions of test specimens

Type of test	Dimensions of test specimens mm	Number of test specimens
Compressibility and recovery	50 × 50	3 (single ply or 3 groups of *n* test specimens)
Flexibility	150 × 15	3
Behaviour in oil or in fuel	50 × 50	3 for each reagent

Table 2 — Thicknesses used for testing flexibility

Type of material	Minimum thickness mm	Maximum thickness mm
Composition cork	3,2	4,8
Rubbercork	3,2	4,8

7 Tests

7.1 Determination of thickness

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

7.2 Determination of apparent density

Determine the apparent density in accordance with ISO 7322:2014, 6.2.

7.3 Determination of tensile strength

Determine the tensile strength in accordance with ISO 7322:2014, 6.3.

7.4 Determination of compressibility and recovery

Determine the compressibility and recovery in accordance with ISO 7322:2014, 6.4.

The dimensions of the test specimens are specified in Table 1. The test specimens shall consist of a single ply or a number of superimposed plies to give a minimum test thickness of 3,2 mm.

Results obtained for test specimens outside this test thickness shall be regarded as merely indicative. For specification purposes, agreement on compressibility and recovery values shall be reached between the interested parties for those materials whose thickness, in a single ply or multiple plies, does not fall within the nominal thickness specified.

7.5 Resistance to boiling water

Determine the resistance to boiling water in accordance with ISO 7322:2014, 6.5.

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7.6 Flexibility

7.6.1 Method A

7.6.1.1 Procedure

Firmly hold the test specimen at one point on a circular mandrel (4.1) and slowly but firmly, under finger pressure, force the test specimen to contact 180° of the full mandrel diameter for approximately (5 ± 1) s. Repeat this flexure using decreasing mandrel diameters on new test specimens until failure (3.3) occurs.

7.6.1.2 Calculation and expression of results

The test result is the minimum diameter, expressed in millimetres, on which the test specimen could be flexed without any signs of failure (3.3).

A flexibility factor can be calculated by dividing this minimum diameter by the nominal thickness of the test specimen.

7.6.2 Method B

7.6.2.1 Procedure

Place the test specimens in the oven (4.2) set at (100 ± 2) °C, for 70 h. After this period, remove the test specimens, allow them cool for (24 ± 1) h under laboratory ambient conditions. Carry out the test as specified in 7.6.1.1.

7.6.2.2 Calculation and expression of results

The test result is the minimum diameter, expressed in millimetres, on which the test specimen could be flexed without any signs of failure (3.3).

7.7 Behaviour of composition cork and rubbercork in fluids

These test methods provide a standardized procedure to measure the effect of immersion in specified fluids under definite conditions of time and temperature. The test results are not intended to give any direct correlation with service conditions, taking into account the wide variations in temperature and special use that can be found in gasket applications. The specific test fluids and test conditions outlined were selected as typical for purposes of comparing different materials and can be used as a routine test when agreed between the interested parties.

7.7.1 Behaviour in ASTM IRM 903 oil

7.7.1.1 Procedure

The test specimens shall have the dimensions defined in Table 1 and the material thickness defined in Table 2. The test specimens shall be conditioned before the test as specified in 6.3.

Determine the thickness of the test specimens as specified in 7.1.

Place the test specimens in the containers (4.3) with ASTM IRM 903 oil (or equivalent), for 72 h, at ambient temperature (between 22 °C and 30 °C). At the end of this period, remove the test specimens, clean them with absorbent paper (4.5) and determine the new thickness of the test specimens.

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7.7.1.2 Calculation and expression of results

The change in thickness of the test specimen is given by the formula:

$$\Delta d = \frac{d_2 - d_1}{d_1} \times 100\,\%$$

where

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

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

The test result is expressed as a percentage, rounded to the nearest integer.

7.7.2 Behaviour in ASTM IRM 901 oil

7.7.2.1 Procedure

The test specimens shall have the dimensions specified in Table 1 and the material thickness specified in Table 2. The test specimens shall be conditioned before the test as specified in 6.3.

Determine the thickness of the test specimen as specified in 7.1.

Place the test specimens in the containers (4.3) with ASTM IRM 901 oil (or equivalent), ensuring that the test specimens are separated from each other and from the bottom of the container and remain immersed in the test fluid. Cover the containers with aluminium foil (4.6) and place the containers for (70 ± 2) h in the oven (4.2) set at 100 °C.

After this period, remove the test specimens from the containers and immediately immerse them in a cool fresh portion of the test fluid, for 30 min to 60 min at ambient temperature (between 22 °C and 30 °C). Remove the test specimens from the containers, clean them with absorbent paper (4.5) and determine the new thickness of the test specimens.

7.7.2.2 Calculation and expression of results

The change in thickness of the test specimen is given by the formula:

$$\Delta d = \frac{d_2 - d_1}{d_1} \times 100\,\%$$

where

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

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

The test result is expressed as a percentage, rounded to the nearest integer.

7.7.3 Behaviour in ASTM Fuel A (or equivalent)

7.7.3.1 Procedure

The test specimens shall have the dimensions specified in Table 1 and the material thickness specified in Table 2. The test specimens shall be conditioned before the test as specified in 6.3.

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Determine the volume of the test specimen if test results are to be expressed as the change of this property.

Place the test specimens in the containers (4.3) with the reagent, for 24 h, at ambient temperature (between 22 °C and 30 °C). At the end of this period, remove the test specimens, clean them with absorbent paper (4.5) and make a visual examination or determine the new volume of the test specimens.

7.7.3.2 Calculation and expression of result

The test result is expressed either by:

— the existence or absence of disaggregation (3.4), or

— the change in volume, as a percentage of the initial volume, rounded to the nearest 0,1 %, calculated according to the formula:

$$\Delta V = \frac{V_2 - V_1}{V_1} \times 100\,\%$$

where

V_1 is the volume of the test specimen before immersion, expressed in cubic millimetres, rounded to the nearest tenth;

V_2 is the volume of the test specimen after immersion, expressed in cubic millimetres, rounded to the nearest tenth.

8 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 4708;

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

c) the sampling report;

d) the results obtained;

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

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Annex A
(normative)

Reagents' characteristics

The reagents used to evaluate the disaggregation which has occurred in the material after its immersion, shall have the characteristics shown in Table A.1. This evaluation can be made by visual observation, or by determination of the relative change in mass, thickness or volume.

Table A.1 — Characteristics of reagents

Characteristic	ASTM IRM 901 oil	ASTM IRM 903 oil	Fuel A
Saybolt viscosity at 38 °C (cSt)	—	31,9 to 34,1	
Saybolt viscosity at 99 °C (cSt)	18,12 to 20,34	—	
Flash point (COC) °C	≥ 243	≥ 163	—
—	—	—	Isooctane [a]
[a] In accordance with specifications given in *Manual for Rating Motor Fuels by Motor and Research Methods*.			

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