

New Zealand Standard

# Chemical Preservation of Round and Sawn Timber

Superseding NZMP 3640:1992

NZS 3640:2003

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## NZS 3640:2003

### COMMITTEE REPRESENTATION

This Standard was prepared under the supervision of the Timber Preservation Committee (P 3640) for the Standards Council established under the Standards Act 1988.

The Committee consisted of representatives nominated by the following organizations:

Building Industry Authority (BIA)  
Building Research Association of New Zealand (BRANZ)  
Consumer Representative  
Co-opted Member  
New Zealand Forest Research Institute Limited (ForestResearch)  
New Zealand Plywood Manufacturers Association  
New Zealand Timber Industry Federation Inc.  
New Zealand Timber Preservation Council  
Timber Preservation Chemical Suppliers

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### AMENDMENTS

No.	Date of issue	Description	Entered by, and date
1	March 2004	Allows for the inclusion of new chemical preservative formulations within the Hazard Classes H3.1, H3.2, H4 and H5.	Incorporated in this edition
2	October 2005	Clarifies requirements for LOSP formulations and allows for dual branding.	Incorporated in this edition
3	August 2006	Reinstates boron treatment and allows CuN at 0.05 % m/m elemental copper in hazard class H3 (both with conditions).	Incorporated in this edition
4	March 2007	Corrects errors following the incorporation of Amendments 1, 2 and 3 into the Standard	Incorporated in this edition
5	December 2012	Allows for the inclusion of new timber treatments and incorporates the Department of Building and Housing Amendment 7 to B2/AS1 for table 6.1 for H1.1, H1.2.	Incorporated in this edition

**NZS 3640:2003**

Incorporating Amendments 1, 2, 3, 4 and 5

New Zealand Standard

# Chemical Preservation of Round and Sawn Timber

Superseding NZMP 3640:1992

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## NOTES

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CONTENTS	PAGE
Committee representation .....	IFC
Acknowledgement .....	IFC
Copyright .....	IFC
Referenced documents .....	3
Latest revisions .....	4
Foreword .....	5
Review of Standards .....	5

## Section

1	Scope and Interpretation .....	7
1.1	Scope .....	7
1.2	Interpretation .....	8
1.3	Testing .....	8
2	Definitions .....	9
3	Hazard Classes and Treatment Requirements .....	12
3.1	Hazard classifications .....	12
3.2	Selection of timber treatment .....	13
3.3	Preservative penetration and retention .....	13
3.4	Penetration and retention sampling requirements .....	13
4	Preservatives .....	15
4.1	Approved preservatives .....	15
4.2	Fixed waterborne preservatives .....	15
4.4	Light organic solvent preservatives (LOSPs) .....	17
4.5	Other preservative types .....	19
5	Identification of Treated Timber .....	20
5.1	Branding .....	20
5.2	Colouring .....	22
6	Hazard Class Specifications .....	24
6.1	Hazard classes H1.1 and H1.2 .....	24
6.2	Hazard class H2 .....	27
6.3	Hazard classes H3.1 and H3.2 .....	27
6.4	Hazard class H4 .....	30
6.5	Hazard class H5 .....	30
6.6	Hazard class H6 .....	32

Amd 5  
Dec '12

## Appendix

A	New Zealand Timber Preservation Council (NZTPC) requirements of registered treatment plants (Informative) ..	33
B	Specification Advisory Notes (Informative) .....	35
C	Bibliography (Informative) .....	37
D	Application form for approval of a timber preservative (Informative) .....	38
E	Determination of triadimefon and cyproconazole in glue-line and surface-treated timber (Normative) .....	46

Amd 5  
Dec '12



## NZS 3640:2003

### Table

3.1	Hazard classification.....	12
4.1	Relative proportions of CCA components.....	15
4.2	Relative proportions of alkaline copper quaternary components .....	16
4.3	Relative proportions of CuAz components.....	16
4.4	LOSP fungicides.....	18
4.5	Relative proportions of triadimefon and cyproconazole components .....	19
5.1	Requirements for branding or identification of treated timber .....	20
5.2	Colour coding for timber to be used as framing.....	23
6.1	Minimum preservative retention in the H1.1, H1.2 analysis zone .....	26
6.2	Minimum preservative retention in the H3.1, H3.2 analysis zone .....	29
6.3	Minimum preservative retention in the H4 analysis zone ....	30
6.4	Minimum preservative retention in the H5 analysis zone ...	31
6.5	Minimum preservative retention in the H6 analysis zone (rounds, part rounds and sawn timber) .....	32
E1	Gas chromatograph conditions.....	48

### Figure

5.1	Example brandings.....	22
5.2	Suggested branding layout .....	22



## REFERENCED DOCUMENTS

Reference is made in this document to the following:

### NEW ZEALAND STANDARDS

NZS 3602:2003	Timber and wood-based products for use in building
NZS 3603:1993	Timber structures Standard
NZS 3604:2011	Timber-framed buildings
NZS 3605:2001	Timber piles and poles for use in building

### JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

AS/NZS 1604:----	Specification for preservative treatment
Part 2:2012	Reconstituted wood-based products
Part 3:2012	Plywood
Part 4:2012	Laminated veneer lumber (LVL)
Part 5:2012	Glued laminated timber products
AS/NZS 1605:----	Methods for sampling and analysing timber preservatives and preservative-treated timber
Part 1:2006	General requirements, sampling, and determination of sapwood and heartwood presence
Part 2:2006	Determination of preservative penetration by spot tests
Part 3:2006	Analysis methods for determination of preservative retention
Part 4:2006	Analysis methods for determination of preservative solution concentration
AS/NZS 2843.1:2006	Timber preservation plants – Timber preservation plant site design

### AUSTRALIAN STANDARDS

AS 1604.1:2012	Specification for preservative treatment – Sawn and round timber
AS 3530:2009	Solvents – Mineral turpentine and white spirit

### BRITISH STANDARD

BS ISO 12040:1997	Graphic technology. Prints and printing inks. Assessment of light fastness using filtered xenon arc light
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Amd 5  
Dec '12

## NZS 3640:2003

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### OTHER PUBLICATIONS

Agricultural Compounds and Veterinary Medicines (ACVM) Group database, Ministry of Agriculture and Forestry, [www.foodsafety.govt.nz](http://www.foodsafety.govt.nz)

American Wood Protection Association AWPA Standard P8-01 July 2011 – Standard for Oil-Borne Preservatives

New Zealand Building Code Handbook and Approved Documents, Department of Building and Housing (became part of the Ministry of Business, Innovation and Employment on 1 July 2012)

### NEW ZEALAND LEGISLATION

Hazardous Substances and New Organisms (HSNO) Act 1996

### LATEST REVISIONS

The users of this Standard should ensure that their copies of the above mentioned New Zealand Standards and referenced overseas Standards are the latest revisions or include the latest amendments. Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on [www.standards.co.nz](http://www.standards.co.nz)

## FOREWORD

This Standard supersedes NZMP 3640:1992 – Minimum Requirements of the NZ Timber Preservation Council Inc.

Creosote has been removed from the coverage of this Standard without prejudice by previous amendment.

Under Amendment No. 5, this Standard has been revised to include the following recently approved amendments:

- Micronised copper quaternary and micronised copper azole (CuAz);
- Water based azole (propiconazole plus tebuconazole);
- Dearomatised 'white spirit' solvent;
- Methylene chloride solvent;
- Glueline treatment for laminated veneer lumber (triadimefon, cyproconazole, bifenthrin).

In addition, iodo propynyl butyl carbamate (IPBC), bis-(tri-n-butyltin) naphthenate (TBTN) and bis-(tri-n-butyltin) oxide (TBTO) have been removed from the H1.2 hazard class without prejudice.

This Standard refers to the WOODmark® scheme, which is an initiative of the New Zealand Timber Preservation Council and to the AgriQuality Timber Treatment Programme. Quality assurance schemes arranged by other organisations in the future could also comply with the requirements of this Standard.

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## REVIEW OF STANDARDS

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6140.

## NOTES

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## NEW ZEALAND STANDARD

# CHEMICAL PRESERVATION OF ROUND AND SAWN TIMBER

## 1 SCOPE AND INTERPRETATION

### 1.1 Scope

#### 1.1.1

This Standard sets out requirements for the preservative treatment and identification of timber to provide protection from decay and insect attack. This includes marine borers in all likely exposure conditions throughout New Zealand. The requirements are based on hazard classes that are described in this Standard.

The assessment of treatments in this Standard is on an evidential basis for resisting fungal, insect or marine wood borer attack within the prescribed hazard class.

In addition, in this Amendment No. 5 some consideration has also been given to the intended end-use of the treated timber.

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#### 1.1.2

The requirements for hazard class H1.1 and H1.2 apply to all species for which hazard class H1.1 and H1.2 is specified in NZS 3602. Hazard classes H2, H3.1, H3.2, H4, H5 and H6 apply only to Pinus species.

Some special requirements are also included for softwood Laminated Veneer Lumber (LVL). Refer to AS/NZS 1604 Parts 2 to 5 with the exception of H1.2 treatment for LVL for which this Standard will apply.

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#### **C1.1.2**

*While it may be possible to treat other species using the provisions of this Standard, such treatments are outside the scope of this Standard and the adequacy of the resulting treatments will need to be demonstrated.*

*For the treatment of hardwoods refer to AS 1604.1. For the treatment of other wood-based products, refer to AS/NZS 1604, Parts 2 to 5.*

#### 1.1.3

This Standard is intended for use by treatment plants. Assessment of compliance is to apply at the plant gate.

