International Standard ISO 5634

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Paper and board — Determination of grease resistance

Papier et carton — Détermination de l'imperméabilité aux graisses

First edition — 1986-12-15

UDC 673.3/.7 : 620.193.47 **Ref. No. ISO 5634-1986 (E)**

Descriptors : paper, paperboards, tests, determination, oil resistance, test equipment.

Price based on 4 pages

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 5634 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Paper and board — Determination of grease resistance

0 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.

1 Scope and field of application

This International Standard specifies a method for the determination of the grease resistance of paper and board. The paper or board may be tested either creased or uncreased. The test is primarily intended for foodboard, greaseproof, vegetable parchment and similar products.

2 References

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

ISO 187, *Paper and board — Conditioning of samples*.

ISO 4046, *Paper, board, pulp and related terms — Vocabulary*.

3 Principle

The test pieces are placed on a glass plate, with or without a layer of cellulose wadding depending on the objective of the test, and dyed palm kernel oil is applied, together with a weight, to the upper side of the test pieces. The time elapsed until an indication of the penetration of the grease through the test pieces is noted. This indication may be visual or actual.

NOTE — Greases other than the standardized one may be used, in which case this fact is to be stated in the test report.

For determination of **actual penetration** of grease through the test pieces, the end point is indicated by staining of cellulose wadding in contact with the test pieces.

For **visual observation** of the passage of grease through the test pieces, the end point is determined when the eye can detect spots of grease on the underside of the test pieces.

4 Definitions

For the purposes of this International Standard, grease resistance is described by two characteristics: "break-through" time (actual penetration) and "show-through" time (visual penetration).

4.1 break-through: The time elapsed between the application of the test grease, together with the weight, to one side of the test piece and the penetration of grease through the other side of the test piece.

NOTE — In practice, the time needed to penetrate the wadding is included; this is very short and therefore negligible.

4.2 show-through: The time elapsed between the application of the test grease, together with the weight, to one side of the test piece and visual detection of the first sign of grease on the other side, but before grease actually penetrates the surface.

NOTES

1 For many grades of paper and board, show-through time and break-through time are nearly identical.

2 Although break-through is the main characteristic of grease resistance, show-through may be of interest in special cases, for example in the study of plastic laminated foodboard.

5 Materials and apparatus

5.1 Standard grease consisting of palm kernel oil or another oil with the following properties:

- temperature of liquefaction: 27 to 29 °C;
- dynamic viscosity at 35 °C: 33,5 to 35 mPa·s;
- dyed with 0,25 % (m/m) Sudan red or a similar fat-soluble dye.

NOTES

1 Dyed palm kernel oil suitable for this test is commercially available as Merck 6981 or equivalent.

2 If the grease is lumpy, it should be homogenized before use with the aid of a stirrer or by mixing with a spatula.

3 The use of alternative oils may not give comparable results with those of palm kernel oil.

5.2 Cellulose wadding, made of bleached chemical pulp (see ISO 4046, term 6.149).

The penetration time when measured with palm kernel oil is less than 15 s.

5.3 Glass plate, not smaller than 220 mm × 350 mm.

The plate shall be supported in such a way that the underside can be viewed in a mirror.

5.4 Mirror, placed beneath the glass plate (5.3) in such a way that the whole of the undersides of the test pieces can be viewed (see figure 1).

5.5 Creasing apparatus, as described in the annex.

5.6 Metal template, round or square, for example 60 mm × 60 mm, and 2 to 3 mm thick, with a hole, diameter 30 mm in the centre.

The template is used to apply a specific volume of grease.

5.7 At least 10 test weights, 50 to 55 g, diameter 30 mm.

5.8 Ten metal rings, about 200 g, external diameter 65 to 70 mm, internal diameter about 55 mm.

6 Sampling and preparation of test pieces

Sample in accordance with ISO 186.

Condition the samples at 23 °C and 50 % relative humidity in accordance with ISO 187.

