

Australian/New Zealand Standard™

Methods of test for pulp and paper

**Method 209: Laboratory processing of
pulp—PFI mill method**



AS/NZS 1301.209:2017

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 March 2017 and by the New Zealand Standards Approval Board on 5 April 2017.
This Standard was published on 9 May 2017.

The following are represented on Committee PK-019:

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This Standard was issued in draft form for comment as DR AS.NZS 1301.209:2016.

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Originated in Australia as AS 1301.P209ts—1975.
Previous and first joint edition AS/NZS 1301.209s:2003.
Jointly revised and redesignated as AS/NZS 1301.209:2017.

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Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN 978 1 76035 755 9

PREFACE

This Standard was prepared by Joint Technical Committee PK-019, Methods of Test for Pulp and Paper, to supersede AS/NZS 1301.209s:2003, *Methods of test for pulp and paper* Method 209s: *Laboratory processing of pulp—PFI mill method*.

This Standard is part of the AS/NZS 1301 series, *Methods of test for pulp and paper*.

The objective of this Standard is to set out a procedure for the beating of pulp using a PFI mill. Information on care and maintenance of the mill is also provided.

This Standard is an adoption with national modifications and has been reproduced from ISO 5264-2:2011, *Pulps—Laboratory beating—Part 2: PFI mill method*, and has been varied as indicated to take account of Australian/New Zealand conditions. The modifications are specified in Appendix ZZ (normative). Informative Appendix ZA has been added to provide additional information on the conditioning of the surfaces of the beating elements.

A similar Standard that is also used in place of this Standard is TAPPI T248, *Laboratory beating of pulp (PFI mill method)*.

As this Standard is reproduced from an International Standard, the following applies:

- (A) In the source text ‘this part of ISO 5264’ should read ‘this Australian/New Zealand 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’ have been used in this Standard to define the application of the annex or appendix to which they apply. A ‘normative’ annex or appendix is an integral part of a Standard, whereas an ‘informative’ annex or appendix is for information and guidance only.

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INTRODUCTION

In view of the widespread use of the following beaters:

- Valley beater,
- PFI mill,

it has been decided to provide guidance on the use of these beaters in order to achieve consistency of results with each instrument. Although both beaters show similar trends in the effect on pulp properties, there is no correlation between the actual results obtained with the different types of beaters.

ISO 5264-1 specifies a method of laboratory beating using a Valley beater.

Beating is a preliminary step in the preparation of laboratory sheets for testing the physical properties of pulps. In the PFI mill, each beating is performed separately, i.e. a new test portion of unbeaten pulp is taken for each beating.

NOTE A complete test of physical properties normally comprises unbeaten pulp and several beatings of the same pulp, where the beating is carried out for different numbers of roll revolutions. The number of roll revolutions depends on the type of pulp and the beating load. After beating, the drainability is measured according to ISO 5267-1 or ISO 5267-2, and laboratory sheets are prepared according to ISO 5269-1^[1], ISO 5269-2^[2] or ISO 5269-3^[3]. Physical testing of the laboratory sheets is performed according to ISO 5270^[4].

AUSTRALIAN/NEW ZEALAND STANDARD

Methods of test for pulp and paper

Method 209

Laboratory processing of pulp—PFI mill method

1 Scope

This part of ISO 5264 specifies a method for the laboratory beating of pulp using a PFI mill. The description is limited to the sampling, preparation and beating of the pulp and the beating equipment.

NOTE Beating is a preliminary step in testing the physical properties of pulp.

In principle, this method is applicable to all kinds of chemical and semi-chemical pulps. In practice, the method might not give satisfactory results with certain pulps having extremely long fibres.

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 638, *Paper, board and pulps — Determination of dry matter content — Oven-drying method*

ISO 4119, *Pulps — Determination of stock concentration*

ISO 5263-1, *Pulps — Laboratory wet disintegration — Part 1: Disintegration of chemical pulps*

ISO 5267-1, *Pulps — Determination of drainability — Part 1: Schopper-Riegler method*

ISO 5267-2, *Pulps — Determination of drainability — Part 2: "Canadian Standard" freeness method*

ISO 7213, *Pulps — Sampling for testing*

ISO 14487, *Pulps — Standard water for physical testing*

3 Principle

A measured amount of pulp at a specified stock concentration is beaten between a roll with bars and a smooth beater housing, both rotating in the same direction, but at different peripheral speeds.

4 Apparatus and auxiliary materials

Use ordinary laboratory equipment and the following.

4.1 PFI mill, as specified in Annex A.

See Annexes B and C.

4.2 Disintegrator, as specified in ISO 5263-1.

4.3 Balance, capable of weighing the sample with an accuracy of at least $\pm 0,2$ g.

4.4 Standard water, purified to have an electrical conductivity $\leq 0,25$ mS/m at 25 °C, as specified in ISO 14487.

4.5 A reference pulp, as described in Annex C, kept for beating-control purposes and stored for a sufficient time for the physical properties to stabilize. The reference pulp should, if possible, be of the same grade as that normally beaten in the beating equipment concerned. Since some pulp grades are not stable, it might be necessary to choose another grade.

To minimize a change in the pulp over time, the reference pulp should be kept at room temperature at a relative humidity range of 40 % to 60 % in a dark and dust-free place.

NOTE Stored under the recommended conditions, the reference pulp will, in most cases, be stable for approximately 10 years. Changes in the level of the tensile strength and tear strength values might be an indication that the reference pulp is no longer stable. The stability can be checked by measuring the viscosity of the reference pulp, e.g. twice a year.

5 Sampling

If the beating is being done to evaluate a lot of pulp, the sample shall be selected in accordance with ISO 7213.

If the beating is done on another type of sample, report the source of the sample and, if possible, the sampling procedure used.

Select the test portions so that they are representative of the gross sample received.

6 Preparation of sample

If the sample is wet or air-dry, weigh a test portion for the determination of the dry-matter content in accordance with ISO 638. If the sample is in the form of an aqueous pulp suspension, determine the dry-matter content in accordance with ISO 4119.

Take a test portion of the sample corresponding to $(30,0 \pm 0,5)$ g of oven-dry pulp. Do not cut pulp sheets and avoid the use of cut edges. If the sample is in the form of machine-dried sheets or flash-dried slabs, soak the pulp thoroughly in 0,5 litre of standard water (4.4) at room temperature for at least 4 h. Tear the soaked pulp into pieces approximately 25 mm $\times$ 25 mm in size. It is essential that the pulp sample be thoroughly softened by soaking, to ensure that the preliminary disintegration leads to only a minimal beating effect. Wet pulps may be disintegrated without soaking.

7 Procedure

For each test portion (each degree of beating), carry out the procedure described in 7.1 to 7.3.

7.1 Disintegration

Disintegrate the initially wet portion or the soaked test portion as described in ISO 5263-1. Use standard water (4.4) at (20 ± 5) °C to give a total volume of $(2\ 000 \pm 25)$ ml. The mass fraction in the disintegrator (4.2) will then be about 1,5 %.

Pulps having an initial mass fraction of dry matter of 20 % or more shall be disintegrated for 30 000 revolutions of the propeller, whereas pulps having an initial mass fraction of dry matter of < 20 % shall be disintegrated for 10 000 revolutions of the propeller.