AS 1301.448:2019

Australian STANDARD

Methods of test for pulp and paper

Method 448: Tensile strength of paper and paperboard (constant rate of elongation method, 20 mm/min) (ISO 1924-2:2008, MOD)

STANDARDS Australia

AS 1301.448:2019

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Appita
Australian Institute of Packaging
Monash University

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Originated as AS 1301.448s—1984.
Second edition 1991.
Jointly revised and designated as AS/NZS 1301.448s:2007.
Revised and redesignated as AS 1301.448:2019.

Preface

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee PK-019, Methods of Test for Pulp and Paper, to supersede AS/NZS 1301.448s:2007, *Methods of test for pulp and paper, Method 448s: Tensile strength of paper and paperboard (constant rate of elongation method)*.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify a method for measuring the tensile strength, strain at break and tensile energy absorption of paper and board, using a testing machine operating at a constant rate of elongation (20 mm/min). This Standard also specifies equations for calculating the tensile index, the tensile energy absorption index and the modulus of elasticity.

This Standard is an adoption with national modifications, and has been reproduced from, ISO 1924-2:2008, *Paper and board — Determination of tensile properties — Part 2: Constant rate of elongation method (20 mm/min)*. The modifications are additional requirements and are set out in Appendix ZZ, which has been added at the end of the source text.

Appendix ZZ lists the variations to ISO 1924-2:2008 for the application of this Standard in Australia.

As this document has been reproduced from an International Standard, the following applies:

(a) In the source text "this part of ISO 1924" should read "this Australian Standard".

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

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms "normative" and "informative" are used in Standards to define the application of the appendices or annexes to which they apply. A "normative" appendix or annex is an integral part of a Standard, whereas an "informative" appendix or annex is only for information and guidance.

Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1924-2 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

This third edition cancels and replaces the second edition (ISO 1924-2:1994), which has been technically revised with respect to terms and definitions (in order to be in line with the terms and definitions used in ISO 1924-3[1]). The numbering of clauses and their contents have been changed to be congruent with ISO 1924-3.

ISO 1924 consists of the following parts, under the general title *Paper and board — Determination of tensile properties*[1)]:

— *Part 2: Constant rate of elongation method (20 mm/min)*

— *Part 3: Constant rate of elongation method (100 mm/min)*

1) ISO 1924-1, *Constant rate of loading method*, was withdrawn in 2004 as it was considered obsolete.

Introduction

The method for determination of tensile properties specified in this part of ISO 1924 is the one most commonly used. It is related to the method specified in ISO 1924-3. In this part of ISO 1924 (ISO 1924-2), the constant rate of elongation applied is 20 mm/min, whereas in ISO 1924-3, the constant rate of elongation applied is 100 mm/min.

Since the results of a tensile test depend on the rate of elongation applied, this part of ISO 1924 and ISO 1924-3 will not give the same results. The rate dependence can vary according to paper grade and is different for tensile strength, strain at break, tensile energy absorption and modulus of elasticity.

NOTE 1 In most cases, the tensile properties can increase by 5 % to 15 % when the rate of elongation is increased from 20 mm/min (180 mm test span length) to 100 mm/min (100 mm test span length).

NOTE 2 In this part of ISO 1924, the same terminology and symbols are used as in ISO 1924-3 and in general literature concerning materials physics and mechanics.

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1 Scope

This part of ISO 1924 specifies a method for measuring the tensile strength, strain at break and tensile energy absorption of paper and board, using a testing machine operating at a constant rate of elongation (20 mm/min). This part of ISO 1924 also specifies equations for calculating the tensile index, the tensile energy absorption index and the modulus of elasticity.

Testing in conformance with this part of ISO 1924 always includes the measurement of tensile strength. Measurement or calculation of other properties is subject to agreement between the parties concerned.

This part of ISO 1924 is applicable to all papers and boards, including papers with a high strain at break if the results are within the capacity of the testing machine. It also applies to the components of corrugated board but not, however, to corrugated board itself.

This part of ISO 1924 is not applicable to tissue paper and tissue products for which ISO 12625-4[2] is applicable. For the determination of tensile properties of laboratory sheets, ISO 5270[3] is recommended.

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 534, *Paper and board — Determination of thickness, density and specific volume*

ISO 536, *Paper and board — Determination of grammage*

3 Terms and definitions

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

3.1
tensile strength
maximum tensile force per unit width that paper and board will withstand before breaking under the conditions defined in this International Standard

3.2
tensile index
tensile strength divided by the grammage

3.3
elongation
increase in length of a test piece

Note 1 to entry: Elongation is expressed in millimetres.