CORRUGATED BOX MANUFACTURERS' PRACTICAL STANDARDS
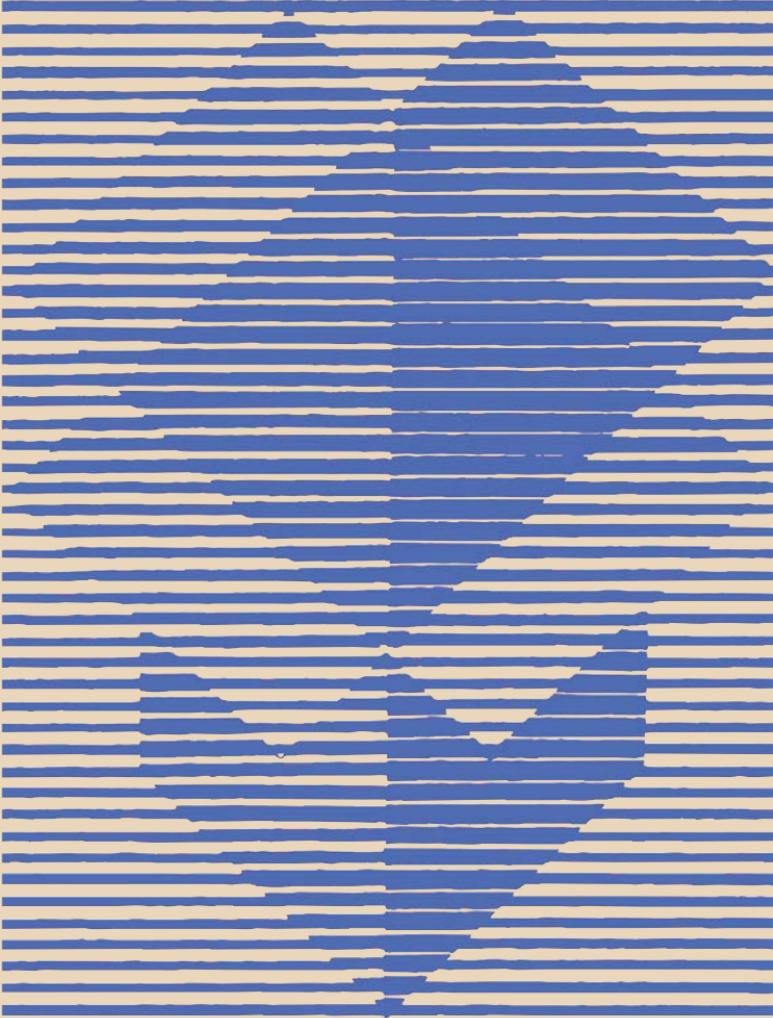
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Standard Test Method for Thickness of Board

FEDERATION OF CORRUGATED BOX MANUFACTURERS OF INDIA

FOREWORD

Standardisation and adoption of scientific Test Methods are essential for quality control.

Measuring the thickness of corrugated board, which apparently appears to be simple, does call for standardisation and accuracy in the measurements.

I have great pleasure in presenting the booklet on **Standard Test Method for Thickness of Corrugated Board**. The R&D Committee of our Federation deserves to be congratulated on their continuing and consistent efforts in bringing out such useful booklets of Test Methods and Technical Information Booklets.

I do hope this booklet will benefit the corrugated box manufacturers as well as others connected with the industry.

S. J. Ajmera
President
Federation of Corrugated Box
Manufacturers of India

Standard Test Method for Thickness of Board

1.   SCOPE

This test is applicable for measuring thickness of all types of corrugated fibreboard intended for use in the manufacture of packing cases or used inside such packing cases as internal fitments.

2.   DEFINITION

The thickness of a single sheet of corrugated fibreboard is the distance between two plane parallel surfaces of micrometer by way of which the test pieces are subjected to the specified pressure.

3.   PRINCIPLE

The thickness of fibreboard is measured with the test pieces under a specified pressure.

4.   APPARATUS

4.1   Dial Gauge Micrometer – A dial gauge micrometer with a plane circular anvil and a concentric plane plunger. The area of the anvil and of the face of the plunger shall be 10.0 ± 0.2 cm^2.