### C1.1.3

*NZS 3640 is to be used in conjunction with NZS 3602, NZS 3603 and NZS 3604 which are referenced in the New Zealand Building Code (NZBC) Compliance Documents.*

*NZBC Compliance Document acceptable solution B2/AS1 may reference all or part of a Standard. As this Standard may not be referenced as a complete Standard users need to refer to B2/AS1 for compliance requirements.*

*The New Zealand Timber Preservation Council (NZTPC) and AgriQuality as examples operate quality control and branding schemes. Further details are given in Appendix A. This Standard does not preclude the adoption of any other appropriate quality assurance schemes which may be introduced in the future.*

*The effectiveness of preservative treatment can be adversely affected by subsequent handling, storage and utilisation. These issues are outside the scope of this Standard, but some advisory information is given in Appendix B.*

## 1.2 Interpretation

### 1.2.1

In this Standard the word “shall” indicates a requirement that must be adopted in order to comply with the Standard; the word “should” indicates a recommended practice.

### 1.2.2

The full titles of referenced documents relevant to treatment plant facilities and treatment operators are given in the list of Referenced Documents. Appendix C sets out other related documents of interest to the treatment industry.

### 1.2.3

Clauses prefixed by “C” and printed in italic type are intended as general comments or as comments on the corresponding mandatory clauses, and do not form part of the Standard. They are not to be taken as the only or complete interpretation of the corresponding clause, nor should they be used for determining in any way the mandatory requirements of compliance with NZS 3640. This Standard can be complied with if the comment is ignored. A commentary clause need not have a corresponding Standard clause.

### 1.2.4

The terms 'Normative' and 'Informative' have been used in this Standard to define the application of the Appendix to which they apply. A 'Normative' Appendix is an integral part of a Standard while an 'Informative' Appendix is only for information and guidance.

### 1.2.5

Preservative retentions and their depth of penetration into timber are specified for each hazard class. Treated timber shall be deemed to have met the specification if, after testing samples for preservative retention and penetration, the characteristic value (see section 2) for each is met.

## 1.3 Testing

Where spot tests for the presence of preservative or tests for determination of the retention of preservative are required, such tests shall be carried out in accordance with AS/NZS 1605. The determination of triadimefon and cyproconazole in LVL shall be by the method in Appendix E of this Standard.

## 2 DEFINITIONS

For the purposes of this Standard, unless inconsistent with the context, the following definitions shall apply:

ACVM. Agricultural Compounds and Veterinary Medicines Group of the Ministry of Agriculture and Forestry (MAF).

ANALYSIS ZONE. The zone of treated wood that will contain a specified retention of preservative. This zone varies and its precise dimension and location is set out in the appropriate hazard class specification.

ANALYTICAL REQUIREMENT. The minimum preservative retention required by the Standard determined by chemical analysis using methods described in AS/NZS 1605 with the exception of the determination of triadimefon and cyproconazole in LVL that shall be by the method in Appendix E of this Standard.

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Dec '12

BAE. Boric acid equivalent.

BASIC DENSITY. Oven dry weight in relation to saturated volume, of a sample of wood, expressed as g/cm<sup>3</sup> or kg/m<sup>3</sup>.

BORINGS. Borings are cylindrical samples extracted from treated wood for the purpose of determining preservative penetration or retention.

BRAND. The identification mark applied to pieces or packets of timber in accordance with this Standard.

CCA. Copper chrome arsenate.

CHARACTERISTIC VALUE (PENETRATION). The 10th percentile of the required penetration.

NOTE – For example, if 10 samples are taken from a population of treated product, the population is deemed to have met the specification if nine of the samples meet or exceed the specified depth of penetration.

CHARACTERISTIC VALUE (RETENTION). The 10th percentile of the required preservative retention.

NOTE – For example, if 10 samples are taken from a population of treated product, the population is deemed to have met the specification if nine of the samples meet or exceed the specified preservative retention.

CHARGE. The quantity of timber processed in a timber preservation plant by one complete treatment process cycle.

COMPONENT. Active ingredient in the preservative formulation.

COMPLETE PENETRATION. Evidence of preservative throughout the specified penetration zone.

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CORE. The central one-ninth of the nominal sawn dimensions.

CuAz. Copper azole.

CuN. Copper naphthenate.

DDAC. Didecyltrimethyl ammonium chloride.

DDAx. Didecyltrimethyl ammonium chloride or didecyltrimethyl carbonate/bicarbonate.

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## NZS 3640:2003

**EXTREME DECAY HAZARD.** Where the decay development is more rapid than in other ground contact situations. This can be due to soil type and conditions, accumulation of nutrients in soil, or horticultural practices such as mulching or composting affecting biological activity in the soil.

**FIXED PRESERVATIVE.** A preservative in which the effective chemicals are leach resistant.

**FIXED WATERBORNE PRESERVATIVE.** A preservative in which the effective chemicals are fixed in the wood so that leaching will be minimized.

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Dec '12 **FIXING.** The process by which CCA preservatives become fixed into the wood fibre.

**GROUND ATMOSPHERE.** The atmosphere between the ground and the floor (i.e. in the subfloor space).

**HAZARD CLASS.** Describes an environment or condition categorized environments or conditions of use where timber is at particular risk of biodegradation by one or more biological agents (e.g. fungi, insects, bacteria or marine organisms).

**HEARTWOOD.** The non-living central part of a tree trunk containing tannins and resins etc., which can be differentiated from sapwood by means of chemical reagents.

**IN SITU PREPARATIONS.** Fungicidal solutions applied after machining or cutting treated timber to provide additional protection to the exposed cut surfaces.

**IPBC.** Lodo propynyl butyl carbamate.

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Dec '12 **LAMINATED VENEER LUMBER (LVL).** A product which is an assembly of veneers laminated with adhesive, in which the grain direction of the outer veneers and most of the other veneers is in the longitudinal direction.

**LOSP.** Light organic solvent preservative.

**MACHINED TIMBER.** Sawn timber which has been planed or moulded.

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Dec '12 **MICRONISED COPPER.** A copper compound ground into particles that are 0.005 to 10 microns in size and suspended in water with the aid of a dispersant.

**NZTPC.** The New Zealand Timber Preservation Council.

**PACKET BRANDED.** Weatherproof legible identification placed on each side of a packet of treated timber (intended to be handled as a single unit) with all letters and symbols at least 200 mm high.

**PENETRATION.** The depth to which a prescribed preservative is present in the timber.

**PENETRATION TEST.** A test where chemical reagents are applied to samples of the treated wood, which identify evidence of penetration of the preservative at the prescribed depth in the wood using methods described in AS/NZS 1605.

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Dec '12 **PENETRATION TRACER.** A chemical compound used as an additive in a treating solution and can be used as a penetration indicator chemical for the active ingredient.

**PLANT.** The whole organization or entity required to effect the preservative treatment and branding of timber.

**PRESERVATIVE.** A chemical, or formulation of chemical(s) applied to timber with the object of protecting the timber from degradation by any timber-destroying organism.

**RETENTION.** Where expressed as a percentage, retention is on the basis of mass per unit mass, unless otherwise stated.



**SAPWOOD.** The outer portion of a tree trunk containing living cells and water conducting and storage tissue, which can be differentiated from heartwood by means of chemical reagents.

**SAWN TIMBER.** Timber which has been cut with a saw, which may or may not be subsequently machined.

**SPOT TESTS.** Colourmetric chemical test reagent applied to a freshly-cut cross-section of timber, or increment borer core, that reacts with a chemical active ingredient to determine its distribution in the timber.

**TAE.** Total active element.

**TBTN.** Bis-(tri-n-butyltin) naphthenate.

**TBTO.** Bis-(tri-n-butyltin) oxide.

**TIMBER.** The wood from trees whether naturally round or sawn, hewn, split, or otherwise fashioned or manufactured into veneer or plywood.

**TREATED.** Treated with preservative in accordance with this Standard.

**UTILITY SERVICE POLE.** A natural round used to support telecommunication or electrical supply lines or lighting fittings.

## NZS 3640:2003

### 3 HAZARD CLASSES AND TREATMENT REQUIREMENTS

#### 3.1 Hazard classifications

Six hazard classes are described in this Standard. Each is denoted by a hazard number and is described in terms of service exposure and biological hazard as listed in table 3.1. Hazard classes H1 and H3 have two sub classes.

**Table 3.1 – Hazard classification**

<b>Hazard class</b>	<b>Exposure</b>	<b>Service conditions</b>	<b>Biological hazard</b>	<b>Typical uses</b>
H1.1	Protected from the weather, above ground	Protected from the weather, always dry	Borers	Interior finishing timber – see NZS 3602
H1.2	Protected from the weather, above ground, but with a possibility of exposure to moisture	Protected from the weather, but with a risk of moisture content conducive to decay	Borers, decay	Wall framing – see NZS 3602
H2	Protected from the weather, above ground	Protected from the weather, dry, exposed to ground atmosphere where well-ventilated but not in contact with the ground	Borers, termites	Framing timber in Australia
H3.1	Exposed to the weather, above ground	Periodic wetting, not in contact with the ground	Decay fungi and borers	Cladding, fascia, joinery – see NZS 3602 for requirements on paint protection
H3.2	Exposed to the weather, above ground, or protected from the weather but with a risk of moisture entrapment	Periodic wetting, not in contact with the ground, more critical end uses	Decay fungi and borers	All H3.1 uses, plus structural and decking – see NZS 3602
H4	Exposed to the weather, in ground or in fresh water	Ground contact, or conditions of severe or continuous wetting	Decay fungi and borers	Fence posts, landscaping timbers
H5	Exposed to the weather, in ground or in fresh water	Ground contact, or conditions of severe or continuous wetting, where uses are critical and where a higher level of protection than H4 is required	Decay fungi and borers	House piles and poles, crib walling
H6	Sea water or estuarine ground	Immersion in seawater or estuarine ground	Marine wood borers and decay	Marine timber and piles

### **C3.1**

*NZBC clause B2.3.1 refers to minimum durability requirements for building elements. Timber used for structural purposes is required to be durable in-service for the life of the building, being not less than 50 years unless the building has a specified intended life. This is applicable to hazard classes H1.2, H3.2, H4, H5, and H6. Structural timber refers to timber that has been graded to characteristic strength and stiffness properties.*

*The minimum requirement for a H1.2 treatment for timber framing is to provide protection in-service but the preservative treatment is not designed for extended exposure to elevated moisture content.*

*Timber used for non-structural purposes, such as H1.1 and H3.1 is required to be durable in-service for a minimum of 5 years and 15 years respectively.*

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## **3.2 Selection of timber treatment**

NZS 3602 sets out the requirements for the level of treatment needed for particular uses of timber. Treatment for service at a higher hazard class number usually satisfies requirements for service at a lower hazard class number, except in the case of H2 and the H3.1 treatments identified in table 6.2 as being excluded for timber framing use. Additionally, H2 may not meet the requirements of H1.2.

