AS/NZS 1301.454s:2006

Australian/New Zealand Standard™

Methods of test for pulp and paper

Method 454s: Determination of opacity (paper backing)—Diffuse reflectance method

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee PK-019, Methods of Test for Pulp and Paper. It was approved on behalf of the Council of Standards Australia on 14 February 2006 and on behalf of the Council of Standards New Zealand on 3 March 2006.
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The following are represented on Committee PK-019:

Australian Plantation Products and Paper Industry Council (A3P)
Appita
CSIRO Forestry and Forest Products
Ensis Papro, SCION
National Association of Forest Industries

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Australian/New Zealand Standard™

Methods of test for pulp and paper

Method 454s: Determination of opacity (paper backing)—Diffuse reflectance method

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Foreword

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

This edition cancels and replaces AS 1301.454s—1992 and NZS 1301.454s—1992.

This Standard conforms to ISO 2471:1998 except that the following changes have been incorporated:

(a) Provision for the measurement of coloured papers.

(b) A single working standard has been permitted rather than the requirement that there be two working standards.

(c) The Procedure in this Standard permits the measuring of all the R_∞ first and then all the R_0 of the test pieces, or the other way round, whichever is preferred.

TAPPI Method T519om-86 gives the following formula (based on Kubelka-Munk theory) for correcting opacity measured on a sample of grammage w to that which would have been measured on a sample of grammage x:

$$\text{Opacity} = \frac{[100(A-1]}{(A-r_\infty{}^2)}$$

where

$$A = \left[\frac{r_\infty(1-r_0 r_\infty)}{r_\infty - r_0}\right]^{\frac{x}{w}}$$

where

$$r_0 = \frac{R_0}{100} \text{ and } r_\infty = \frac{R_\infty}{100}$$

w = conditioned grammage of the test specimen

x = the common grammage to which the opacity is to be reduced.

The term ‘normative’ has been used in this Standard to define the application of the annex to which it applies. A ‘normative’ annex is an integral part of a Standard.

Introduction

This standard prescribes the method for determining the opacity (paper backing) of paper. Opacity (paper backing) is the property that governs the extent to which one sheet of paper visually obscures printed matter on underlying sheets of paper.

Other methods for determining opacity are used where the purpose of the measurement is different to that described above. For example opacity (white backing), formerly known as contrast ratio, is used when the purpose of the test is to measure the reduction in a standard contrast caused by interposition of a sheet of the paper. Another example is measurement of the amount and condition of light penetrating a sheet (transparency or translucency).

Luminous factors of the paper are needed for calculating the opacity, that is, measurements of reflectance factor made under specified spectral conditions. The reflectance factor depends on the conditions of measurement and particularly the spectral and geometric characteristics of the instrument used for its determination.

Contents

Determination of opacity (paper backing)—Diffuse reflectance method

1 Scope

This standard specifies a method for the measurement of the opacity (paper backing) of paper by diffuse reflectance.

Paper that has been treated with a fluorescent dyestuff or exhibits significant fluorescence may be measured by this method, provided a near ultra-violet filter is used to eliminate the fluorescence.

The opacity of coloured paper may also be measured by this standard.

2 Normative references

The following documents are referred to in this Standard.

AS/NZS
1301.436s Measurement of diffuse reflectance factor

3 Definitions

For the purpose of this standard the following definitions apply:

3.1 Reflectance Factor *R*

The ratio, expressed as a percentage, of the radiation reflected by a surface to that reflected by a perfect reflecting diffuser under the same conditions.

3.2 Luminous Factor R_y

The Y tristimulus value, defined by the CIE, determined for illuminant C with the 1931 2° observer.

3.3 Single sheet Luminous Factor R_0

The luminous factor of a single sheet of the material with a black backing.

3.4 Intrinsic Luminous Factor R_∞

The luminous factor of a layer or pack of material thick enough to be opaque.

3.5 Opacity (paper backing)

The ratio, expressed as a percentage, of the single sheet luminous reflectance factor to the intrinsic luminous reflectance factor of the same sample.

4 Apparatus

4.1 Reflectometer

As specified in AS/NZS 1301.436s and with the spectral characteristics specified in 4.2 or 4.3.

4.2 Filter colorimeter

A filter that at an effective wavelength of 557 nm and in conjunction with the optical characteristics of the reflectometer gives an overall response equivalent to the CIE tristimulus value Y (EIE 45-15-060) of the CIE 1931 standard colorimetric system (CIE 45-15-040) of the test piece evaluated for the CIE standard illuminant C (EIE 45-15-145).