

AS/NZS 1604.3:2021



Australian/New Zealand Standard™

# Preservative-treated wood-based products

Part 3: Test methods



AS/NZS 1604.3:2021

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee TM-012, Timber Grading and Preservation. It was approved on behalf of the Council of Standards Australia on 24 March 2021 and by the New Zealand Standards Approval Board on 03 March 2021.

This Standard was published on 16 April 2021.

The following are represented on Committee TM-012:

- Australian and New Zealand Timber Preservative Manufacturers Association
- Australian Forest Products Association
- Australian Timber Flooring Association
- Australian Timber Importers Federation
- Building Research Association of New Zealand
- Engineered Wood Products Association of Australasia
- Forest and Wood Products Australia
- Forestry Corporation of NSW
- Glued Laminated Timber Association of Australia
- Ministry of Business, Innovation and Employment (NZ)
- National Centre for Timber Durability and Design Life
- NATSPEC
- New Zealand Timber Industry Federation
- New Zealand Timber Preservation Council
- New Zealand Wood Processors Association
- Responsible Care New Zealand
- Scion
- Tasmanian Timber Promotion Board
- Timber Preservers Association of Australia

This Standard was issued in draft form for comment as DR AS/NZS 1604.3:2018.

### **Keeping Standards up-to-date**

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

[www.standards.org.au](http://www.standards.org.au)

[www.standards.govt.nz](http://www.standards.govt.nz)

ISBN 978 1 76113 270 4

Australian/New Zealand Standard™

# **Preservative-treated wood-based products**

## **Part 3: Test methods**

Originated as AS/NZS 1605.1:2006, AS/NZS 1605.2:2006, AS/NZS 1605.3:2006 and AS/NZS 1605.4:2006.  
Revised, amalgamated and redesignated as AS/NZS 1604.3:2021.

© Standards Australia Limited/the Crown in right of New Zealand, administered by the New Zealand Standards Executive 2021

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth) or the Copyright Act 1994 (New Zealand).

## Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TM-012, Timber Grading and Preservation, to supersede AS/NZS 1605.1:2018, *Methods for sampling and analysing timber preservatives and preservative-treated timber, Part 1: General requirements, sampling, and determination of sapwood and heartwood presence*, AS/NZS 1605.2:2018, *Methods for sampling and analysing timber preservatives and preservative-treated timber, Part 2: Determination of preservative penetration by spot tests*, AS/NZS 1605.3:2018, *Methods for sampling and analysing timber preservatives and preservative-treated timber, Part 3: Analysis methods for determination of preservative retention* and AS/NZS 1605.4:2018, *Methods for sampling and analysing timber preservatives and preservative-treated timber, Part 4: Analysis methods for determination of preservative solution concentration*.

The objective of this Standard is to provide prescriptive methods for testing and analysing preservatives and preservative-treated wood-based products for use by manufacturers (treaters) and associated parties.

This Standard is part of a series on preservative-treated wood-based products as follows:

AS/NZS 1604.1, *Preservative-treated wood-based products, Part 1: Products and treatment*

AS/NZS 1604.2, *Preservative-treated wood-based products, Part 2: Verification requirements*

AS/NZS 1604.3, *Preservative-treated wood-based products, Part 3: Test methods*

The revision of the series includes:

- (a) An improved performance-oriented approach.
- (b) Improved clarity and uniformity around the requirements for preservative penetration.
- (c) Better definition of the framework for treating, specifying and using conforming products.
- (d) A new system for verifying the key characteristics of conforming products.
- (e) Revised presentation and information content to ensure efficient application of each Part.
- (f) Some modifications and additions to the treatment specifications and test methods.
- (g) A reorganization of the test methods including removal of those no longer in common use.

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is for information and guidance only.