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## **3.3 Preservative penetration and retention**

### **3.3.1 Penetration**

The penetration of the preservative into timber shall be checked using a chemical reagent appropriate to the preservative being tested in accordance with AS/NZS 1605. The preservative shall be found throughout the wood to the required depth.

Some active ingredients such as synthetic pyrethroids, tebuconazole and propiconazole cannot be checked with a chemical reagent. Other actives e.g. boron, may be present at a concentration below the sensitivity limit of the chemical reagent. In such cases, penetration shall be confirmed either by chemical analysis or by use of a penetration tracer whichever is the most applicable to the active in question. Penetration for the azoles used for timber framing shall be confirmed by chemical analysis.

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### **3.3.2 Retention**

The retention of preservative shall be determined by chemical analysis in accordance with AS/NZS 1605 where available, and shall be expressed as per cent mass of preservative per mass of oven dry wood. Alternative analytical methods may be submitted to Standards New Zealand as part of the approval process, the application form for which is set out in Appendix D.

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The triadimefon and cyproconazole retention analysis for LVL is to be determined according to the method of analysis described in Appendix E of this Standard.

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## **3.4 Penetration and retention sampling requirements**

### **C3.4**

*All quality assurance systems must include a systematic sampling regime which reflects the size and operation of the plant.*

### **3.4.1**

Borings should be taken at right angles to growth rings. Samples shall be taken in clear, straight-grained wood at least 150 mm away from knots, splits, checks or other defects, and at least 450 mm from the end or edge of pieces. In the case of H6, samples shall be taken at the mid-point of a piece. Samples shall be representative of the charge. Where mixed charges occur, sampling shall be directed at the product considered to be the most difficult to treat.

## NZS 3640:2003

### 3.4.2

The holes left after extraction of borings shall be plugged with dowels treated with the same preservative, and to the same or higher retention as the piece from which the boring was taken.

### 3.4.3

Samples per charge shall consist of:

- (a) Sawn timber shall be two sets of ten cross-sections at least 30 mm thick for penetration and cross-section analyses. An additional set of samples shall be required when penetration is being determined by analysis of the central ninth core;
- (b) For CCA –
  - (i) Roundwood – Three sets of 10 borings
  - (ii) Sawn timber – Either two sets of 10 cross-sections at least 30 mm thick, or three sets of 10 borings;
- (c) For copper quaternary and CuAz – Roundwood and sawn timber shall be two sets of 10 cross-sections at least 30 mm thick –
  - (i) Roundwood – Two sets of 10 cross-sections at least 30 mm thick
  - (ii) Sawn timber – Two sets of 10 cross-sections at least 30 mm thick;
- (d) For LOSP – Sawn timber shall be three sets of 10 cross-section samples at least 30 mm thick;
- (e) For laminated veneer lumber (LVL) shall be two sets of 10 cross-section samples at least 30 mm thick.

NOTE – For all of the above, one set is to be retained by the sampler.

### 3.4.4

Clause deleted.

### 3.4.5

When samples are spot-tested and/or analysed for preservative penetration and retention in accordance with section 6, the charge, lot or parcel of timber they represent shall be deemed to have met the requirements of this Standard if the characteristic values for penetration and retention are met.

4 PRESERVATIVES

4.1 Approved preservatives

Preservative formulations shall be approved under the Hazardous Substances and New Organisms (HSNO) Act 1996 and listed as approved substances on the New Zealand Environmental Protection Authority (EPA) register.

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4.2 Fixed waterborne preservatives

**C4.2**

*These preservatives are deposited in the wood in a relatively insoluble form and are therefore suitable for use where leaching by water may occur.*

4.2.1 Copper chrome arsenate (CCA)

4.2.1.1 Situation

CCA preservatives are suitable for use in all hazard classes. Preservative penetration and retention shall be as required by section 6.

**C4.2.1.1**

*CCA preservatives have a broad spectrum of effectiveness against insects, wood-destroying fungi, and marine borers.*

4.2.1.2 Specification

Copper, chromium and arsenic salts or oxides shall be dissolved in water to give a solution containing the active elements within the proportions given by table 4.1.

Table 4.1 – Relative proportions of CCA components

Copper (%)	Chromium (%)	Arsenic (%)
23 to 25	38 to 45	30 to 37

4.2.2 Copper quaternary

4.2.2.1 Situation

Copper quaternary preservatives are approved for use in hazard classes H3.1, H3.2, H4 and H5. Preservative penetrations and retentions shall be as required by section 6.

**C4.2.2.1**

*Copper quaternary preservatives have a broad range of fungicidal and insecticidal effectiveness.*

4.2.2.2 Specification

Copper quaternary preservatives shall comprise mixtures of inorganic copper compounds and didecylmethyl ammonium quaternary compound (either DDA chloride or DDA carbonate/bicarbonate). Alkaline or ammoniacal formulations are dissolved in water. Alternatively, the copper may be micronised to form a dispersion in water. The treating solution containing the active ingredients shall be within the proportions given by table 4.2.

Amd 5  
Dec '12

Table 4.2 – Relative proportions of alkaline copper quaternary components

Copper (%)	DDAx (%)
56 to 67	33 to 44

#### 4.2.3 Copper azole (CuAz)

##### 4.2.3.1 Situation

Copper azole preservatives are suitable for use in hazard classes H3.1, H3.2, H4 and H5. Preservative penetrations and retentions shall be as required by section 6.

##### C4.2.3.1

*Copper azole preservatives have a broad range of fungicidal and insecticidal effectiveness.*

##### 4.2.3.2 Specification

Copper azole preservatives shall comprise mixtures of an inorganic copper salt and triazole fungicide (tebuconazole) formulated as an emulsion, or as a suspension of micronised copper and triazole fungicide (tebuconazole), that can be readily diluted with water to give a treating solution containing the active ingredients within the proportions given in table 4.3.

Table 4.3 – Relative proportions of CuAz components

Copper (%)	Azole (%)
95.8 to 96.4	3.6 to 4.2

#### 4.2.4 Propiconazole/tebuconazole/permethrin (PTP)

##### 4.2.4.1 Situation

The combination of propiconazole, tebuconazole and permethrin is suitable for use in hazard classes H1.2 and H3.1.

Preservative penetrations and retention shall be as required by section 6.

##### C4.2.4.1

*The combination of propiconazole, tebuconazole and permethrin has a broad range of fungicidal and insecticidal effectiveness.*

##### 4.2.4.2 Specification

Propiconazole, tebuconazole and permethrin shall be formulated as a microemulsion for dilution in water to give a treating solution containing the azole active ingredients in a 1:1 ratio.

The total azole to permethrin ratio shall be 10:1 to meet the permethrin retention in timber for H1.2 but does not preclude the use of a higher concentration of permethrin, such as a total azole to permethrin ratio of 3:1, where the treating solution may also be used for treating timber for export, e.g. to Australia.

##### C4.2.4.2

*Evidence must be available which demonstrates that the penetration of the tracer chemical correlates with the penetration of the active ingredients.*

### 4.3 Non-fixed water borne preservatives

#### 4.3.1 Boron compounds

##### 4.3.1.1 Situation

Boron preservatives are suitable for use in hazard class H1.1 and H1.2. Boron preservatives are suitable for use in hazard class H3.1 provided an oil alkyd or modified acrylic or modified latex grey pigmented surface coating is applied to all timber surfaces, after treatment and before dispatch from the treatment plant.

Preservative penetration shall be as required in section 6.

##### **C4.3.1.1**

*Boron compounds are non-fixed, waterborne preservatives which have insecticidal and fungicidal effectiveness.*

*The use of boron compounds in H3.1 situations exposed above ground and to the weather requires a priming coat as described in 4.3.1.1, plus a minimum of two further coats of a well-maintained paint system on all exposed surfaces to minimise the potential for boron loss by leaching (refer to NZS 3602 Clause 111.2.1).*

##### 4.3.1.2 Specification

Boron preservatives shall be expressed as boric acid equivalent (BAE) and shall comprise boric acid or water soluble borate compounds such as sodium octaborate, sodium tetraborate, sodium pentaborate, or mixtures of these that are to be dissolved in water.

### 4.4 Light organic solvent preservatives (LOSPs)

#### 4.4.1 Situation

LOSPs are suitable for use in hazard classes as specified in table 4.4.

In addition, CuN at 0.05 % m/m elemental copper and the tributyl tin compounds (TBTO, TBTN) are suitable for use in hazard class H3.1 for fascia, cladding, joinery and other timber components less than 30 mm thick but are not suitable for H1.2 framing applications. A continuous face brand shall be applied along the full length of the timber prior to dispatch from the treatment plant.

Amd 5  
Dec '12

Preservative penetrations shall be as required in section 6.

