Australian/New Zealand Standard™

Methods of test for pulp and paper

Method 429s: Flat crush resistance of corrugated board

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The following are represented on Committee PK-019:

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National Association of Forest Industries
New Zealand Pulp and Paper Industry Association
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Foreword

This standard was prepared by Joint Technical Committee PK-019, Methods of Test for Pulp and Paper, as a part of AS/NZS 1301, *Methods of test for pulp and paper.*

This edition cancels and replaces AS 1301.429s — 1989 and NZS 1301.429s:1989.

In this edition, changes have been made to the dimensions in Figure 1.

Introduction

This Standard describes the procedure for measuring the crushing resistance of the arch structure of corrugated board when subjected to loads applied perpendicular to the surface of the board and under conditions which minimize lateral motion of the facings. This test may be used on single-wall or single-face corrugated board, but cannot be adapted to measuring the crushing resistance of double-wall corrugated board.

NOTE — Failure of corrugations in single-wall board may occur in either of two ways:

(a) When lateral motion is prevented, the tips of the arches flatten, followed by the crushing of the sides of the arches.

(b) If lateral motion is permitted, the tips of the arches flatten, followed immediately and at a reduced load by lateral motion of the facings, permitting the corrugations to fall over sideways or roll.

Double walled corrugated board usually fails by lateral motion of the centre liner. No satisfactory technique has been developed for the prevention of this type of failure, and therefore this test is not suitable for double-wall board.

The flat crush test evaluates the resistance of the flutes in corrugated board to a crushing force applied perpendicular to the surface of the board. Although not directly correlating with compression tests on corrugated fibreboard containers, it is a combined measure of the effect of some of the factors involved in the operation of fabricating the board, and of the material used to form the corrugations. Low flat crush values may reflect poor formation of the corrugations, substandard materials, or damage to the corrugations after they are formed. Such damage may occur in subsequent manufacturing operations in the container plant (such as crushing under printing stereos) or through careless storage and handling by the container user. For this reason, great care should be exercised in selecting flat crush test pieces to be sure that they reflect the conditions to be evaluated, and that causes of low test results are properly interpreted.

This method allows use of a fixed platen type instrument or a beam deflection type instrument, provided that in the latter case, a test piece holder is used to prevent lateral movement of the upper portion of the test piece during compression. The test piece holder is optional if a fixed platen instrument is used. If under these conditions the flutes of the collapsed test piece exhibit sideways collapse, this is to be taken as a property of the board and results of such tests are to be included in the average value reported.

This method conforms to ISO 3035:1982, *Single-faced and single-wall corrugated fibreboard — Determination of flat crush resistance.*

Other similar standards are TAPPI T808om-01, TAPPI T825om-96, CPPA D.20P-93, EN 23035:98 and BS 4686:1971.

Flat crush resistance of corrugated board

1 Scope

This standard describes the procedure to be used to determine the flat crush resistance of single wall corrugated board.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of AS/NZS 1301.429s. At the time of publication, the editions indicated were valid. All standards are subject to revisions, and parties to agreements based on AS/NZS 1301.429s are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

AS
1301.P414m — 1986, *Conditioning of paper for testing*

AS/NZS
1301.415s:1998, *Standard atmosphere for paper testing*
1301.449s:1997, *Description of crush testing equipment*

3 Principle

A test piece is subjected to an increasing force applied perpendicular to the surface by a compression tester having two flat and parallel platens. The maximum force attained before the fluting collapses is recorded.

4 Apparatus

4.1 Motor driven crush testing machine, as described in AS/NZS 1301.449s. Both the fixed platen type and the beam deflection type are described in AS/NZS 1301.449s.

4.2 Test piece cutter, capable of cutting the corrugated arch structure with the required accuracy leaving clean-cut edges which are at right angles to the facings, and which are free from frayed or crushed corrugations. A circular device having a razor or scalpel blade as the cutting edge is recommended.

4.3 Test piece holder, consisting of an assembly of a type similar to that shown in Figure 1, with the following recommended dimensions. The outer sleeve is 89 mm internal diameter closed at the base with a 7 mm thick flat bottom. A flange 3 mm wide and 1 mm high runs around the inside bottom of the sleeve and emery cloth (grade 00) covers the surface within this flange. Two vent holes, 40 mm long and 10 mm wide, are cut into opposite sides of the sleeve with the bottom of the vent at the same height as the inside bottom surface. The piston is about 89 mm in diameter, such that it slides neatly in the sleeve without friction. The circular wall of the piston is about 41 mm high and a central rod 12 mm in diameter is fixed to the inside bottom surface and protrudes 13 mm above the top of the circular wall. The outer bottom surface of the piston, which is covered by emery cloth (grade 00), and the inner bottom surface of the sleeve are subject to the same parallelism requirements as the platen surfaces described in AS/NZS 1301.449s. The parallelism of the platens in this method is not essential but the bottom platen must be perpendicular to the line of application of the force. Stainless steel is recommended as the material of construction for both piston and sleeve. Test piece holders of other designs are permitted providing they perform the same function as the one described.

NOTE 1 — Emery cloth is not necessary on the platens for this test, but where the same tester is used for tests where it is necessary it may be present on the platens. It is necessary in the holder. Any emery cloth must be replaced as soon as any defect is observed. On no account should a knife