# Contents

<b>Preface</b>	<b>ii</b>
<b>Section 1 Scope and general</b>	<b>1</b>
1.1 Scope	1
1.2 Application	1
1.3 Normative references	1
1.4 Terms and definitions	2
1.5 Report of test results	3
1.5.1 Analysis of preservative-treated wood-based products	3
1.5.2 Analysis of preservatives	4
1.6 Other methods of analysis	5
1.7 Sampling preservative liquid — Requirements	5
1.8 Sampling preservative-treated wood-based products	5
1.9 Presence of sapwood and heartwood in some softwoods	5
1.9.1 Principle	5
1.9.2 Reagents	5
1.9.3 Procedure	6
1.10 Presence of sapwood and heartwood in some hardwoods	6
1.10.1 Principle	6
1.10.2 Reagent — 0.1 % methyl orange	6
1.10.3 Procedure	6
<b>Section 2 Solution analysis</b>	<b>7</b>
2.1 Scope and general requirements	7
2.1.1 Scope of section	7
2.1.2 Preparation of preservative liquids and solutions for analysis	7
2.1.3 Related methods of analysis	7
2.2 Determination of copper, chromium and arsenic in CCA preservative solutions	8
2.2.1 Principle	8
2.2.2 Reagents	8
2.2.3 Procedure	8
2.2.4 Calculations of the percentage of metals	10
2.3 Determination of boron in preservative solution	10
2.3.1 Principle	10
2.3.2 Reagents	10
2.3.3 Procedure	11
2.3.4 Calculation	12
2.4 Determination of quaternary ammonium compounds in solutions	12
2.4.1 General	12
2.4.2 Reagents	12
2.4.3 Standardization of sodium tetraphenylboron solution	13
2.4.4 Analysis procedure	13
2.4.5 Calculations	13
2.5 Determination of copper in copper-based preservative solutions	14
2.5.1 Principle	14
2.5.2 Reagents	14
2.5.3 Procedure	14
2.5.4 Calculation	15
2.6 Determination of bifenthrin in water-based solutions by gas chromatography (GC)	15
2.6.1 Principle	15
2.6.2 Reagents	15
2.6.3 Procedures	16
2.6.4 Calculations	17
2.7 Determination of propiconazole, tebuconazole and permethrin in preservative solutions	17
2.7.1 Principle	17

2.7.2	Reagents .....	17
2.7.3	Procedures .....	17
2.7.4	Calculation .....	18
2.7.5	Suitability and specificity .....	18
2.8	Determination of imidacloprid in preservative solutions .....	18
2.8.1	Principle .....	18
2.8.2	Reagents .....	18
2.8.3	Procedures .....	19
2.8.4	Calculations .....	20
2.9	Determination of triadimefon and cyproconazole in aqueous solutions .....	20
2.9.1	Principle .....	20
2.9.2	Reagents .....	20
2.9.3	Procedures .....	21
2.9.4	Calculations .....	22
2.10	Determination of copper in copper naphthenate solution .....	23
2.10.1	Principle .....	23
2.10.2	Reagents .....	23
2.10.3	Procedure .....	24
2.10.4	Calculation .....	24
2.11	Determination of water content in high-temperature creosote .....	25
2.11.1	Principle .....	25
2.11.2	Apparatus .....	25
2.11.3	Reagent — Dry carrier liquid .....	25
2.11.4	Procedure .....	25
2.11.5	Calculation .....	25
2.11.6	Report .....	26
2.12	Determination of matter insoluble in toluene for high-temperature creosote .....	26
2.12.1	Principle .....	26
2.12.2	Reagents .....	26
2.12.3	Apparatus .....	26
2.12.4	Procedure .....	26
2.12.5	Calculations .....	27
2.12.6	Report .....	27
2.13	Determination of relative density of high-temperature creosote by hydrometer .....	27
2.13.1	General .....	27
2.13.2	Apparatus .....	28
2.13.3	Procedure .....	28
2.13.4	Calculation .....	28
2.13.5	Report .....	28
2.14	Determination of relative density of high-temperature creosote by density pycnometer .....	29
2.14.1	Apparatus .....	29
2.14.2	Calibration of pycnometers .....	29
2.14.3	Procedure .....	30
2.14.4	Calculation .....	30
2.14.5	Report .....	31
2.15	Test of distillation for high-temperature creosote .....	31
2.15.1	Principle .....	31
2.15.2	Apparatus .....	31
2.15.3	Preparation of laboratory sample .....	34
2.15.4	Dehydration of sample .....	34
2.15.5	Apparatus assembly .....	34
2.15.6	Procedure .....	36
2.15.7	Calculations .....	38
2.15.8	Report .....	38
2.16	Determination of coke residue in high-temperature creosote .....	38
2.16.1	Principle .....	38
2.16.2	Apparatus .....	39