##### **C4.4.1**

*LOSPs are fungicides, insecticides or termiticides used singly or in combination.*

*Refer to NZS 3602 for conditions of use for H3.1 applications and painting requirements.*

Amd 5  
Dec '12



Table 4.4 – LOSP fungicides

Fungicides	Hazard classes <sup>(1)</sup>
Bis-(tri-n-butyltin) oxide (TBTO) <sup>(2)</sup>	H3.1
Bis-(tri-n-butyltin) naphthenate (TBTN) <sup>(2)</sup>	H3.1
Copper naphthenate (CuN) <sup>(2)</sup>	H3.1 and H3.2
Propiconazole + tebuconazole (1:1) <sup>(3) (4)</sup>	H3.1
NOTE – (1) For further information on hazard classes, and especially H3.1, refer to table 3.1. (2) H3.1 TBTO, TBTN, and CuN are specifically excluded from H1.2 framing. (3) Propiconazole + tebuconazole shall be used only in combination with permethrin and with a hydrocarbon resin with minimum concentration of 2 % and with a combined concentration of resins and waxes of 3 % or more in the treating solution. (4) IPBC may be added as a mouldicide.	

#### 4.4.2 Specification

##### 4.4.2.1 Naphthenic acid specification

The naphthenic acid component of TBTN and CuN shall conform to AWPB Standard P8-01.

##### 4.4.2.2 Light organic solvent specification

The light organic solvent (LOS) shall either comply with table 1 of AS 3530 or be a dearomatised hydrocarbon solvent with an aniline point between 65 °C – 75 °C, maximum aromatic content of 0.5 % by weight and distillation boiling point range between 150 °C and 220 °C. The light organic solvent is commonly referred to as white spirits.

##### C4.4.2.2

*Any change in solvent specification may affect the solubility and stability of the active ingredients or additives in the treatment solution so any change in solvent will require appropriate testing by the preservative supplier to confirm fitness for purpose.*

##### 4.4.2.3 Methylene chloride

Methylene chloride may be used as an alternative solvent carrier to LOS for propiconazole plus tebuconazole (1:1). The use of any formulation with methylene chloride as the solvent carrier and for use at specific treatment facilities requires separate EPA approvals and specific controls under the HSNO Act to cover the importation, storage, transport, site handling, treating, solvent recovery and disposal requirements. The solvent recovery process shall be capable of achieving a maximum Tolerable Exposure Limit (TEL) for methylene chloride of 3 mg/m<sup>3</sup>.

##### 4.4.2.4 Additive specification

Other additives such as water-repellent waxes, resins and colourants are permitted but shall not impair the preservative efficacy, penetration of actives into the timber or treatment solution stability. Penetration tracer chemicals are required where there is no colourmetric spot test for the active ingredient and they shall not impair the preservative efficacy, penetration of actives into the timber or treatment solution stability.

##### C4.4.2.4

*Evidence must be available which demonstrates that the penetration of the tracer chemical correlates with the penetration of the active ingredients.*



4.4.3 *LOSP insecticides*

LOSP insecticides include synthetic pyrethroid compounds of permethrin, cypermethrin, or deltamethrin. The total azole to permethrin ratio shall be 10:1 to meet the permethrin retention in timber for H3.1 but does not preclude the use of a higher concentration of permethrin, such as a total azole to permethrin ratio of 3:1, where the treating solution may also be used for treating timber for export, e.g. to Australia.

Amd 5  
Dec '12

**C4.4.3**

*These are used in LOSP treatments for hazard classes H1.1 and H3.1. Higher concentrations of insecticides are added to azoles, TBTN or CuN LOSP treatments for hazard class 3 treated timber exported to Australia and other markets.*

Amd 5  
Dec '12

4.5 **Other preservative types**

4.5.1 *Laminated veneer lumber*

Triadimefon and cyproconazole formulated as a suspension and added to phenol formaldehyde resin shall be permitted as a glueline veneer treatment for H1.2. The triadimefon and cyproconazole shall be within the proportions given in table 4.5. The bifenthrin shall be added to the glueline in proportion to achieve the required retention of 0.0023 % m/m for the analysis zone described in 6.1.2.2(b).

**Table 4.5 – Relative proportions of triadimefon and cyproconazole components**

Triadimefon (%)	Cyproconazole (%)
90.0 to 91.8	8.2 to 10.0
NOTE – Triadimefon and cyproconazole to be used in combination with bifenthrin.	

Amd 5  
Dec '12

## NZS 3640:2003

### 5 IDENTIFICATION OF TREATED TIMBER

#### 5.1 Branding

##### 5.1.1

The plant shall ensure that the finished product after all cutting, machining and treatment, as made available to the market, bears the correct branding in accordance with the requirements of section 5. Such branding, where required, shall either be on the timber's end, edge or face, or on the packet containing the timber and in accordance with table 5.1.

##### **C 5.1.1**

*Timber treated for export to overseas Standards shall be identified in accordance with the requirement of the importing country.*

##### 5.1.2

Framing timber for H1.2 is also required to be coloured in accordance with table 5.2.

**Table 5.1 – Requirements for branding or identification of treated timber**

Solid timber product type	Brand position
Fence battens Fence droppers	Branding not required
Bundled fence palings, pickets and cavity or roof battens	Packet branded
Sawn or machined timber < 1250 mm <sup>2</sup> cross-section	Branding not required
Mouldings	Branding not required
Sawn or machined timber < 1.5 m long; and cross-section < 5000 mm <sup>2</sup>	One end of each piece, or branded on a broad face 150 mm from an end, or repetitively along the length at 1.5 m centres, or packet branded
Other sawn or machined timber	One end of each piece, or branded on a broad face 150 mm from an end, or repetitively along the length at 1.5 m centres
Posts – rounds, part rounds	One end of each piece
Piles or poles for use in buildings to NZS 3605	One third of the length of the piece, from and facing the top
Utility service poles	Location specified by purchaser
<b>Engineered wood products</b>	
Laminated veneer lumber – see 4.5.1	Branded repetitively along the length at a minimum of 1.5 m centres and shall be no greater than 1.8 m centres
NOTE – The width of the member is the longest cross-section dimension, and the thickness is the smallest cross-section dimension.	

**C Table 5.1**

*The plant's quality assurance systems need to ensure correct branding. This is not generally a problem when branding and treatment are performed at the same place, but on occasion these operations are performed at different times and at different places. In such instances the plant's procedures need to ensure finished products are treated and labelled correctly.*

*Poles when treated under contract may be 'disc branded' after inspection and acceptance by the purchasing agent.*

**5.1.3**

Branding shall be by permanent ink, imprint, incision or burn brand applied directly to the timber or on a plastic tag affixed to the timber.

**5.1.4**

The brand shall identify:

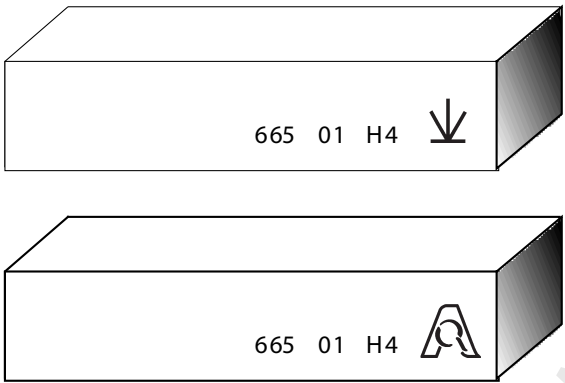
- (a) The plant responsible for preservative treatment of the timber by means of a plant number or trade name;
- (b) The hazard class for which the timber has been treated;
- (c) The preservative type using the following code numbers:

CCA oxide.....	01
CCA salt.....	02
Boron .....	11
TBTO .....	56
Copper naphthenate.....	57
Copper azole (as emulsion) .....	58
TBTN .....	62
Propiconazole + tebuconazole + permethrin.....	64
Triadimefon + cyproconazole + bifenthrin .....	66
Permethrin .....	70
Micronised copper azole (as dispersion) .....	88
Micronised copper quaternary (as dispersion) .....	89
Alkaline copper quaternary.....	90

The sequence of the above information in the brand shall be plant number, preservative code number, and hazard class number as in figure 5.1.

NOTE – IPBC, previously included in this Standard, had code number 63 – see the Foreword of this Standard for further information.

Amd 5  
Dec '12



**Key**

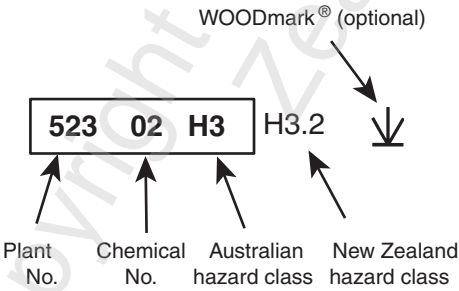
Treatment plant number .....	665
Preservative code number.....	01
Hazard class number.....	H4
Woodmark ® (optional).....	↓
AgriQuality Assurance (optional).....	A

**Figure 5.1 – Example brandings**

**5.1.4.1**

Timber that may be exported to Australia may be branded to comply with both the relevant Australian Standard AS 1604.1 and this Standard. This provision shall only apply in respect of timber treated to H3.2, equivalent to H3 in AS 1604.1, using alkaline copper quaternary (90), CCA (01 or 02), CuAz (58), CuN (57), micronized copper quaternary (89), or micronized copper azole (88).

A suggested branding layout is set out in figure 5.2.



**Figure 5.2 Suggested branding layout**

NOTE – The position of the New Zealand hazard class may be alongside or below the box in the figure.

**5.1.5**

Round or sawn piles and poles complying with NZS 3605 shall also comply with the branding requirements of that Standard.

**5.2 Colouring**

In addition to end branding, framing timber for H1.2 shall be colour coded as specified in table 5.2.

