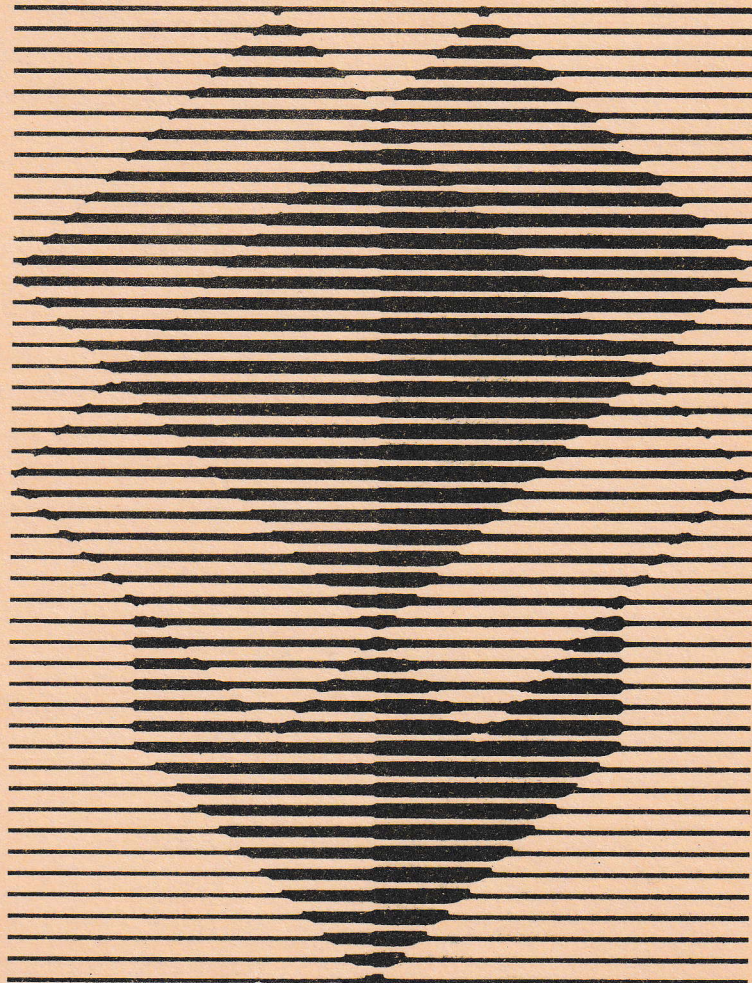


CORRUGATED BOX MANUFACTURERS' PRACTICAL STANDARDS

FOR PRIVATE CIRCULATION ONLY

NO. 3:90

Standard Test Method for Bursting Strength of Corrugated Fibreboard



FEDERATION OF CORRUGATED BOX
MANUFACTURERS OF INDIA

Our first booklet 'Corrugated Box Manufacturers' Practical Standards' 1:87, was the beginning of our efforts to establish uniform standards for the corrugated packaging industry.

The second booklet 'Corrugated Packaging' 2:89 was designed as a corporate brochure of the industry.

These publications met with immense success.

We now present the Standard Test Method for Bursting Strength of Corrugated Fibreboard.

Bursting Strength of corrugated board is an important and critical parameter for corrugated packaging.

This booklet lays down the Standard Method of conducting the Bursting Strength Test, taking into consideration the current practices, international standards, etc.

We record our appreciation for the ceaseless efforts of the R & D Committee in drafting the test method and bringing out this convenient booklet for ready reference.

We look forward to encouraging response from the industry.

MAHENDRA D. SHAH

President
Federation of Corrugated
Box Mfrs. of India

Bombay
15.7.'90

FCBM STANDARD

Test Method for Bursting Strength of Corrugated Fibreboard

1. SCOPE

This test is applicable mainly to 3 ply and 5 ply corrugated fibreboards.

2. DEFINITION

Bursting Strength is defined as the hydrostatic pressure required to produce rupture of the material when the pressure is applied at a specific controlled increasing rate through a rubber diaphragm to a specific circular area of the material under test.

3. PRINCIPLE

The test specimen of corrugated fibreboard is firmly clamped between annular surfaces. Uniformly increasing pressure is applied to one side by pumping fluid under a flexible diaphragm over a circular free testing area, until the specimen bursts. The maximum pressure sustained by the specimen is recorded.

4. APPARATUS

4.1 Type of Burst Tester

A motor-driven hydraulic burst tester shall be used.

4.2 Clamping Device

Clamping device shall be such that the specimen can be held without slippage during the Test. The clamping pressure is critical in the testing of corrugated boards. It should be only great enough to prevent slippage of the specimen during burst but not great enough to completely crush the flutes.

Clamping pressure shall be adjustable & measurable up to 14Kgf /cm² (Kp/cm²).