2.16.3	Procedure.....	39
2.16.4	Calculation.....	39
2.16.5	Report.....	39
2.17	Determination of phenols (tar acids) in high-temperature creosote.....	39
2.17.1	Principle.....	39
2.17.2	Apparatus.....	39
2.17.3	Reagents.....	40
2.17.4	Procedure.....	40
2.17.5	Report.....	40
2.18	Determination of closed flashpoint of high-temperature creosote (closed cup).....	41
2.18.1	Principle.....	41
2.18.2	Apparatus.....	41
2.18.3	Procedure.....	41
2.18.4	Report.....	42
2.19	Determination of limpid point of high-temperature creosote.....	42
2.19.1	Principle.....	42
2.19.2	Apparatus.....	42
2.19.3	Preparation of samples.....	42
2.19.4	Procedure.....	42
2.19.5	Report.....	43
<b>Section 3</b>	<b>Penetration spot tests.....</b>	<b>44</b>
3.1	Scope and general requirements of section.....	44
3.1.1	Scope of section.....	44
3.1.2	Preparation of test pieces from test specimens.....	44
3.1.3	Assessment of penetration.....	44
3.2	Determination of copper penetration in wood-based products treated with copper-based preservatives.....	44
3.2.1	Method 1 — Rubeanic acid.....	44
3.2.2	Method 2 — Chromazurol S.....	45
3.2.3	Method 3 — PAN indicator.....	45
3.3	Determination of boron penetration in wood-based products treated with boron-based preservatives.....	46
3.3.1	Method 1 — Turmeric acid.....	46
3.3.2	Method 2 — Pyrocatechol violet.....	46
3.4	Determination of zinc penetration in wood-based products treated with zinc-containing preservatives.....	47
3.4.1	General.....	47
3.4.2	Method 1 — Dithizone.....	47
3.4.3	Method 2 — PAN indicator.....	48
3.5	Determination of cobalt penetration in wood-based products treated with cobalt-containing preservatives.....	49
3.5.1	General.....	49
3.5.2	Principle.....	49
3.5.3	Reagent — PAN indicator.....	49
<b>Section 4</b>	<b>Retention tests.....</b>	<b>50</b>
4.1	Scope and general requirements of section.....	50
4.1.1	Scope of section.....	50
4.1.2	Preparation of test pieces from test specimen.....	50
4.1.3	Related methods of analysis.....	50
4.2	Determination of copper, chromium and arsenic in preservative-treated wood-based products.....	50
4.2.1	Principle.....	50
4.2.2	Reagents.....	50
4.2.3	Procedure.....	51
4.2.4	Calculation of the percentages of metals in treated wood-based products.....	52
4.2.5	Composition of copper chromium arsenic (CCA).....	52
4.3	Determination of boron in preservative-treated wood-based products.....	52



4.3.1	Principle .....	52
4.3.2	Reagents .....	52
4.3.3	Procedure for analysis of treated wood-based product .....	53
4.3.4	Calculation .....	54
4.4	Determination of copper in preservative-treated wood-based products treated with copper preservatives .....	54
4.4.1	Principle .....	54
4.4.2	Reagents .....	54
4.4.3	Procedure .....	55
4.4.4	Calculation .....	56
4.5	Determination of tebuconazole and/or propiconazole in preservative-treated wood-based products by gas chromatography (GC) .....	56
4.5.1	Principle .....	56
4.5.2	Reagents .....	56
4.5.3	Sampling .....	56
4.5.4	Procedure .....	57
4.5.5	Standard solutions .....	58
4.5.6	Standardization .....	58
4.5.7	Calculations .....	59
4.6	Determination of bifenthrin in preservative-treated wood-based products .....	60
4.6.1	Principle .....	60
4.6.2	Reagents .....	60
4.6.3	Sampling .....	60
4.6.4	Procedure .....	61
4.6.5	Data handling and calculations .....	62
4.7	Determination of permethrin in preservative-treated wood-based product extracts .....	63
4.7.1	General .....	63
4.7.2	Principle .....	63
4.7.3	Reagents .....	63
4.7.4	Apparatus .....	64
4.7.5	Sampling .....	64
4.7.6	Procedure .....	65
4.7.7	Data handling and calculations .....	66
4.8	Determination of imidacloprid in preservative-treated wood-based product extracts .....	67
4.8.1	Principle .....	67
4.8.2	Reagents .....	67
4.8.3	Sampling and moisture content .....	67
4.8.4	Procedure .....	68
4.8.5	Calculations .....	69
4.9	Determination of quaternary ammonium compound in wood-based products .....	70
4.9.1	Principle .....	70
4.9.2	Reagents .....	70
4.9.3	Sampling .....	71
4.9.4	Procedure .....	71
4.9.5	Calculation of quaternary ammonium compound retention .....	71
4.10	Determination of bifenthrin in glue-line-treated wood-based products .....	72
4.10.1	Principle .....	72
4.10.2	Reagents .....	72
4.10.3	Sampling .....	72
4.10.4	Procedure .....	72
4.10.5	Preparation of standards .....	74
4.10.6	Data handling and calculations .....	74
4.11	Determination of imidacloprid in glue-line-treated wood-based products — ELISA analysis .....	75
4.11.1	Principle .....	75
4.11.2	Reagents and apparatus .....	75
4.11.3	Sampling and moisture content .....	75
4.11.4	Procedure .....	76