Table 5.2 – Colour coding for timber to be used as framing

Hazard class	Preservative	Colour <sup>(1)</sup>
H1.2 <sup>(2)</sup>	Boron	Pink <sup>(3)</sup>
	Propiconazole, tebuconazole, permethrin <sup>(4)</sup>	Green <sup>(5)</sup>
<p>NOTE –</p> <p>(1) These colours shall not be used for any preservative types/hazard classes other than specified.</p> <p>(2) LVL with H1.2 glue-line treatment outlined in 4.5.1 does not require colour coding.</p> <p>(3) Colour – Red 112 (red) or Red 122 (pink).</p> <p>(4) Formulated as a water-based emulsion.</p> <p>(5) The colour green is to be distinctly different (colour green 368) from the green of copper-based preservatives.</p>		

**C Table 5.2**

*Timber treated to H3.2 is readily distinguishable by spot test from those treatments approved for framing. As an example two reagents (ammonia solution and rubeanic acid) are applied to a freshly-cut surface. A blue/black colouration indicates the presence of copper, an active ingredient of all H3.2 treatments. Other reagents may also be used, e.g. chrome azurol.*

Amd 5  
Dec '12

**5.2.1 Colourant used to distinguish timber**

The type and concentration of colourant used shall ensure the timber is distinguishable from untreated timber and other preservative treatments.

**5.2.2 Light fastness**

The pink or green colour for treatments shall have a light-fast rating of 5 in accordance with BS ISO 12040.

Amd 5  
Dec '12

## NZS 3640:2003

### 6 HAZARD CLASS SPECIFICATIONS

#### 6.1 Hazard classes H1.1 and H1.2

H1.1 applies to timber used in situations protected from the weather, dry in service, and where resistance to borer only is required.

H1.2 applies to timber used in situations protected from the weather, but where there is a risk of moisture content conducive to decay.

Timber treated to hazard class H1.1 and H1.2 shall comply with the requirements of this clause. The description of hazard class, the preservative and the branding shall be as described in sections 3, 4 and 5 respectively.

##### **C6.1**

*H1.1 and H1.2 timber must be kept dry during storage, when handled prior to use and in service.*

##### **6.1.1 Sawn timber**

###### **6.1.1.1 Penetration**

Complete sapwood penetration is required.

The penetration of the preservative into the timber shall be checked using a chemical reagent (see 3.3.1).

Some active ingredients such as synthetic pyrethroids, tebuconazole and propiconazole cannot be checked with a chemical reagent. Other actives e.g. boron, may be present at a concentration below the sensitivity limit of the chemical reagent. In such cases, penetration shall be confirmed either by chemical analysis or by use of a penetration tracer whichever is the most applicable to the active in question.

Where evidence of complete sapwood penetration is to be confirmed by analysis, the samples will comply if the preservative is found in the central one-ninth sapwood core of the sample.

##### **C6.1.1.1**

*Compliance with this Standard requires clear evidence at the time of sampling that the preservative is present in every part of the sapwood and at a concentration greater than that present in an untreated sample taken from the same timber source.*

*No central ninth core concentrations have been set additional to the 'wet' cores for H1.1 in table 6.1.*

*It is noted that the analytical detectable limit for an active ingredient may vary with the chemical analytical method and sample size. The detectable limit in the central ninth core may be less than an effective concentration for that preservative. If the active is highly concentrated in a small portion of the cross-section, it is possible that subsequent processing or fabrication may expose unprotected parts of the cross-section which could result in failure of the timber. Care is needed to ensure the durability of the treated timber in-service is not adversely affected by a preservative gradient across the timber cross-section.*

##### **6.1.1.2 Analysis zone**

- (a) For H1.1-classed timber, the analysis zone is the central one-ninth of the sapwood cross-section. For dry boron treated timber (i.e. moisture content less than 24 %) the full sapwood cross-section is the analysis zone.
- (b) For H1.2-classed sawn timber, the analysis zone is the full sapwood cross-section. In addition, when azole treated timber is 30 mm thick or more there is also a requirement for analysis of the central one-ninth of the sapwood cross-section.

**6.1.1.3 Preservative retention requirement**

The concentration retention of preservative in the retention analysis zone of the treated timber shall be not less than specified in table 6.1.

**6.1.2 Glueline treated laminated veneer lumber (LVL)**

The preservative shall be applied as a glueline additive to every glueline followed by a surface treatment to the outer surface veneers.

**6.1.2.1 Penetration**

There is no penetration analysis requirement for the preservative.

**6.1.2.2 Analysis zone**

The analysis zone is:

- (a) The outer 2 mm for LVL surface veneers; and
- (b) The full cross-section (less the outer surface veneers).

**6.1.2.3 Preservative retention requirement**

The retention of preservative in the two retention zones of the treated timber shall be not less than specified in table 6.1.

Amd 5  
Dec '12



## NZS 3640:2003

**Table 6.1 – Minimum preservative retention in the H1.1, H1.2 analysis zone**

Preservative type	Component	Retention % m/m oven-dry weight of wood	
		H1.1	H1.2
Waterborne preservatives			
CCA	As	0.04	–
Boron compounds –			
Hardwoods core	H <sub>3</sub> BO <sub>3</sub>	0.20	Not applicable
Softwoods (wet) core	H <sub>3</sub> BO <sub>3</sub>	0.10	Not applicable
Softwoods x-sect	H <sub>3</sub> BO <sub>3</sub>	0.10	0.40 <sup>(1)</sup>
Propiconazole + tebuconazole (1:1) <sup>(2)</sup>			
Cross-section	Propiconazole + tebuconazole	Not applicable	0.04 + 0.04 <sup>(3)</sup>
Central ninth core	Propiconazole + tebuconazole	Not applicable	0.01 + 0.01 <sup>(3)</sup>
Laminated veneer lumber <sup>(4) (5) (6)</sup>			
Triadimefon + cyproconazole	Triadimefon + cyproconazole	Not applicable	0.042 + 0.005 (glueline) 0.174 + 0.024 (surface)
Light organic solvent preservatives (LOSPs)			
Synthetic pyrethroids –			
Permethrin	–	0.0060	Not applicable
Cypermethrin	–	0.0060	Not applicable
Deltamethrin	–	0.0006	Not applicable
NOTE –			
(1) This cross-section retention is required whether the material is sampled wet, where the timber is intended to be air dried, or on the dry timber.			
(2) Formulated as a waterbased emulsion. The minimum permethrin retention is 0.0060 % m/m.			
(3) The requirement for azoles shall be a 50:50 ratio in the retention zone and the minimum proportion of any one azole is to be 45 % of the total.			
(4) This treatment shall be applied only to LVL with a maximum veneer thickness of 4.3 mm and as a glueline additive equal to or greater than 450 g/m <sup>3</sup> triadimefon and 45 g/m <sup>3</sup> cyproconazole. A second separate application is also required to the outer veneer surface.			
(5) Bifenthrin is required in the glueline as outlined in 4.5.1.			
(6) Glueline and surface treatment sampling of LVL shall be in final state and form prior to dispatch from the treatment plant.			

### **C Table 6.1**

*Extended time in block stack after hot pressing can affect analytical recovery of the active ingredients. To ensure the samples are typical of normal production, analytical samples should only be taken after the glueline treated product has completed the full production process. Samples should not be taken directly off the end of the press.*



## 6.2 Hazard class H2

For timber treated to hazard class H2, refer to AS 1604.1 or the requirements of the country to which the timber is being exported.

## 6.3 Hazard classes H3.1 and H3.2

H3.1 applies to timber used in situations above ground, exposed to the weather – generally in non-structural applications, but including cladding used as bracing if the component is painted.

H3.2 applies to timber used in situations above ground, exposed to weather, or protected from the weather but with a risk of moisture entrapment. This classification is for more critical end uses and includes exposed joists and decking.

Amd 5  
Dec '12

Timber treated to hazard class H3.1 and H3.2 shall comply with the requirements of this clause. The description of hazard class, preservative and the branding shall be as described in sections 3, 4 and 5.

### C6.3

See table 3.1 and C3.1 for descriptions of H3.1 and H3.2 hazard classes.

Amd 5  
Dec '12

### 6.3.1 Round, part round, or sawn timber

#### 6.3.1.1 Penetration

The penetration of the preservative into the timber shall be checked using a chemical reagent (see 3.3.1).

Some active ingredients such as synthetic pyrethroids, tebuconazole, and propiconazole cannot be checked with a chemical reagent. Other actives e.g. boron, may be present at a concentration below the sensitivity limit of the chemical reagent. In such cases, penetration shall be confirmed either by chemical analysis or by use of a penetration tracer whichever is the most applicable to the active in question.

A penetration tracer chemical is required in the treating solution for the propiconazole plus tebuconazole treatment when the timber thickness is 30 mm or more. See 4.2.4.2 and 4.4.2.4.

Where evidence of complete sapwood penetration is to be confirmed by analysis, the samples will comply if the preservative is found in the central one-ninth sapwood core of the sample.

Samples which fail the penetration test shall be deemed to have failed the analytical requirement.

Amd 5  
Dec '12

## NZS 3640:2003

### 6.3.1.1.1

Clause deleted.

### 6.3.1.1.2 *Heartwood penetration*

For timber treated in final shape and form, no minimum heartwood penetration is specified.

Where timber is not treated in final shape and form, there shall be evidence of penetration to a depth of 5 mm after machining. Unpenetrated heartwood shall be permitted if it comprises less than 20 % of the cross-section of the piece, does not extend through the piece from one surface to the opposite surface, and does not exceed half the dimension of any side of the cross-section.

#### **C6.3.1.1.2**

*For the purposes of this clause, machining means profiling to a different cross-sectioned dimension or profile.*

### 6.3.1.2 *Analysis zones – sapwood*

- (a) The analysis zone shall be the outer 25 mm from any sapwood face, or the full depth of sapwood where the sapwood depth is less than 25 mm.
- (b) For H3.1 classed sawn timber treated with a propiconazole plus tebuconazole treatment and when the timber is 30 mm thick or more, there is also a requirement for analysis of the central one-ninth of the sapwood cross-section.

### 6.3.1.3 *Preservative retention requirement*

The retention of preservative in the analysis zone of the treated timber shall be not less than specified in table 6.2.