From the samples, cut at least 10 test pieces, about 60 mm × 60 mm, with the sides parallel to the machine and cross directions. Mark the directions on the test pieces.

NOTE — If creasing is required, the procedure described in the annex should be followed.

7 Procedure

Carry out at least 10 determinations on the side to be tested.

Perform the tests in the atmosphere used to condition the samples.

7.1 Determination of the break-through

If only break-through is to be measured, place each test piece, with the surface to be in contact with the content of the package upwards, on a thin layer of cellulose wadding (5.2) on the horizontal glass plate (5.3).

NOTE — If it is not known which surface is to be in contact with the content of the package, test both sides.

Place the metal template (5.6) on the test piece. Press it firmly, and completely fill the hole with grease (5.1), bringing it into contact with the test piece. Start the timer and draw a straightedge over the top surface of the template, giving the layer of grease a plane upper surface and a uniform thickness. Remove the template and centre a metal ring on the test piece. Place a weight (5.7), centered on the layer of grease, on each test piece.

NOTE — If the test pieces are creased, place the template in such a way that the hole is centered over the intersection of the creases.

Examine the underside of the test pieces in the mirror and note the time which elapses until the first red stains are observed on the cellulose wadding. Note the position on the test piece if the test pieces are creased (for example: 45 min, CD crease).

Make observations at least at the following intervals:

every 1 min for the first 10 min;

every 2 min between 10 and 30 min;

every 5 min between 30 and 60 min;

every 10 min between 60 and 150 min;

every 30 min between 2 1/2 and 8 h;

after 24 h;

after 48 h (final inspection).

7.2 Determination of show-through

If show-through is to be measured, place the test pieces directly on the glass plate as shown in figure 1 and note the appearance of the first stain. Immediately and carefully, transfer the test pieces to a thin sheet of cellulose wadding and continue as in 7.1.

8 Expression of results

Calculate the mean and the range for the break-through time and show-through time if required.

Express the results as follows:

below 10 min: to the nearest 1 min;

10 to 30 min: to the nearest 2 min;

30 to 60 min: to the nearest 5 min;

60 to 150 min: to the nearest 10 min;

2 1/2 to 8 h: to the nearest 30 min;

8 to 24 h: between 8 h and 24 h;

after 24 h: over 24 h;

after 48 h: over 48 h.

9 Test report

The report shall give the following particulars:

a) reference to this International Standard;

b) place and date of testing;

c) identification of the sample and tested surface;

d) identification of the grease used in the test if other than the prescribed palm kernel oil;

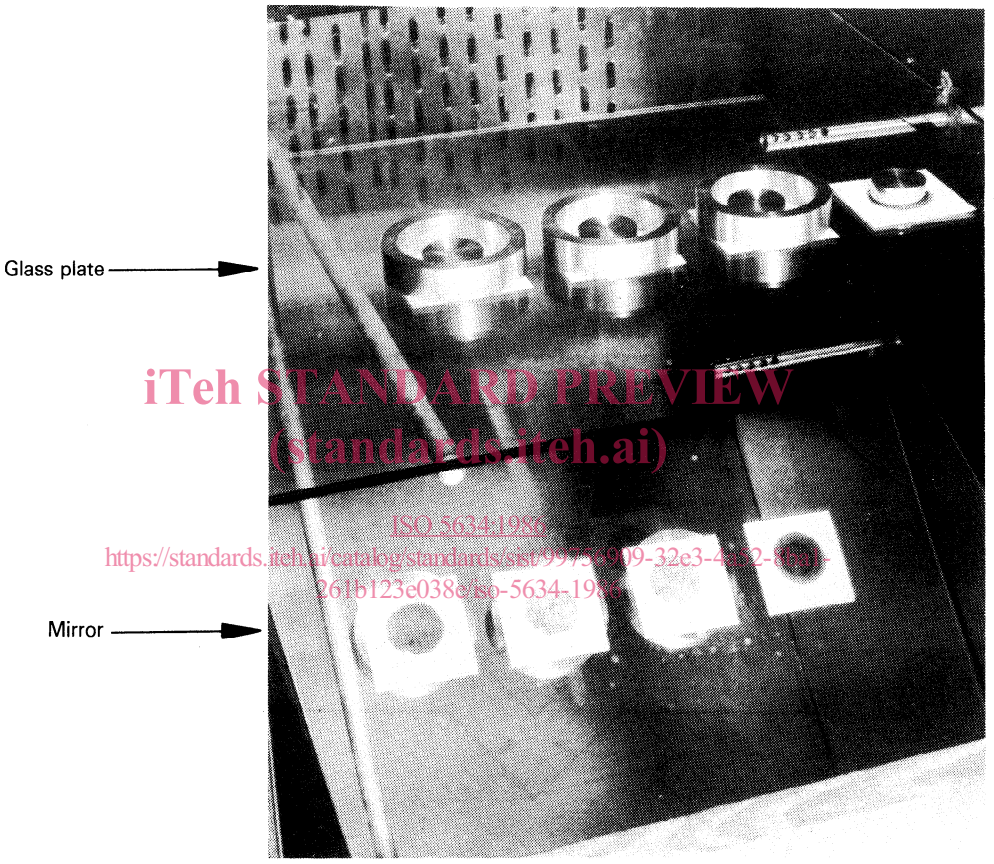
e) the testing temperature if other than 23 °C;