4.11.5	Calculations.....	77
4.12	Determination of triadimefon and cyproconazole in glueline-treated and surface-treated wood-based products.....	78
4.12.1	Principle.....	78
4.12.2	Reagents.....	78
4.12.3	Sampling and moisture content.....	78
4.12.4	Procedure.....	78
4.12.5	Standard solutions.....	79
4.12.6	Quantitation.....	79
4.12.7	Chromatography.....	79
4.12.8	Calculations.....	80
4.13	Determination of thiacloprid in glueline-treated wood-based products.....	81
4.13.1	Principle.....	81
4.13.2	Reagents and apparatus.....	81
4.13.3	Sampling and moisture content.....	82
4.13.4	Procedure.....	82
4.13.5	Calculations.....	83
4.14	Determination of creosote or pigment-emulsified creosote in preservative-treated wood-based products.....	84
4.14.1	Principle.....	84
4.14.2	Reagent — Toluene.....	84
4.14.3	Procedure.....	84
4.14.4	Calculations.....	86
4.14.5	Correction.....	86
4.15	Determination of deltamethrin in preservative-treated wood-based products.....	87
4.15.1	Principle.....	87
4.15.2	Reagents.....	87
4.15.3	Apparatus.....	87
4.15.4	Sampling.....	88
4.15.5	Procedure.....	88
4.15.6	Extraction.....	88
4.15.7	Data handling and collection.....	89
4.15.8	GC configuration.....	89
4.16	Determination of didcyldimethylammonium chloride in wood-based products.....	90
4.16.1	Principle.....	90
4.16.2	Apparatus.....	90
4.16.3	Reagents.....	91
4.16.4	Sampling.....	91
4.16.5	Calibration.....	91
4.16.6	Sample analysis.....	92
4.16.7	Calculation of DDAC concentration.....	92
4.17	Determination of copper in copper naphthenate preservative-treated wood-based products.....	92
4.17.1	Principle.....	92
4.17.2	Reagents.....	92
4.17.3	Procedure.....	92
4.17.4	Calculation.....	93
<b>Appendix A (informative) Test methods no longer in common use.....</b>		<b>95</b>
<b>Bibliography.....</b>		<b>96</b>

## NOTES

# Australian/New Zealand Standard

## Preservative-treated wood-based products

### Part 3: Test methods

#### Section 1 Scope and general

##### 1.1 Scope

This Standard specifies general requirements for testing and analysing preservatives and preservative-treated wood-based products. The types of test methods included are —

- (a) solution analysis ([Section 2](#));
- (b) penetration spot tests ([Section 3](#)); and
- (c) retention tests ([Section 4](#)).

NOTE 1 Methods for determining the presence of sapwood and heartwood in wood-based products are included in [Section 1](#) to facilitate the correct application and interpretation of the test methods.

NOTE 2 The test methods presented are those considered to be in current use at the time of publication of this Standard and are listed in approximate order of common usage in each case.

NOTE 3 Test methods included in previous versions of this Standard, but now not considered to be in common use, are not included but may, if necessary, be obtained from the previous standards. These methods are listed, for information purposes, in [Appendix A](#).

##### 1.2 Application

This Standard is intended for use in conjunction with AS/NZS 1604.1 and AS/NZS 1604.2, NZS 3640 or the relevant standard to which the wood-based product is claimed to have been treated. AS/NZS 1604.1 specifies that preservative-treated wood-based products be verified in accordance with AS/NZS 1604.2 using the test methods in this Standard.

NOTE Test results should be achieved within the level of accuracy appropriate to the test procedure.

##### 1.3 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:

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 2026, *Laboratory glassware—Density hydrometers*

AS 3529, *Solvents—Toluene*

AS/NZS 1604.1, *Preservative-treated wood-based products, Part 1: Products and treatments*

AS/NZS 1604.2, *Preservative-treated wood-based products, Part 2: Verification requirements*

AS/NZS 4491, *Timber—Glossary of terms in timber-related Standards*

NZS 3640, *Chemical preservation of round and sawn timber*

ISO 2719, *Determination of flash point — Pensky-Martens closed cup method*

ISO 5272, *Toluene for industrial use — Specifications*