#### **C6.3.1.3**

*An insecticide component is not required for the LOSP treated timber intended for use in New Zealand, but may be a requirement for timber that is being exported.*

**Table 6.2 – Minimum preservative retention in the H3.1, H3.2 analysis zone**

Preservative type	Component	Retention % m/m oven dry weight of wood	
		H3.1	H3.2
Waterborne preservatives			
CCA	Cu + Cr + As	0.37	0.37
Copper quaternary <sup>(1)</sup>	Cu + DDAX where X = chloride or carbonate/bicarbonate	0.35	0.35
Copper azole <sup>(1)</sup>	Cu + tebuconazole	0.23	0.23
Boron compounds	H <sub>3</sub> BO <sub>3</sub>	0.80 <sup>(2)</sup>	Not approved
Propiconazole + tebuconazole (1:1) <sup>(3)</sup>	Propiconazole + tebuconazole	0.03 + 0.03 <sup>(4) (5) (6)</sup> and 0.01 + 0.01 <sup>(4) (7)</sup>	Not approved
Light organic solvent preservatives (LOSPs)			
CuN	Cu	0.05 <sup>(9)</sup>	0.10
Propiconazole + tebuconazole (1:1) <sup>(8)</sup>	Propiconazole + tebuconazole	0.03 + 0.03 <sup>(4) (5)</sup> and 0.01 + 0.01 <sup>(4) (7)</sup>	Not approved
TBTO, TBTN	Sn	0.08 <sup>(9)</sup>	Not approved
NOTE –			
(1) Includes micronised copper – see 4.2.			
(2) Boron compounds are approved for H3.1 only for timber boards for fascia, cladding, joinery, cavity bat- tens and other timber components less than 30 mm thick and only when an oil alkyd, modified acrylic or modified latex grey pigmented coating is applied to all timber surfaces, after treatment and before dispatch from the treatment plant.			
(3) Propiconazole + tebuconazole shall be used only in combination with permethrin. The minimum permethrin retention is 0.0060 % m/m. See 4.2.4.2.			
(4) The requirement for azoles shall be a 50:50 ratio in the retention zone and the minimum proportion of any one azole is to be 45 % of the total.			
(5) Retention required in the sapwood cross-section for all timber dimensions.			
(6) The water-based azole treatment at this H3.1 retention shall not be used for timber framing. See table 6.1 for the H1.2 retention requirements.			
(7) Additional retention requirement to analyse sapwood present in the central ninth when the timber is 30 mm thick or more.			
(8) Propiconazole + tebuconazole shall be used only in combination with permethrin and with a hydrocarbon resin with minimum concentration of 2 % and with a combined concentration of resins and waxes of 3 % or more in the treating solution. The minimum permethrin retention is 0.0060 % m/m. See 4.4.3.			
(9) CuN at 0.05 % m/m and TBTO/TBTN are approved for H3.1 timber boards for fascia, cladding, joinery and other timber components less than 30 mm thick and provided a continuous face brand is applied along the full length of the timber at the treatment plant. Refer to NZS 3602 for conditions of use in H3.1 applications and painting requirements.			

Amd 5  
Dec '12

NZS 3640:2003

6.4 Hazard class H4

For advice concerning machining, see Appendix B5. Timber treated to hazard class H4 shall comply with the requirements of this clause. The description of hazard class, preservatives and the branding shall be as described in sections 3, 4 and 5 respectively.

6.4.1 Round, part round, or sawn timber including agricultural or horticultural uses except on very severe hazard sites.

6.4.1.1 Penetration

Penetrations shall be as given below for the following timbers:

- Roundwood: Complete sapwood penetration, with evidence of distribution continuous through both earlywood and latewood with a minimum of 10 mm.
- Part rounds: Complete sapwood penetration with a minimum of 10 mm in both sapwood and heartwood. Unpenetrated heartwood shall be permitted if it comprises less than one-third the original diameter.
- Sawn timber: Complete sapwood penetration with a minimum of 10 mm in both sapwood and heartwood. Unpenetrated heartwood shall be permitted if it comprises less than 20 % of the cross-section of the piece, does not extend through the piece from one surface to the opposite surface, and does not exceed half the dimension of any side of the cross-section.

Samples which fail the penetration test shall be deemed to have failed the analytical requirement.

6.4.1.2 Analysis zones

Analysis zones shall be as given below for the following timbers:

- Sapwood: The outer 25 mm, or the full sapwood depth when this is between 10 mm and 25 mm.
- Heartwood: The outer 10 mm.

6.4.1.3 Preservative retention requirement

The analysis zone shall be the outer 25 mm of the treated timber and shall be not less than specified in table 6.3.

Table 6.3 – Minimum preservative retention in the H4 analysis zone

Preservative type	Component	Retention % m/m oven dry weight of wood
Copper quaternary	Cu + DDAX where x = chloride or carbonate/bicarbonate	1.02
CCA	Cu + Cr + As	0.72
CuAz	Cu + tebuconazole	0.416

6.5 Hazard class H5

For advice concerning machining, see Appendix B5. Timber treated to hazard class H5 shall comply with the requirements of this clause. The description of hazard class, preservative and the branding shall be as described in sections 3, 4 and 5 respectively.

6.5.1 Utility service poles

6.5.1.1 Penetration

Complete sapwood penetration shall be required, continuous with evidence of distribution through both earlywood and latewood.

Samples which fail the penetration test shall be deemed to have failed the analytical requirement.

#### 6.5.1.2 Analysis zones

The analysis zones for CCA, copper quaternary and copper azole shall be the outer 30 mm.

Amd 5  
Dec '12

#### 6.5.1.3 Preservative retention requirement

The retention of preservative in the analysis zone of the treated timber shall be not less than specified in table 6.4.

**Table 6.4 – Minimum preservative retention in the H5 analysis zone**

Preservative type	Component	Retention % m/m oven dry weight of wood
Copper quaternary	Cu + DDAX where x = chloride or carbonate/bicarbonate	1.35
CCA	Cu + Cr + As	0.95
CuAz	Cu + tebuconazole	0.759

Amd 5  
Dec '12

#### 6.5.2 Round, part round, or sawn timber for use in buildings including retaining wall vertical members, but excluding horticultural support or shelter

##### 6.5.2.1 Penetration

Complete sapwood penetration shall be achieved, continuous with evidence of distribution through both earlywood and latewood, plus a minimum of 30 mm penetration from three sawn faces and a minimum of 20 mm from the other sawn face.

Samples which fail the penetration test shall be deemed to have failed the analytical requirement.

##### 6.5.2.2 Analysis zones

The analysis zone shall be the penetrated zone as described in 6.5.2.1. With sawn timber, this may be taken from any face.

##### 6.5.2.3 Preservative retention requirement

The retention of preservative in the analysis zone of the treated timber shall be not less than specified in table 6.4.

#### 6.5.3 Round, part round, or sawn timber used for horticultural support or shelter on very severe extreme hazard sites

##### 6.5.3.1 Penetration

###### 6.5.3.1.1

There shall be evidence of distribution through both earlywood and latewood, and shall meet the requirements below:

- Length greater than 3.6 m (i.e. a pole) – Complete sapwood penetration with a minimum depth of 30 mm;
- Length less than or equal to 3.6 m (i.e. a post) – Complete sapwood penetration. If sawn, complete sapwood penetration and a minimum of 10 mm from each sawn face.

Samples which fail the penetration test shall be deemed to have failed the analytical requirement.

Amd 5  
Dec '12

**C6.5.3.1.1**

*A pole requires a higher level of penetration due to its size and greater value.*

**6.5.3.1.2**

Unpenetrated heartwood shall be permitted if: it comprises less than 20 % of the cross-section of the piece; it does not extend through the piece from one surface to the opposite surface; and it does not exceed half the dimensions of any side of the cross-section.

**6.5.3.2 Analysis zones**

The analysis zones shall be as given below:

- (a) Length greater than 3.6 m – The outer 30 mm from any surface;
- (b) Length less than or equal to 3.6 m – The outer 10 mm from any surface.

**6.5.3.3 Preservative retention requirement**

The retention of preservative in the analysis zone of the treated timber shall be not less than specified in table 6.4.

**6.6 Hazard class H6**

Timber treated to hazard class H6 shall comply with the requirements of this clause. The description of hazard class, the preservative and the branding shall be as described in sections 3, 4 and 5 respectively.

**6.6.1 Penetration**

Complete sapwood penetration shall be achieved, continuous with evidence of distribution through both earlywood and latewood, with a minimum of 40 mm penetration from any face including heartwood.

Samples which fail the penetration test shall be deemed to have failed the analytical requirement.

**C6.6.1**

*Because of difficulty in obtaining the required penetration and retention in heartwood, care should be taken in selecting predominantly sapwood for treatment to this specification.*

**6.6.2 Analysis zones**

The analysis zone shall be the outer 40 mm of the sample. With sawn timber, this shall be taken from any face.

**6.6.3 Preservative retention requirement**

The retention of preservative in the analysis zone of the treated timber shall be not less than specified in table 6.5.

**Table 6.5 – Minimum preservative retention in the H6 analysis zone  
(rounds, part rounds and sawn timber)**

Preservative type	Component	Retention % m/m oven dry weight of wood
CCA	Cu	0.40

## APPENDIX A NEW ZEALAND TIMBER PRESERVATION COUNCIL (NZTPC) REQUIREMENTS OF REGISTERED TREATMENT PLANTS

(Informative)

This Appendix describes registration in accordance with the NZTPC and includes other recognised quality assurance schemes.

### A1 The New Zealand Timber Preservation Council (NZTPC)

The NZTPC manages a quality assurance scheme for treatment of timber under the WOODmark® brand.

### A2 Registered treatment plants

Plants will treat and identify timber wholly in accordance with the provisions of this Standard.

### A3 Treatment plant records

Full records of all timber treatment carried out will be retained by each treatment plant for a period of 10 years.

### A4 Minimum NZTPC requirements and identification

#### A4.1 The WOODmark® and the WOODmark® device √

The WOODmark® and the WOODmark® device √ are the registered certification marks of the NZTPC.

