AS/NZS 1301.444:2016
ISO 3037:2013

AS/NZS 1301.444:2016

Australian/New Zealand Standard™

Methods of test for pulp and paper

Method 444: Determination of edgewise crush resistance (unwaxed edge method)

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Method 444: Determination of edgewise crush resistance (unwaxed edge method)

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee PK-019, Methods of Test for Pulp and Paper to supersede AS/NZS 1301.444s:2004, *Methods of test for pulp and paper—Corrugated fibreboard*—Part 444s: *Determination of edgewise crush resistance (unwaxed edge method) (ISO 3037:1994, MOD)*.

The objective of this Standard is to provide a method for determining the edgewise crush resistance of corrugated fibreboard.

This Standard is identical with, and has been reproduced from ISO 3037:2013, *Corrugated fibreboard—Determination of edgewise crush resistance (unwaxed edge method)*.

As this Standard is reproduced from an International Standard, the following applies:

(a) In the source text 'this International Standard' should read 'this Australian/New Zealand Standard'.

(b) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by reference to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian/New Zealand Standard*
ISO 186	Paper and board—Sampling to determine average quality	AS/NZS 1301 Method of test for pulp and paper 1301.417s Method 417s: Sampling to determine average quality

The normative references ISO 187 and ISO 13820 have not been adopted as Australian/New Zealand Standards. In Australia and New Zealand the following Standards are generally used:

(i) AS/NZS 1301.414s:2006, *Methods of test for pulp and paper*, Method 414s: *Conditioning of paper for testing*.

(ii) AS/NZS 1301.415s:2008, *Methods of test for pulp and paper*, Method 415s: *Standard atmosphere for testing paper and board and procedure for monitoring the atmosphere*.

(iii) The AS/NZS Standards use different humidity ranges and allow different apparatus to ISO 187.

(iv) AS/NZS 1301.449s:2013, *Methods of test for pulp and paper*, Method 449s: *Description of crush testing equipment*.

(v) The above Standards describe the test instruments used to perform crush tests set out as in other parts of AS/NZS 1301.

Only normative references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

The term 'informative' has been used in this Standard to define the application of the annexes to which it applies. An 'informative' annex is only for information and guidance.

CONTENTS

INTRODUCTION

A variety of methods for the determination of edgewise crush resistance are in use in different parts of the world. These can be classified into three groups as follows:

a) Those in which a carefully cut rectangular test piece is tested without any special treatment or modification (e.g. ISO 3037).

b) Those in which the edges of the test piece to which the force is applied are waxed, to prevent the test result being influenced by "edge effects" (e.g. ISO 13821, *Corrugated fibreboard — Determination of edgewise crush resistance — Waxed edge method*).

c) Those in which the test piece edges are not waxed but the shape of the test piece is such that the length is substantially reduced at a point midway between the loaded edges, in order to reduce the failure to occur away from those edges (e.g. JIS Z 0403-2).

The dimensions of the test piece vary from one group to the other and, in group c), the methods vary in the shape and method of reducing the length, and in whether or not the test piece is held in a clamp during crushing.

The methods may not give the same numerical results, but it can be shown that most of them can be used to predict the top-to-bottom compression strength which will be achieved when the board is properly converted into a transport package.

This International Standard describes a method from group a). It is intended as a method for quality measurement and quality specification purposes and is selected because it correlates with the top-to-bottom compression strength of the final transport package and because it is the simplest and most operationally convenient method, an important factor when large numbers of tests need to be conducted. However, it does not measure the actual intrinsic compressive strength of the corrugated fibreboard, giving lower results than most of the methods in groups b) and c). This systematic difference is due to edge effects.

Other methods may be used for other purposes, particularly when the object of the test is to study fundamental structural characteristics of the package.

There are methods available for calculating the edgewise crush resistance from the compression strength of the component papers.

AUSTRALIAN/NEW ZEALAND STANDARD

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Method 444:
Determination of edgewise crush resistance (unwaxed edge method)

1 Scope

This International Standard specifies an unwaxed edge method for the determination of the edgewise crush resistance of corrugated fibreboard. It is applicable to all corrugated fibreboard grades.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 13820, *Paper, board and corrugated fibreboard — Description and calibration of compression-testing equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
edgewise crush resistance
maximum force per unit length that a test piece of corrugated fibreboard can support until the onset of failure when a compressive force is applied with the flute structure perpendicular to the loading surfaces

4 Principle

A rectangular test piece of corrugated fibreboard, placed between the platens of a compression tester with the flutes perpendicular to the surfaces of the platens, is subjected to an increasing compressive force until failure occurs. The maximum force sustained by the test piece is measured.

5 Apparatus

5.1 Fixed-platen compression testing machine as described in ISO 13820. It is preferable to avoid the use of emery paper on the platens.

While it is safer to avoid the use of emery paper on the platens, because it is a requirement of other test methods, the platens may be faced with very fine emery paper of a grade not coarser than 00. Where this is done, due regard should be paid to maintaining the flatness and parallelism requirements specified for the faces.

NOTE A flexible beam compression tester per ISO 13820 is not recommended for this test method as there are significant questions regarding its ability to be maintained with sufficient parallelism to provide accurate test values for these specimens.