AS/NZS 1301.565:2016
ISO 22891:2013

AS/NZS 1301.565:2016

Australian/New Zealand Standard™

# Methods of test for pulp and paper

# Method 565: Determination of transmittance by diffuse reflectance measurement



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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 20 January 2016 and on behalf of the Council of Standards New Zealand on 17 December 2015.
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The following are represented on Committee PK-019:

Appita
Australian Forest Products Association
New Zealand Paper Forum
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# Methods of test for pulp and paper

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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.

The objective of this Standard is to provide a method for determining the transmittance of paper by diffuse reflectance measurement.

This Standard is identical with, and has been reproduced from ISO 22891:2013. *Paper—Determination of transmittance by diffuse reflectance measurement.*

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 references to Australian or Australian/New Zealand Standards, as follows:

| *Reference to International Standard* | | *Australian/New Zealand Standard* | |
|---|---|---|---|
| ISO | | AS/NZS | |
| | | 1301 | Method of test for pulp and paper |
| 186 | Paper and board—Sampling to determine average quality | 1301.417s | Method 417s: Sampling to determine average quality |
| 2469 | Paper, board and pulps—Measurement of diffuse radiance factor | 1301.436 | Method 436: Measurement of diffuse radiance factor |

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

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annex to which they apply. A 'normative' annex is an integral part of a Standard, whereas an 'informative' annex is only for information and guidance.

CONTENTS

# INTRODUCTION

This International Standard presents a method of determining the transmittance indirectly from reflectance factor data obtained by measurement under specified conditions. The equation used to calculate the transmittance is based on the Kubelka-Munk theory of light scattering and light absorption, and the equation can therefore only be strictly applied if measurements are made on materials which scatter light sufficiently to justify the application of this theory.

The reflectance factor depends on the conditions of measurement, and particularly on the spectral and geometric characteristics of the instrument used for its determination. This International Standard should therefore be read in conjunction with ISO 2469 and ISO 2471.

The transmittance value obtained by this method is a single value compatible with the opacity value determined according to ISO 2471, since all measurements are related to the luminance factor calculated with respect to the CIE illuminant C.

The method described in this International Standard gives only the total transmittance and does not distinguish between regular transmittance and diffuse transmittance. It does not provide a direct measure of the ability to distinguish, for example, written text through a transparent medium. This can be assessed only if the ratio of the regular to the diffuse transmittance is known.

It is emphasized that this method is for the determination not of the transmittance by direct measurement but of the transmittance obtained indirectly from reflectance factor measurements. Under ideal conditions, they are the same, but in practice, it can be necessary to emphasize the difference.

AUSTRALIAN/NEW ZEALAND STANDARD

# Methods of test for pulp and paper

## Method 565:
## Determination of transmittance by diffuse reflectance measurement

## 1 Scope

This International Standard specifies a method for the calculation of transmittance based upon diffuse reflectance measurements.

The use of the method is restricted to white and near-white translucent papers (see 3.9). If it is necessary to determine the transmittance of papers which contain fluorescent whitening agents the fluorescence emission is eliminated using the prescribed UV cut-off filter.

NOTE This means that, although this International Standard refers to ISO 2469, which permits the use of both filter colourimeters and abridged spectrophotometers, a filter colourimeter with no means of eliminating the emission of fluorescence is not suitable for this type of measurement if fluorescent whitening agents are present.

## 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 2469, *Paper, board and pulps — Measurement of diffuse radiance factor (diffuse reflectance factor)*

ASTM E308-06, *Standard Practice for Computing the Colors of Objects by Using the CIE System*

## 3 Terms and definitions

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

**3.1**
**reflectance factor**
*R*
ratio of the radiation reflected by a body to that reflected by the perfect reflecting diffuser under the same conditions of illumination and detection

Note 1 to entry: The ratio is often expressed as a percentage.

**3.2**
**luminance factor (C)**
$R_y$
reflectance factor weighted with reference to the colour matching function $\bar{y}(\lambda)$ of the CIE 1931(2°) Standard Observer and the CIE illuminant C

Note 1 to entry: This property corresponds to the attribute of visual perception of the luminance of the reflecting surface. The strict definition refers to the luminous efficiency function (for photopic vision) $V(\lambda)$. Since this function is identical with the $\bar{y}(\lambda)$ function, the latter is preferred here, since it is more familiar in a paper technology context and it is this function which is indicated in connection with the ASTM E308 tables necessary for the computations.

Note 2 to entry: Since the concept of "luminance" in this International Standard is strictly for small fields of view, it only embodies the $\bar{y}(\lambda)$ function of the CIE 1931(2°) Standard Observer. Thus, it is sufficient to only add the qualification (C) to indicate the CIE illuminant C, and not the full designation (C/2°).