#### A4.2

Timber that has been treated in strict compliance with the NZTPC's Timber Preservation Quality Manual and this Standard shall, as a minimum requirement, be branded with:

- (a) The identification number issued by the NZTPC for the plant where the timber was treated;
- (b) The chemical number;
- (c) The hazard class number to which the timber has been treated (e.g. H3.1).
- (d) The WOODmark® device √ ;

The positioning and placement of the brand should conform to the requirements of table 5.1.

#### A4.3

NZTPC licensees who are also approved producers of square sawn piles will also apply a brand supplied by the NZTPC.

#### A4.4

Registered numbers issued by the State Forests of New South Wales to New Zealand plants may be used as an alternative to the NZTPC's registered number, after approval has been obtained from the NZTPC.

### A5 NZTPC Quality Manual


The NZTPC Quality Manual provides a framework of quality systems designed to ensure that timber preservation and associated processes are carried out in a controlled manner. Its provisions must be adhered to by timber preservation plants which are licensed with the NZTPC to use the WOODmark® and WOODmark® device √ .



## NZS 3640:2003

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### A6 Enquiries

Any enquiries regarding the use of the NZTPC's Timber Preservation Quality Manual, the WOODmark® and the WOODmark® device  in conjunction with this Standard should be addressed to:

The Executive Officer  
NZ Timber Preservation Council Inc,  
P O Box 308  
Wellington  
New Zealand

Telephone: +64 4 473 5200  
Fax: +64 4 473 6536  
Email: [inquiries@nztpc.co.nz](mailto:inquiries@nztpc.co.nz)

### A7 AgriQuality Timber Treatment Programme

AgriQuality operates a quality assurance scheme for the treatment of timber.

#### A7.1 *Minimum requirements and identification*

Plants that comply with audits (timber treatment/environmental management/health and safety practices) and product testing are certified and licensed to use the registered assurance mark (e.g. figure 5.1).

#### A7.2 *Enquiries*

Any enquiries regarding certification should be addressed to:

Forestry Business Manager  
AgriQuality Ltd  
P O Box 4127  
Mt Maunganui South

Freephone: 0508 00 11 22  
Email: [info@agriquality.com](mailto:info@agriquality.com)



## APPENDIX B SPECIFICATION ADVISORY NOTES

(Informative)

### B1

The mandatory provisions of this Standard apply up to the treatment plant gate, but this Appendix covers some of the issues relating to subsequent handling and use of treated timber.

The care and proper handling of timber after treatment, prior to use and in service may be covered by specific recommendations from suppliers detailing necessary or desirable maintenance procedures that may influence the performance of the product.

### B2 Care of treated timber

#### B2.1

Treated timber should be properly cared for before use to avoid exposure to a hazard situation for which it has not been protected (e.g. H1.1, H1.2, H3.1 and H3.2 timbers should be stored out of contact with the ground).

Amd 5  
Dec '12

NOTE – A leachable preservative is one whose active ingredients are removed or are partially removed by the action of water.

#### B2.2

Waxes and resins are often added to LOSP treatments. These may serve different purposes:

- (a) To act as a binder for the active ingredients in the timber;
- (b) To impart some measure of water repellency to the wood; and
- (c) To prevent “blooming” of the active ingredients during solvent evaporation.

The water repellency function is usually intended only as a temporary measure for protection from rainwetting until such time as the wood is painted or enclosed. It should not be assumed that the long-term performance of unpainted LOSP treated wood is significantly improved by the addition of waxes and repellents.

### B3 Fixing CCA preservatives

AS/NZS 2843.1 contains requirements for timber treated with CCA preservatives to allow for fixing of the active ingredients to occur for environmental protection and occupational health and safety reasons.

## NZS 3640:2003

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### **B4 Building poles and piles**

#### **B4.1**

Ends cut after treatment should not be put into the ground.

#### **B4.2**

Any cut or bored surfaces should have been allowed to surface dry before applying *in situ* preparations or connecting metal fasteners. Refer to NZS 3604 for the protection of metal fasteners.

#### **B4.3**

Where possible, the cut ends should be continuously protected from the weather.

#### **B4.4**

Treated timber that is to be used as driven timber piles should be allowed to stand for three weeks after treatment before being driven.

### **B5 Machining and sawing treated timber**

With timber for use in hazard class H3.1 and above, it is inadvisable to cut or machine the timber after treatment. When this is unavoidable, supplementary protection as prescribed by the manufacturer should be applied to the cut surface. This protection, however, cannot be expected to be as effective as the original treatment.

Any shavings, sawdust or offcuts should not be burnt but disposed of in an approved landfill.

## APPENDIX C BIBLIOGRAPHY

### (Informative)

In addition to the referenced documents in the front of this Standard, the following publications may be of interest to treatment plant proprietors and operators.

#### NEW ZEALAND STANDARDS

NZS 3607:1989            Specification for round and part-round timber fence posts

#### JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

AS/NZS 1148:2001      Timber – Nomenclature – Australian, New Zealand and imported species  
AS/NZS 2843.2:2000   Timber preservation plant safety code – Plant operation

#### LEGISLATION

Building Act 1991  
Building Regulations 1992

#### OTHER PUBLICATIONS

Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites. Published by Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council (NHMRC), Canberra, 1992.

Protocols for Assessment of Wood Preservatives. Australasian Wood Preservation Committee, Victoria, 1997.

Timber Preservatives and Antisapstain Chemicals – Approved Code of Practice for the Safe Use of. Occupational Safety and Health Service, Department of Labour, Wellington, 1994.

Treatment and disposal of timber preservative wastes. Waste Management Guide 02. New Zealand Department of Health, Wellington, 1987.

**APPENDIX D**  
**APPLICATION FORM FOR APPROVAL OF A TIMBER PRESERVATIVE**

(Informative)

**D1**

The application form for approval of a new preservative is included for information. Application forms are available from Standards New Zealand. Copies of these forms follow this page.

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## APPLICATION FOR APPROVAL OF TIMBER PRESERVATIVES

**For approval in:**

**NZS 3640:2003 – Chemical Preservation of Round and Sawn Timber**

Send the signed, completed form along with fee, relevant data packages and attachments to:

Standards New Zealand

Postal address:  
Private Bag 2439  
Wellington 6140  
New Zealand

Courier address:  
Level 6  
8 Gilmer Terrace  
Wellington  
New Zealand

Tel: (04) 498 5990  
Fax: (04) 498 5994

Amd 5  
Dec '12

Provide four copies of the application and supporting documentation. In addition, provide an electronic copy of the application form on disk.

**PART A – General information**

1.

Trade name of the timber preservative

2.

Applicant details

Company name

Postal address

Street address

Telephone number

Facsimile number

Email address

Contact person

3.

Person acting on behalf of applicant (if applicable)

Name

Postal address

Street address

Telephone number

Facsimile number

Email address

4.

Application type (delete yes/no as applicable)

(a)

Amendment to existing approved preservative

Examples: an amendment could be to a retention level or to

include an additional hazard class for an existing

timber preservative

Yes/No

(b)

Approval of new preservative

Yes/No

## PART B – Information on the timber preservative

### 1. Approval under HSNO Act 1996

(1) HSNO approval number \_\_\_\_\_; or

(2) Attach written confirmation from ERMA New Zealand\* that the trade name product matches an existing approved substance.

Amd 5  
Dec '12

### 2. Formulation type

Tick the one box that describes the type of timber preservative formulation:

- ☐ Emulsifiable concentrate
- ☐ Emulsion (oil in water)
- ☐ Emulsion (water in oil)
- ☐ Liquid; ready to use in water
- ☐ Liquid: ready to use in other solvent (specify type) \_\_\_\_\_
- ☐ Soluble concentrate
- ☐ Water soluble granules
- ☐ Other (give details) \_\_\_\_\_

### 3. Preservative specification

Provide a description and specification to be included in section 4 of NZS 3640:2003

Where other ingredients are included that may contribute to the overall performance of the preservative, then these should also be included (e.g. water repellent systems).

The specification should be confirmed with a Certificate of Analysis using validated analytical methods and a suitably accredited laboratory.

The applicant will provide:

- (1) A colourmetric method (where applicable) for checking the penetration of the active ingredient(s) in timber; and
- (2) An analytical method for the active ingredients in timber for confirmation of retentions.

<b>Description:</b>

Specification for active ingredients:	
Component (%)	Allowable range

\* From 1 July 2011, ERMA became the Environmental Protection Authority (EPA).

Amd 5  
Dec '12



- ☐ Hazard class 1
- ☐ Hazard class 2
- ☐ Hazard class 3
- ☐ Hazard class 4
- ☐ Hazard class 5
- ☐ Hazard class 6

Attach a summary document (less than 300 words) identifying the timber preservative and the purpose of this application. Indicate the retentions and hazard classes for the candidate timber preservative. This overview should include reference to the testing undertaken, to justify the retentions for each hazard class for which approval is being sought.

The full Standards Committee will vote on the approval for adoption of the candidate timber preservative into NZS 3640:2003.

List the other countries where the timber preservative is already registered, and summarize the retentions approved for specific hazard class or end uses:

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Attach copies of the trade name product label, a material safety data sheet, and any technical or marketing information describing the trade name product, and how the treated timber is proposed to be used.

## PART C – Efficacy as a timber preservative

Clearly identify any data or reports in Part C that could be interpreted as commercially sensitive, and therefore confidential (see section 9 of the Official Information Act, 1982). The data provided in this section will only be made available to the reviewers.

The efficacy volume submitted in this section should include comprehensive data on the methodology used, and the results from laboratory and field scale trials, which prove that the timber preservative will be effective at the active ingredient retentions claimed for each hazard class. Field trials should reflect the type of timber product and end-use exposure conditions for the hazard class. It must be clearly identified where data has been generated in-house or by external third-party organizations.