f) creasing, if carried out, and the force if other than 10 N/cm;

g) the break-through time (mean and range);

h) the show-through time (mean and range) if required;

i) any departures from the method or any other circumstances that may have affected the results.



NOTE — These examples are well past the end point.

Figure 1 — Test assembly

Annex

Creasing

(This annex forms an integral part of the Standard.)

A.1 Apparatus

Creasing bed, consisting of a flat plate in which a right-angled groove has been cut (figure 2) and a bar to fit the groove. The bar shall have a machined, but not cutting, edge (radius of curvature about 0,3 mm).

NOTE — Other creasing apparatus may be used, provided that the reverse side of the crease is not broken.

A.2 Procedure

Place the test piece on the creasing bed so that the machine direction is parallel with the groove in the bed. For folding boxboard and other non-homogeneous materials, the test piece shall be placed with the outer surface (the side not to be in contact with the content of the package) upwards. For homogeneous materials, such as greaseproof, five test pieces shall be creased one face up and five the other face up.

Produce a crease by pressing the bar into the groove with a force of 10 N per linear centimetre of crease for 10 to 15 s. For practical purposes this may be achieved by loading the bar with a mass of 1 kg for each linear centimetre to be creased.

Make a second crease at right angles to and intersecting the first. After creasing, examine the reverse side of the test piece to ensure they are unbroken.

Repeat the procedure with all test pieces.

NOTE — 10 N/cm may not be sufficient to create a distinct crease in very thick boxboard. In this case, additional weights should be applied to the bar and the actual force reported together with the results.

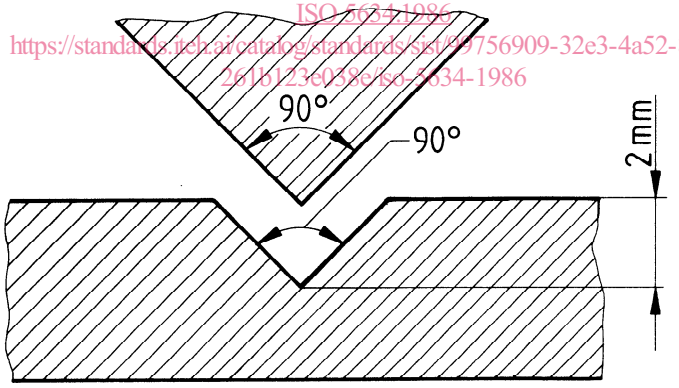


Figure 2 — Creasing bed

This page intentionally left blank

This page intentionally left blank