

Australian/New Zealand Standard™

**Methods of test for pulp and paper—  
Freeness of pulp**



## **AS/NZS 1301.206s:2002**

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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 28 February 2002 and on behalf of the Council of Standards New Zealand on 21 March 2002. It was published on 16 April 2002.

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The following interests are represented on Committee PK-019:

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National Association of Forest Industries  
New Zealand Forest Research Institute  
New Zealand Pulp and Paper Industry Association  
Printing Industries Association of Australia  
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Paper manufacturers  
Pulp manufacturers  
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# Australian/New Zealand Standard™

## Methods of test for pulp and paper— Freeness of pulp

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## Foreword

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

This edition cancels and replaces AS 1301.206s — 1988 in Australia and NZS 1301.206s — 1988 in New Zealand.

This revision includes data which has recently become available on the use of freeness correction factors. It also clarifies the method of calibrating the freeness tester, and reintroduces the specification of the height of the hydraulic head, which was removed in the previous revision.

Annexes A and B form integral parts of this Standard. Annex C is for information only.

## Introduction

This Standard prescribes the procedure to be used in measuring the freeness of pulp, which is an arbitrary measure of the drainage properties of pulp stock. Freeness is measured under specific conditions of temperature and stock concentration using a specified testing instrument. The freeness determined according to this Standard is commonly called Canadian Standard Freeness and is based on the test developed by the Canadian Pulp and Paper Research Institute. The design of the instrument is such that the result is strongly influenced by the drainage rate in the initial stages of drainage. Freeness is different from drainage time which is covered by TAPPI method T221om-93. The result of the freeness test depends mainly on the quantity of fines and debris present<sup>(1)</sup> and on the degree of fibrillation of fibres, their flexibility and their fineness.

The test was originally designed to yield information for the control of the manufacture of groundwood pulp, but it is also used in studies of the behaviour of various pulps during beating and in the control of beaters and refiners. Freeness measurements do not necessarily correlate with drainage behaviour on the wire of a paper machine.

In this method stainless steel is listed as a preferred material of construction for some components of the freeness tester. Certain stocks will corrode bronze, and corrosion effects on screen plates, orifice pieces and side tubes change the performance of the instrument. In addition, some stocks readily give rise to deposits at these places, and it is convenient to be able to clean the parts by drastic chemical methods such as are permissible with a corrosion resistant material.

This Standard conforms to ISO 5267-2:1980 *Pulps — Determination of drainability — Part 1: 'Canadian Standard' freeness method*. However, the apparatus described in this Standard allows designs and dimensions, not all of which are included in ISO 5267-2:1980. None of these affect the test result.

Similar methods are CPPA C.1 (1994), TAPPI T227om-94 and SCAN C21:65.

Another method for measuring freeness is the Schopper-Riegler method. Schopper-Riegler freeness is different from Canadian Standard Freeness. There is no AS/NZS Standard for the Schopper-Riegler method; it is, however, described in ISO 5267-1:1979 and SCAN C19:65.

# Freeness of pulp

## 1 Scope

This Standard prescribes the procedure to be used in measuring the freeness of pulp.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of AS/NZS 1301.206s. At the time of publication, the edition indicated was valid. All standards are subject to revisions, and parties to agreements based on AS/NZS 1301.206s are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

AS/NZS

1301.207s:1998, *Determination of stock concentration.*

1301.214s:1993, *Equipment for preparation of handsheets.*

## 3 Principle

A specified volume of stock drains from a cylindrical chamber into a cone with two orifices, one at the side and one at the bottom. The volume of stock which passes through the side orifice is measured. This volume, measured in mL and corrected if the temperature and concentration of the stock is different from that specified, is the freeness.

## 4 Apparatus

**4.1 Freeness tester** (see Figure 1), consisting of a drainage chamber and a rate measuring funnel mounted on a vibration free support so that their axes of symmetry are vertical and coincide, and the top of the funnel is  $180 \pm 15$  mm below the bottom of the screen plate. Except where stated otherwise the components of the tester may be fabricated from stainless steel or phosphor bronze or from metal wholly plated with nickel or hard chrome. The drainage chamber consists of a cylinder closed at the top with a rigid lid capable of providing an air-tight closure. The inside surface of the lid is fitted with a thick rubber gasket ring. An air-cock is provided in the centre of the lid as a means of admitting air to the cylinder. The bottom of the cylinder is fitted with a perforated plate (screen plate) fabricated preferably from stainless steel but brass may be used. Stainless steel shall conform in composition to AISA Type No 316 or similar. The screen plate is held in place by the flange of a ring which is screwed on to the bottom of the cylinder. The bottom of the cylinder is closed with a rigid bottom lid, which is covered with a thick soft rubber gasket which fits against the flange holding the screen plate in position.

NOTE 1 — Figure 1 shows the original Canadian design. However, alternative designs of the top and bottom lids of the drainage chamber are now available and may be used if they provide a satisfactory closure.

The internal dimensions of the cylinder are  $101.5 \pm 0.3$  mm in diameter by  $127 \pm 2$  mm from the upper surface of the screen plate to the rim. The specified height gives the cylinder a capacity in excess of 1000 mL above the screen plate. The air-cock bore should be at least 4.5 mm. Both stainless steel and brass screen plates are typically  $111.0 \pm 0.5$  mm in diameter,  $0.40 \pm 0.15$  mm thick with  $0.50 \pm 0.01$  mm diameter holes spaced at 1.07 mm centres,  $97 \pm 5$  per  $100 \text{ mm}^2$ . Stainless steel plates must be soaked in 20% nitric acid solution for about 10 seconds then thoroughly washed in water before initial use. All screen plates must be fitted to the cylinder with the burrs (if any) of the perforations downwards. The screen plates have a top side and a bottom side. If the screen plate is fitted upside down the freeness readings will be incorrect.

NOTE 2 — Stainless steel screen plates may be fabricated by either punching or drilling the holes. Drilled plates will normally be free from burrs.