
**Paper and board — Determination
of grease resistance —**

**Part 2:
Surface repellency test**

Papier et carton — Détermination de l'imperméabilité aux graisses —

Partie 2: Essai de résistance au mouillage de surface

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ISO 16532-2:2007

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16532-2 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

ISO 16532 consists of the following parts, under the general title *Paper and board — Determination of grease resistance*:

— *Part 1: Grease permeability method*

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— *Part 2: Surface repellency test*

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— *Part 3: Turpentine test for voids in glassine and greaseproof papers*

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Introduction

The resistance to the penetration of fats, greases and oils by paper and board is of particular importance for certain packaging purposes, for example the packaging of food. The packaging should not only provide an effective grease barrier, but should also deter the formation of aesthetically unacceptable grease spots on the packaging surfaces.

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Paper and board — Determination of grease resistance —

Part 2: Surface repellency test

WARNING — The method specified in this part of ISO 16532 involves the use of some hazardous chemicals, which are highly inflammable and are reported to be health hazards. Care shall be taken to ensure that the relevant safety precautions are observed.

1 Scope

This part of ISO 16532 specifies a method for the determination of the grease resistance of paper and board. Primarily, it is intended to establish an approximate level of grease resistance, by testing the degree of surface repellency and/or antiwicking characteristics of paper and board, internally or surface sized with organophobic materials such as fluorocarbons. Some packaging paper and board products, designed for containing pet foods, food for human consumption and other materials, are produced in this way, and any surface stains, due to grease wetting or penetrating the paper or board surface, are aesthetically unacceptable.

This test is not intended to determine the permeability of grease through the paper or board, for which ISO 16532-1 applies.

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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.

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

3 Terms and definitions

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

3.1

grease resistance

ability of paper or board to resist the formation of surface spots or stains or the permeation of grease through the sheet

3.2

surface repellency

ability of the surface of the paper or board to resist any wetting reaction to applied grease materials

3.3

Kit rating

highest number for a series of test solutions that can be placed on the surface of the paper or board without causing a wetting interaction by darkening the paper or board surface

NOTE A higher number implies a better grease resistance for the sample tested.

4 Principle

A range of numbered solutions referred to as Kit ratings is prepared, consisting of a mixture of castor oil and two solvents. Differing degrees of dilution of the oil with the solvents provides varying degrees of "aggressiveness", and therefore different Kit ratings for the solution to be applied. A drop of one such solution is applied to the paper or board surface and the end-point is determined by establishing which of the solutions is the first to cause a wetting interaction by darkening the paper or board surface.

5 Reagents

5.1 **Castor oil**, analytical grade.

5.2 ***n*-Heptane**, analytical grade.

5.3 **Toluene**, analytical grade.

5.4 **Kit test solutions**, prepared from the above reagents using the ratio of mixtures shown in Table A.1 in Annex A.

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6 Apparatus

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6.1 **Absorbent tissue or cotton swatch** (examples, cotton cloth or filter paper), to wipe away Kit test solutions at the end of the test.

6.2 **Balance**, capable of weighing 2 000 g to within 0,1 g.

6.3 **Graduated cylinders**, made of glass, of capacity 100 ml and 500 ml; for preparing Kit test solutions.

6.4 **Stock bottles**, made of glass, with foil-lined caps, glass stoppers, or polythene-lined caps to prevent evaporation losses; for prepared Kit test solutions.

6.5 **Stopwatch or timer**.

6.6 **Test bottles**, with glass stoppers and glass eye-droppers; for use during testing.

6.7 **Testing area**, located in a laboratory with a conditioned atmosphere (see 10.1). The testing area should be a clean, dark bench top with bright, uniform lighting. If the bench top does not have a dark surface, each test piece will need to be backed up with a darker material before testing.

7 Sampling

If the test is being carried out on a lot or consignment of paper or board, the sample shall be selected in accordance with ISO 186. If the test is being made on another type of sample, report the source of the sample and, if possible, the sampling procedure used. Make sure that the test pieces taken are representative of the paper or board sample.

8 Conditioning of samples

Condition samples in accordance with ISO 187, at $23\text{ °C} \pm 1\text{ °C}$ and $50\% \pm 2\%$ relative humidity.

9 Preparation of test pieces

From each sample, cut 10 test pieces with a dimension of at least $50\text{ mm} \times 150\text{ mm}$. Label or identify, in some manner, each side of the test specimen.

Use care when handling the test pieces. The use of plastic gloves to protect the sample is recommended. Do not test in an area that has fingerprints, oil from a previous test, or any other defects in the test piece which may affect the results.

10 Procedure

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10.1 The test shall be carried out in a conditioned room, having a temperature of $23\text{ °C} \pm 1\text{ °C}$ and $50\% \pm 2\%$ relative humidity. Carry out at least 5 determinations on the side to be tested. If the side to be in contact with the fatty product is known, test this side. If not, test both sides.

10.2 Place each test piece on a clean, flat surface, with the test side uppermost, in the testing area (6.7).

10.3 Select one of the test pieces and a Kit test solution (5.4) of intermediate number contained in one of the test bottles (6.6). From a height of about 10 mm, gently release a drop of the test solution from the test bottle onto the surface of the test piece, and start the timer (6.5). Ensure that the glass eye-dropper of the test bottle does not touch the surface of the test piece.

10.4 After 15 s quickly remove the excess test solution with a clean tissue or cotton swatch (6.1) and **immediately examine** the surface to which the test solution was applied. The end-point of the test is denoted by a darkening of any part of the paper or board surface where the test solution was applied.

NOTE 1 If the surface where the testing solution was applied is **not** examined immediately, volatile components of the test solution will be lost and the testing spot may regain its original light-reflectance value and the end-point of the test will not have been reached.

NOTE 2 Darkening of the paper or board surface is a result of wetting of the test piece by the test solution.

NOTE 3 Detection of the end-point may be difficult in paper or board which has been highly refined, or in sheets which have a low thickness and opacity.

10.5 If the end-point is attained on this first test, select an untested area on the same test piece and repeat the procedure in 10.3 and 10.4 using a lower test solution number. Continue this procedure until the highest numbered test solution that does not exhibit an end-point (as in 10.4) is identified. The number of this test solution is the Kit rating for the test piece. Repeat the above procedure for the remaining four test pieces and record their Kit ratings.

NOTE Results from the first test can be used as an indication of which test solution to use for the first drop on the remaining four test pieces.