

Australian/New Zealand Standard™

**Method of test for pulp and paper**

**Method 421: Paper, board and pulps —  
Determination of pH of aqueous extracts  
— Cold extraction**



AS/NZS 1301.421:2020

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Monash University  
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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 to supersede AS/NZS 1301.421:2008, *Methods of test for pulp and paper — Method 421: Determination of pH of aqueous extracts — Cold extraction method*.

The objective of this document is to specify a method for the determination of the pH-value defined by the electrolytes extractable by cold water from a sample of paper, board or pulp.

This document is applicable to all types of paper, board and pulp.

For cellulosic papers used for electrical purposes, the method used should be that given in IEC 60574-2.

This document is identical with, and has been reproduced from, ISO 6588-1:2020, *Paper, board and pulps — Determination of pH of aqueous extracts — Part 1: Cold extraction*.

As this document has been reproduced from an International Standard, 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” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*.

This third edition cancels and replaces the second edition (ISO 6588-1:2012), which has been technically revised. The main changes compared to the previous edition are as follows:

— addition of the last four paragraphs in the Introduction to clarify the differences, in the role and mode of addition of a salt solution, between this document and ISO 29681<sup>[5]</sup>.

A list of all parts in the ISO 6588 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Kraft fibre is well known to contain ionisable groups that are fixed to or in the fibre wall. In order to fulfil the electro-neutrality, these groups are balanced by an equivalent number of positive charges, which can be either protons or various metal ions. Especially in pulp suspensions at low ionic strengths, this can give rise to a marked uneven distribution of mobile ions between the volume held by the fibre wall and the bulk suspension liquor. This means that the fibre acts as an ion exchanger. These ion-exchange phenomena can be modelled very well with the Donnan theory<sup>[2][3]</sup>.

If a relatively clean pulp fibre sample, for example bleached dried pulp, is diluted in deionised water, the result will be a pulp suspension with a very low ionic strength. In such a system, most of the cations present, including protons, will be concentrated in the water volume held by the fibre wall. If the pH is measured, it will be measured in the bulk suspension liquor. By adding salt to this kind of system, the ion exchange phenomena will be decreased, and the concentration of different cations will be the same in the water held by the fibre wall and in the bulk suspension liquor. Since the process waters always contain a certain amount of ions, such a salt addition will give a more realistic environment when measuring the pH of relatively clean pulp samples.

Based on the foregoing, two ISO Standards, ISO 6588-1 and ISO 29681, are available for determination of the pH of cold aqueous extracts of paper, board, or pulps. In ISO 29681, a salt solution is added prior to extraction; however, in ISO 6588-1, the extraction is carried out with distilled or deionized water. ISO 29681 is specifically applicable to bleached pulps from virgin fibres and to pulp samples having a low ionic strength for which the pH-value will give more realistic results related to mill conditions than those obtained with ISO 6588-1.

It is necessary to be aware that the results will not be the same when measuring pH according to ISO 6588-1 and to ISO 29681. The difference can be significant especially when measuring pulps having a low ionic strength.

ISO 6588-2 differs from this document only as regards the extraction conditions. No general guidance can be given as to which of the two procedures (hot or cold) is best suited in a particular situation.

It should be noted that in ISO 6588-1, addition of a salt solution is performed after extraction and filtration only for the purpose of obtaining a more stable and accurate pH measurement.

NOTES

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# Australian/New Zealand Standard

## Method of test for pulp and paper

### Method 421: Paper, board and pulps — Determination of pH of aqueous extracts — Cold extraction

#### 1 Scope

This document specifies a method for the determination of the pH-value defined by the electrolytes extractable by cold water from a sample of paper, board or pulp.

This document is applicable to all types of paper, board and pulp.

As the quantity of extractable ionic material approaches zero, as in the case of highly purified pulps, the precision of the method becomes poor because of the difficulties encountered in making pH measurements on water containing little electrolytic material.

Since the extraction in this document is performed with distilled or deionised water, the pH-value measured will sometimes be different (e.g. for fully bleached pulp) from the pH-value measured under mill process conditions in which various types of process waters, e.g. chemically treated river water containing electrolytes, are used. In such cases, ISO 29681 should be used instead, as it is specifically applicable to bleached pulps from virgin fibres and to pulp samples having a low ionic strength for which the pH value will give more realistic results related to mill conditions than those obtained with this document.

For cellulosic papers used for electrical purposes, the method used should be that given in IEC 60554-2[4].

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 7213, *Pulps — Sampling for testing*

#### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.iso.org/obp>

#### 4 Principle

Extraction of a sample of 2 g for 1 h with 100 ml of cold water of high purity. Filtration of the extract and addition of a salt solution. Measurement of the pH-value of the extract at a temperature between 20 °C and 25 °C.