Note: To cover the range of corrugated fibreboard normally encountered, it is desirable that the measuring capacity of dial gauge micrometer should be at least 20 mm.

4.1.1   The measuring surfaces shall be parallel within 1 part in 1000 of their diameter and the loading of the plunger shall be 20.0 ± 0.5 kN/m^2.

4.1.2 The instrument shall be sufficiently accurate to permit measurement to be made to the nearest 0.05 mm

5.   CALIBRATION

5.1   General

5.1.1 For the instrument in frequent use, it is desirable that the calibration should be checked daily for repeatability and accuracy and monthly for parallelism and foot pressure. If the instrument is not within the tolerance for any test, it should be corrected before subsequent tests are made.

5.2   Calibration checking should be carried out as follows:

5.2.1 Planarity of foot and anvil

       The pressure foot and the anvil should be carefully wiped and opened slightly so that the gap can be seen against a bright light. The gap should be quite even, when observed in two directions at right angles.

5.2.2 Pressure exerted by the foot

       Any suitable means of checking the accuracy and uniformity may be used.

5.2.3 Repeatability of measurement and determination of indication error

5.2.3.1 Set the instrument correctly at zero before commencing.

5.2.3.2 Use a set of slip gauges (gauge blocks) of different thickness that have previously been checked.

5.2.3.3 Insert these individually or in combination between the anvil and the pressure foot and note the corresponding reading on the scale.

5.2.3.4 Check the instrument at approximately 10, 30, 50, 70 and 90 per cent of the full-scale readings.

5.2.3.5 Take a series of at least five readings at the zero position, followed by at least five readings at each check point and finally a further set of at least five readings at the zero position.

5.2.3.6 The instrument should not be reset to zero during the procedure.

5.2.3.7 For each check point on the scale, repeatability of measurement is the standard deviation of the five or more readings taken; indication error is the difference between the mean of the five or more readings and the slip gauge thickness.

5.2.4 Parallelism of foot and anvil

5.2.4.1 Insert a precision ground cylinder on the edge at one side of the pressure foot and note the thickness shown on the scale.

5.2.4.2 Insert the same precision ground cylinder on the edge of the opposite side and note again the thickness shown on the scale.

5.2.4.3 Repeat the procedure at right angles to the original position.

5.2.4.4 Repeat the procedure with other cylinders at approximately 10, 30, 50, 70 and 90 per cent of the full scale readings.

5.2.4.5 The error of parallelism is defined as half the square root of the sum of the squares of the difference between the opposite readings at the ends of the two perpendicular diameters, that is:

$$0.5(d_1^2 + d_2^2)^{1/2}$$

where d_1 and d_2 are each the difference between the measurements at two opposite points.

6. TEST SPECIMEN

Samples large enough to permit the cutting of test pieces with an area of 500 cm^2 (200 x 250 mm). Test specimen shall be free from damage or other irregularities and shall also be free from converting machine marks.

7. CONDITIONING

7.1   Standard Atmospheric Conditions

A relative humidity of 65 $\pm$ 2% and temperature of 27° $\pm$ 2°C will be taken as the standard atmospheric condition for the purpose of testing.

7.2   Conditioning

A suitable room or chamber is required for conditioning samples. Specific temperature and Rh, as specified in 7.1 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 per cent of the total weight.

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

8. PROCEDURE

8.1   Make two measurements on each test specimen.

8.2   Place the test piece horizontally between the two faces of the instrument in such a manner that the edges of the test piece are at least 50 mm from the centre of the anvil. Lower the pressure foot gently, slowly and very carefully on to the test specimen, so

that all punching effect is avoided. Ensure that the test piece remains parallel with the measuring surfaces of the micrometer despite the effect of liverage caused by the mass of the test piece. Also do not impose any stress on the instrument or the test piece by the hand when a reading is being taken. Take the reading when the pointer has ceased to move.

9.   REPORT

The report shall include:

9.1   Date and place of testing;

9.2   Description and identification of material tested;

9.3   Conditioning atmosphere used;

9.4   Number of individual measurement;

9.5   Standard deviation of the thickness;

9.6   Arithmetic mean of all measurements in mm;

9.7   Details of any deviation from this test method.

Published in the interest of manufacturers and users of corrugated boxes. For additional copies, please write to:

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