International Standard ISO 3035

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

Single-faced and single-wall corrugated fibreboard — Determination of flat crush resistance

Carton ondulé simple face et double face — Détermination de la résistance à la compression à plat

Second edition — 1982-12-01

UDC 676.273.31 : 676.017.42 : 539.411 **Ref. No. ISO 3035-1982 (E)**

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

Price based on 2 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (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 authorized 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 3035 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 3035-1975), which had been approved by the member bodies of the following countries:

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

* with the exception of sub-clause 5.1.1.

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

Bulgaria
Canada**

** sub-clause 5.2 only.

Single-faced and single-wall corrugated fibreboard — Determination of flat crush resistance

1 Scope

This International Standard specifies a method for the determination of the flat crush resistance of corrugated fibreboard used in the manufacture of packing cases.

2 Field of application

The method is applicable to single-faced and single-wall (double-faced) corrugated fibreboard. It is not applicable to double-wall (double-double-faced) corrugated fibreboard.

3 Reference

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

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

4 Principle

Subjection of a test piece from a representative sample of corrugated fibreboard to an increasing force applied perpendicularly to the surface by a compression tester having two flat and parallel platens, until the fluting collapses.

Measurement of the maximum force sustained by the test piece.

5 Apparatus

5.1 Flat crush tester: a motor-driven, platen-type compression tester.

The platens shall be large enough to take a test piece of the selected size (see 5.2) without the test piece projecting beyond the platens.[1] 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 ± 2,5 mm/min.

5.1.2 If the tester operates on the principle of beam deflection, the beam shall be such that test results will occur only within 20 to 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 ± 23 N/s (preferred)
or 67 ± 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 instrument, having a circularly guided knife to cut test pieces with an area[2] of not less than 50 cm^2, with the cut edges clean and perpendicular to the facings of the corrugated fibreboard.

6 Sampling

Sampling shall be carried out in accordance with ISO 186.

7 Conditioning

The test pieces shall be conditioned in accordance with ISO 187.

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.

2) Commonly used areas are 64,5 cm^2 (90,6 ± 0,5 mm diameter) and 100 cm^2 (112,8 ± 0,5 mm diameter). When the flat crush resistance is expected to exceed the capacity of the test instrument, a smaller test piece (commonly 32,2 cm^2) may be used.

8 Procedure

Test not less than ten test pieces.

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

Carry out the tests in the standard atmosphere specified in clause 7.

Determine the area of a test piece.

Place the test piece (see figure 1) centrally on the lower platen and operate the tester until the fluting collapses (see figure 2). Record the maximum force sustained by the test piece before collapse of the fluting, to the nearest 10 N.

In the event of the flutes leaning sideways during the test (see figure 3), ignore the relevant test pieces, and make further tests on fresh test pieces.

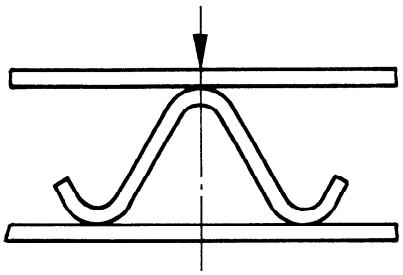

Figure 1 — Test piece before being subjected to pressure

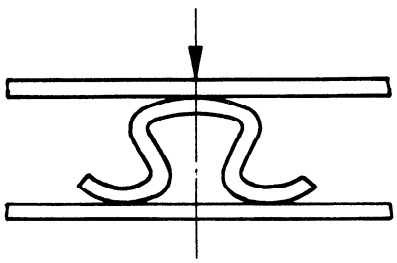

Figure 2 — Test piece after crushing

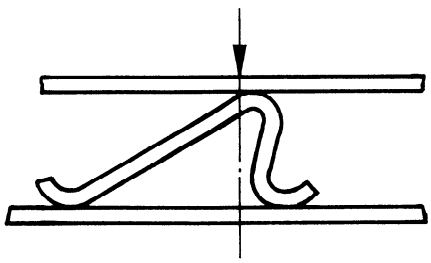

Figure 3 — Flute beginning to lean, for example as a result of sideways movement of the test piece or platens

NOTES

1 Flutes may lean sideways because of relative sideways movement of the platens, because of damage to test pieces especially during cutting, or because of an inherent fault in the corrugated fibreboard. Check the first two by testing further test pieces with the direction of the flutes at right angle to the original direction and ensuring that great care is taken in cutting. If further test pieces have leaning flutes it is probable that the corrugated fibreboard is at fault; these test results shall be stated in the test report.

2 If available, a test piece holder may be used to prevent sideways collapse, but, if such a device is used, it must neither interfere with the operation of the platens nor give vertical support to the test piece.

9 Expression of results

The flat crush resistance X, in kilopascals, is given by the formula:

$$X = \frac{F}{A}$$

where

F is the maximum force, in kilonewtons;

A is the area of the test piece, in square metres.

10 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 area of the test piece;

g) the arithmetic mean and standard deviation of all replicate test results, to the nearest kilopascal;

h) the number of test pieces rejected because of leaning flutes (record also the test results where this number exceeds two; see note 1 to clause 8);

j) details concerning any optional features and of any deviation from the method, including the use of a test piece holder;

k) any other information that may assist in the interpretation of the test results.