4.3 Clamping Rings

The internal diameter of the upper and lower clamping rings shall be 31.5 mm \pm 0.1 mm.

The internal edge at the lower face of the lower clamping ring shall be rounded, 6 mm \pm 0.2 mm radius, to prevent damage to diaphragm.

The edges of the clamping surfaces shall be rounded, $1\text{ mm} \pm 0.1\text{ mm}$ radius.

The clamping surfaces must be flat and should have circular or spiral grooves 0.2 mm to 0.5 mm deep to increase clamping efficiency.

The rings shall be strong enough to withstand the clamping stresses without deformation.

The clamping rings must be mounted parallel and accurately centered.

4.4 Diaphragm

Diaphragm to be of highly elastic material and give the following distention / load properties :-

Bulge height	Pressure range
10 mm.	1.7 to 2.2 Kgf/cm ² (Kp/cm ²)
18 mm.	2.5 to 3.5 Kgf/cm ² (Kp/cm ²)

Bulge height is measured from the upper surface to lower clamping ring.

4.5 Pumping Rate

Pressure under the diaphragm shall be produced by electro hydraulic pump delivering technically pure, air-free glycerine or any other suitable liquid with analogous properties at the rate of $170 \pm 15\text{ ml / min}$.

4.6 Pressure Measurement

The total measuring capacity to extend from 0 to 50 kgf / cm² (kp / cm²). For improved precision, the total measuring range may be divided by the use of more than one precision pressure gauge, independent of each other in operation & selected to maintain a test result between 20% & 80% of the scale of the gauge used.

Pressure gauge shall be fitted with "lazy hand" or "maximum reading" pointers & errors due to frictional forces during operation shall not exceed 0.5% of the scale range.

Pressure gauges shall be accurately calibrated with standardised Aluminium foils.

5. TEST SPECIMEN

Sufficient representative samples of 300 mm x 300 mm size of the corrugated fibreboard should be made available to carry out at least 20 bursts, without overlap of the clamped areas. (If board size does not permit, then take 150 mm x 150 mm specimens).

6. CONDITIONING

6.1 Standard Atmospheric Conditions

A relative humidity of 65 ± 2 percent and temperature of $27 \pm 2^\circ\text{C}$ will be taken as the standard atmospheric condition for the purpose of testing.

6.2 Conditioning

A suitable room or chamber is required for conditioning samples. Specific temperature and Rh, as specified in 6.1 above, should be uniformly maintained throughout the chamber. Samples should preferably be suspended so that the conditioning atmosphere has free access to all its surfaces. The samples will be deemed to be conditioned when the results of two weighings, at an interval of not less than one hour, do not differ by more than 0.25 percent of the total weight.

6.3 After the samples are so conditioned, they shall be touched and/or handled as little as possible and tested immediately.

7. PROCEDURE

7.1 Corrugated Board

7.1.1 Insert specimen between upper clamping ring and diaphragm plate. Apply sufficient clamping pressure (manual or hydraulic) to prevent slippage of specimen during test.

7.1.2 Apply bursting pressure by driving piston forward until diaphragm ruptures specimen, then return piston to original position to prevent rupture of diaphragm. Record the maximum pressure registered by gauge & gently return the indicator of gauge to zero. Discard values obtained from bursts showing creases in the facings radiating from the burst when computing the average. Also disregard audible double bursts.

7.1.3 Allot a minimum area of 150 mm x 150 mm for each burst

to prevent distortion of the board from one clamping area to the next. Leave a distance of at least 25 mm from the edge of the sheet & upper clamping ring or 50 mm between successive clamping areas. Locate bursts so that not more than one burst from each direction is made in line with the same corrugation or in the same line of machine formation, i.e. perpendicular to the corrugations.

Make tests only in areas away from the scores, creases, or obvious imperfections. Make an equal number of bursts with the outer facing up & the inner facing up. Make a minimum of 20 bursts.

8. TOLERANCE

Results of tests made on different samples from the same shipment or results of tests made on different instruments are expected to agree within $\pm 5\%$.

9. REPORT

The Bursting Strength shall be reported in Kg/sq.cm. or in Kilopascals(kpa.)

(1 Kg / sq.cm. = 98.14 Kilopascals).

The report shall include :-

- 9.1 Date of testing
- 9.2 No. of bursts
- 9.3 The highest and lowest readings will be ignored.
- 9.4 Arithmetic mean of the remaining test results shown up to one decimal point.
- 9.5 Clamping pressure in Kg / sq.cm.
- 9.6 Details of any deviation from testing method.

10. LIMITATIONS

- 10.1 The Bursting Strength of a board does not give any indication of the cross direction tensile strength.
- 10.2 Bursting Strength test is not suitable for 7-ply boards because simultaneous bursts of all plies together is rarely possible.

BURST TESTER

(Schematic Diagram)

