
International Standard



3037

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Corrugated fibreboard — Determination of edgewise crush resistance

Carton ondulé — Détermination de la résistance à la compression de chant

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Descriptors : corrugated cardboards, tests, compression test, crushing strength.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

International Standard ISO 3037 was developed by Technical Committee ISO/TC 6, Paper, board and pulps.

This second edition was submitted directly to the ISO Council, in accordance with clause 6.11.2 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 3037-1979), which had been approved by the member bodies of the following countries :

Belgium	Ireland	Sweden
Bulgaria	Israel	Switzerland
Czechoslovakia	New Zealand	Thailand
Egypt, Arab Rep. of	Norway	Turkey
Finland	Poland	United Kingdom
Germany, F. R.	Romania	USA
Hungary	South Africa, Rep. of	USSR
India	Spain	

The member bodies of the following countries had expressed disapproval of the document on technical grounds :

Canada
France

Corrugated fibreboard — Determination of edgewise crush resistance

0 Introduction

The method of determining the edgewise crush resistance of corrugated fibreboard on which this International Standard is based has been used in many countries for a number of years. However, different instruments are in use and it would cause inconvenience if certain countries had to make immediate changes in their existing instruments. For this reason, two sizes of test piece are given in this International Standard. It is hoped that, when this International Standard is next reviewed, it will be possible to recommend only one size of test piece.

1 Scope

This International Standard specifies a method for the determination of the edgewise crush resistance of corrugated fibreboard.

2 Field of application

The method is applicable to single-wall (double-faced), double-wall (double-double-faced), and triple-wall corrugated fibreboard.

3 References

ISO 186, *Paper and board — Sampling for testing.*

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

4 Principle

Subjection of a rectangular test piece of the corrugated fibreboard, placed between the platens of a crush tester, with the flutes perpendicular to the platens, to a compressive action until failure occurs.

Measurement of the maximum force sustained by the test piece.

5 Apparatus and material

5.1 Motor-driven, platen-type, crush tester.

The platens shall be large enough to take a test piece of the selected size (see 7.1) without the test piece projecting beyond the platens¹⁾. They shall also meet the following requirements :

- deviation from parallel not greater than 1 : 1 000;
- lateral play not exceeding 0,05 mm.

5.1.1 If the tester operates with one fixed platen, the other having a direct positive drive, the rate at which the platens approach each other shall be $12,5 \pm 2,5$ mm/min.

5.1.2 If the tester operates on the principle of beam deflection, the deflection at the moment of collapse shall be between 20 and 80 % of the maximum range of deflection that can be measured with the apparatus.

The force applied by the platens shall be developed at a rate of either

- 110 \pm 23 N/s (preferred)
- or 67 \pm 23 N/s

when the platens contact the test piece.

5.1.3 Testers fitted with digital read-out systems may be used provided that it can be shown that the results obtained are comparable with those obtained using the testers described in 5.1.1 and 5.1.2.

5.2 Cutting equipment.

A band-saw or a knife and cutting jig may be used to prepare the test pieces. The equipment shall produce cut edges that are clean, straight, and perpendicular to the facings of the board.

1) The platens may be faced with a very fine emery paper, but where this is done, due regard should be paid to maintaining the faces flat and parallel.

5.3 Guide blocks : two rectangular, smooth-finished, metal blocks, of dimensions 20 mm × 20 mm, and at least 100 mm in length, to support the test piece and keep it perpendicular to the platens.

NOTE — When waxed test pieces are used (see 7.2), the guide block may be cut back by 2 mm along its whole length and for 10 mm of its depth so that it just does not contact the waxed area of the test piece.

5.4 Paraffin wax.

If the edges of the test pieces are to be waxed (see 7.2), paraffin wax with a melting point of approximately 52 °C shall be used.

6 Sampling

Sampling shall be carried out in accordance with ISO 186.

7 Preparation and waxing of test pieces

7.1 Preparation

Rectangular test pieces (at least ten, unless otherwise agreed between the interested parties) shall be cut with the flutes perpendicular to the long edges, in one of the following sizes:

- size A : 25 ± 0,5 mm × 100 ± 0,5 mm
- size B : 30,5 ± 0,5 mm × 50,5 ± 0,5 mm

The test pieces shall be free from converting machine marks, printing and damage.

7.2 Waxing

Size A test pieces shall not be waxed.

Size B test pieces may be waxed or unwaxed. If waxing is performed, both the longer edges shall be dipped in molten paraffin to a depth of 6,0 mm and held there until the absorbed paraffin, as examined visually, begins to migrate above the 6,0 mm dipped zone.

NOTE — Normally a dip for 3 s at a temperature of 69 to 74 °C is adequate.

Immediately after dipping, the edges shall be blotted with paper towelling that has been pre-heated on a hot-plate maintained at 77 to 82 °C.

8 Conditioning

Unless otherwise agreed between the interested parties, the test pieces shall be conditioned in accordance with ISO 187.

9 Procedure

Carry out the tests in the standard atmosphere specified in clause 8.

Place a test piece centrally on the lower platen with its shorter edges perpendicular to the platens and supported by the guide blocks, in such a manner that the surfaces of the test piece in contact with the platens are straight, parallel to each other and at right angles to the corrugated fibreboard facings.

By operating the tester, increase the load until the test piece collapses. Remove the guide blocks when the loading force is approximately 50 N. Record the maximum load sustained to the nearest newton.

Repeat the procedure with the remaining test pieces.

10 Expression of results

The edgewise crush resistance R , in newtons per metre, is given by the formula :

$$R = \frac{F \times 10^3}{l}$$

where

F is the maximum load, in newtons;

l is the long dimension of the test piece, in millimetres.

11 Test report

The test report shall include the following particulars :

- a) a reference to this International Standard;
- b) the date and place of testing;
- c) the type of tester used and the rate of loading (see 5.1.1);
- d) a description and identification of the product tested;
- e) the conditioning atmosphere used;
- f) the size of test pieces used;
- g) whether the test pieces were waxed or unwaxed (see 7.2);
- h) the results of individual tests, in newtons per metre;
- j) the arithmetic mean and standard deviation of all the replicate test results to the nearest 50 N/m;
- k) details of any deviation from the procedure specified;
- m) any other information that may assist in the interpretation of the test results.