AS/NZS 1301.436s:2005

Australian/New Zealand Standard™

# Methods of test for pulp and paper

# Method 436s: Measurement of diffuse reflectance factor



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 9 September 2005 and on behalf of the Council of Standards New Zealand on 23 September 2005.
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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
National Association of Forest Industries
New Zealand Forest Research Institute

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Australian/New Zealand Standard™

# Methods of test for pulp and paper

# Method 436s: Measurement of diffuse reflectance factor

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# Preface

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 Standard has much in common with ISO 2469:1994.

Similar methods are:

TAPPI T525om-02

CPPA E.1 (May 1990).

This edition cancels and replaces AS 1301.436s—1991.

Annexes A to D form integral parts of this standard.

# Foreword

Measurements of diffuse reflectance factor need to be made to a high degree of accuracy and it is necessary therefore that the reflectance of the calibrating standards are known to the same accuracy. To this end the International Organization for Standardization has set up the following reference standards:

(a) ISO Reference Standard of Level 1 (IR 1)—The perfect reflecting diffuser, CIE 45-20-195[1]. This is an ideal uniform diffuser with a reflectance equal to 1.

(b) ISO Reference Standards of Level 2 (IR 2)—Standards whose diffuse reflectance factor has been determined by an ISO Standardizing Laboratory in relation to the IR 1. These Standards are used by Authorized Laboratories to calibrate the instruments they use for assigning values to IR 3s.

(c) ISO Reference Standards of Level 3 (IR 3)—Standards measured by an ISO Authorized Laboratory against an IR 2. These Standards are intended to be used by working laboratories for calibration of their instruments. The requirements of these Standards are given in Appendix B.

Laboratories listed by ISO as being competent to issue IR 2 Standards are known as Standardizing Laboratories. Laboratories listed as competent to issue IR 3 Standards are known as Authorized Laboratories. Lists of such laboratories are available from ISO Central Secretariat, Standards Australia, Standards Association of New Zealand and Appita.

# Contents

*Page*

1 Scope ..... 1
2 Apparatus ..... 1
3 Calibration of working Standards ..... 1
4 Preparation of test pieces ..... 1
5 Procedure ..... 1
6 Report ..... 2

Annexes

A Characteristics ..... 3
B ISO Reference Standards of Level 2 and 3 ..... 4
C Cleaning opal glass Standards ..... 5
D Bibliography ..... 6

# Measurement of diffuse reflectance factor

## 1 Scope

The measurement of diffuse reflectance factor is a procedure which forms the basis of a number of optical test methods[2]. This Standard specifies the equipment and describes the general procedure for measuring diffuse reflectance factor as required for the evaluation of the physical correlates of specific appearance properties of pulp, paper and paperboard. Diffuse reflectance factor ($R$) is the ratio, expressed as a percentage, of the radiant (luminous) flux reflected by a body within a specified cone, to that reflected by the perfect reflecting diffuser under the same conditions of viewing and diffuse illumination.

## 2 Apparatus

**2.1 Reflectometer**, having the photometric and geometric characteristics described in Appendix A. The spectral characteristics of the instrument depend on the property being measured and are prescribed by the Standard to be used for each property.

**2.2 Working standards,** comprising a zero (black) standard and one or more opal glass (or similar material) standards which may be internal or external to the reflectometer. The standards, except for the zero (black) standard, must be calibrated against ISO IR 2 or 3 Standards as prescribed in Clause 3 and should provide levels appropriate for the samples and properties being measured.

**2.3 ISO Reference Standards of Level 2 or 3 (IR 2 or IR 3),** of levels appropriate to the properties and samples to be measured.

## 3 Calibration of working Standards

**3.1** Prepare the instrument as described in Step 5.1 and 5.2.

**3.2** Using the procedure described in Steps 5.3 to 5.5, measure the diffuse reflectance factor of each of the IR 2 or IR 3 standards selected for use to the nearest 0.1. If necessary adjust the assigned value of the working standard so that the instrument readings agree with the IR 2 or IR 3 standard values. Over a narrow working range (about 10 units) the agreement should be within 0.1 units; over wider working ranges the agreement should be within 0.3 units. Calibration at one level and at zero is satisfactory if the instrument is of proven stable linearity.

**3.3** Where an instrument is in constant use it is desirable to use duplicate working standards, one, the internal one(s) if fitted, for routine use and the others as a periodic check on the first. If there is any evidence of disagreement, clean external standards by the procedure described in Appendix C. If the difference persists recalibrate all working standards by the procedure described in 3.2.

## 4 Preparation of test pieces

Prepare the test pieces in accordance with the Standard for the property to be measured.

## 5 Procedure

**5.1** Switch on the instrument and allow about 30 min for it to achieve stable conditions.

**5.2** Check the zero and adjust if necessary. If the instrument is in use for a long period of time, repeat this check at intervals.

**5.3** Set the instrument to operate according to the spectral requirements specified in the Standard for the property to be measured, by selecting the appropriate light source, filters, integrating sphere, glass optics, photoelectric detectors and software combination.