Applicants are referred to the document, Protocols for assessment of wood preservatives from the Australasian Wood Preservation Committee (AWPC). This document gives guidance on the methodology and the minimum type of testing requirement for each hazard class. The basis for approval of a timber preservative for hazard class 3 and higher is weighted towards the performance of a candidate timber preservative in field trials, when compared to benchmark treatments of an existing approved product.

It is assumed that any candidate preservative will meet the preservative penetration requirements already in the Standard for each hazard class. If a different penetration or analytical analysis zone is proposed, then the justification for this must be included in this section.

### 1. Summary of efficacy trials

Summarize the test reports provided as Appendices to the efficacy volume:

Hazard class	Type of test	Testing organization
1.1	Laboratory	
1.2	Laboratory	
3.1	Laboratory	
3.2	Field	
4	Laboratory	
	Field	
5	Laboratory	
	Field	
6	Laboratory	
	Field	

### 2. Justification for approval

For each hazard class, one at a time, provide summaries of the test results cross-referenced to the relevant laboratory and field trials.

Justify from the results a case to support the preservative retentions in the application. Efficacy trials should reflect a range of New Zealand exposure conditions typical to how the preservative treated timber will be used commercially. It is preferable if exposure conditions are optimum for the biological hazard. Data from overseas may be used to complement or support local data.

Applicants must clearly identify and cross-reference experimental product codes with the trade name product. Detailed information should also be provided on the wood substrate, wood density and biological hazards. Preservative retentions used in test material should be unambiguous. It should be made clear on what basis these retentions were determined.

All trials should be carried out following the principles of an established scientific method. There should be sufficient replicates and inclusion of untreated and benchmark treatment controls, prepared using standard methods of treatment. Conclusions should be clear and allow comparisons to be made with data from other trials. Wherever possible, data should be analysed for statistical significance with reference to the type of method used.

It should be clearly stated where approval is being sought for specific products or uses within a hazard class:

- (a) For vertical exposure versus horizontal applications; or
- (b) Where the presence of paint coating is required.

### **3. Permanence of treated timber in-service**

Provide information, based on field tests, on the predicted long-term service life. Use examples of specific treated timber products, in the relevant hazard classes for which approval is sought for the timber preservative.

This section is relevant to adoption of the treated timber in other New Zealand Standards (e.g. NZS 3602), and acceptance in the Building Code.

The expected service life predictions may allow for scaling up to commercial-size timber dimensions, data from leaching and depletion studies, and the effect of climatic conditions such as ultra-violet and weathering effects on timber surfaces.

## PART D: Miscellaneous

### Checklist

Every application must be accompanied by:

- ☐ Covering letter
- ☐ Four copies of complete application
- ☐ Electronic copy of application (on disk)
- ☐ Cheque for fee

### PART A

- ☐ Application form completed
- ☐ Product information

### PART B

- ☐ Application form completed
- ☐ Application overview included

### PART C

- ☐ Efficacy volume (four copies)

### Declaration

The information is supplied to Standards New Zealand for consideration for approval of a timber preservative in NZS 3640:2003 to support:

- (a) New approval; or
- (b) Variation of an existing approval.

Cheque enclosed for: \$ \_\_\_\_\_  
(Please make cheques payable to Standards New Zealand)

All information provided that is confidential is clearly identified.

I declare that all information in this application is true and correct.

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX E – DETERMINATION OF TRIADIMEFON AND CYPROCONAZOLE IN GLUELINE AND SURFACE-TREATED TIMBER

(Normative)

### E1 Principle

Triadimefon and cyproconazole are extracted from ground timber with methanol using Soxhlet extraction or an equivalent automated extraction system. The extract is analysed for triadimefon and cyproconazole by capillary gas chromatography (GC) with flame ionisation detector (FID) detection.

Quantification is done using an internal standard (see E5.1). Results are expressed as a per cent mass/mass (% m/m) on an oven-dry weight basis by correction for the moisture determined on a parallel sample.

### E2 Reagents

All reagents shall be of analytical reagent quality.

The following reagents shall be used:

- (a) Methanol ..... Analytical reagent grade;
- (b) Triadimefon ..... Analytical reference-grade material with certificate of purity;
- (c) Cyproconazole ..... Analytical reference-grade material with certificate of purity;
- (d) Dibutyl phthalate ..... Laboratory reagent grade satisfactory.

### E3 Sampling and moisture content

Samples shall be at least air-dry, and preferably at equilibrium moisture content. Samples to be analysed shall not be oven-dried.

Cross-sectional samples shall be dry milled to pass through a 2 mm screen (such as a Wiley mill). More than 50 % of the sample must be retained on a 1 mm screen.

Surface samples shall be removed with a planer or similar and blended in a bench-top blender for 15 – 30 seconds to reduce the size of any long shavings.

To determine moisture content, accurately weigh a sample, dry overnight at 105 °C, cool the dried sample in a dessicator, then reweigh.

## E4 Procedure

To determine the concentration of triadimefon and cyproconazole, separate samples and analyses are to be carried out on glueline cross-section and surface-treated timber using the following extraction procedure:

- (a) Weigh approximately 5 g of the sample (to the nearest 0.1 mg) into a cellulose extraction thimble (Ws) and place a small amount of glass wool in the top of the thimble;
- (b) Place the extraction thimble into a Soxhlet extractor and add 80 mL of methanol to the collection flask along with some boiling chips;
- (c) Set up the Soxhlet extraction and run for 2.5 hours;

NOTE – Automated Soxhlet extraction may be used in which case sample weights, solvent volumes and extraction time will vary depending on the extraction equipment used.

- (d) Determine the final volume of methanol extract obtained (V) and quantitatively transfer 40 mL of this methanol extract to a 50 mL bottle;
- (e) Add 5.0 mL of dibutyl phthalate internal standard with a volumetric pipette and mix well;
- (f) Filter an aliquot through a 0.2 µm syringe filter into a vial.

## E5 Standard solutions

### E5.1 Internal standard

The internal standard shall be prepared as follows:

- (a) Weigh 0.15 g of dibutyl phthalate to the nearest 0.1 mg into a 100.0 mL volumetric flask;
- (b) Make up to the mark with methanol.

### E5.2 Triadimefon and cyproconazole standards

The triadimefon and cyproconazole standards shall be prepared as follows:

- (a) Weigh approximately 0.01 g of triadimefon standard to the nearest 0.1 mg into a 50 mL bottle;
- (b) Weigh approximately 0.01 g of cyproconazole standard to the nearest 0.1 mg into the same 50 mL bottle;
- (c) Add 5.0 mL of dibutyl phthalate internal standard with a volumetric pipette;
- (d) Make up to approximately 50 mL with methanol;
- (e) Filter an aliquot through a 0.2 µm syringe filter into a vial.

Amd 5  
Dec '12

## E6 QUANTITATION

The instrument settings and operating conditions for determination of triadimefon and cyproconazole shall be in accordance with table E1 and the following procedure:

- (a) A 1 µL aliquot of each standard and sample solution is injected into the GC with FID detection;
- (b) The order of elution is:
  - (i) Dibutyl phthalate
  - (ii) Triadimefon
  - (iii) Cyproconazole.

**Table E1 – Gas chromatograph conditions**

<b>Capillary column</b>	Zebron ZB-1, or equivalent 15 m, 0.25 mm ID, 0.25 µ film thickness
<b>Injector</b>	1 µL splitless injection Temperature 28 °C Sampling time 1.50 minutes Carrier gas helium Total flow 27.2 mL/min
<b>Oven</b>	Initial temperature 40 °C, hold for 1 minute Increase temperature at 5 °C/minute to 80 °C, Then 10 °C/minute to 280 °C. Hold at 280 °C for 10 minutes
<b>Detector</b>	FID at 280 °C



## E7 CALCULATIONS

### E7.1 Moisture content

The percentage moisture content (MC) of the timber sample shall be calculated from the following equation:

$$MC = \frac{W_i - W_f}{W_f} \times 100 \quad \text{..... (Eq E7.1)}$$

where

$W_i$  = initial weight of timber sample, in grams

$W_f$  = final weight of dried timber sample, in grams

### E7.2 Corrected sample weight

The sample weight in grams corrected for moisture content ( $W_c$ ) shall be calculated from the following equation:

$$W_c = \frac{W_s}{\left(1 + \frac{MC}{100}\right)} \quad \text{..... (Eq E7.2)}$$

where

$W_s$  = initial weight of timber sample, in grams

MC = percentage moisture content of the initial timber sample

### E7.3 Relative response factor

The relative response factor (RRF) shall be calculated from the following equation:

$$RRF = \left( \frac{A_{IS}}{A_{std}} \right) \times \left( \frac{wt_{std}}{1} \right) \quad \text{..... (Eq E7.3)}$$

where

$A_{IS}$  = peak area of internal standard in standard chromatogram

$A_{std}$  = peak area of standard in standard chromatogram

$wt_{std}$  = weight of active corrected for per cent purity in standard, in grams

### E7.4 Per cent mass/mass (% m/m) of active ingredients

The per cent mass/mass (% m/m) of triadimefon or cyproconazole shall be calculated separately from the following equation. Separate results shall be obtained for each active ingredient and for the glue/line cross-section and surface treated timber zones:

$$\text{Active concentration (\% m/m)} = \frac{(A_s \times RRF \times V \times 100)}{(A_{IS} \times 40 \times W_c)} \quad \text{..... (Eq E7.4)}$$

where

$A_s$  = peak area of active in sample chromatogram

$V$  = final volume of methanol extract (mL)

$A_{IS}$  = peak area of internal standard in sample chromatogram

$RRF$  and  $W_c$  are defined in E7.2 and E7.3

## NOTES

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Approved by the Standards Council on 27 November 2003 to be a New Zealand Standard pursuant to the provisions of section 10 of the Standards Act 1988.

Amendment No. 5 was approved on 29 November 2012 by the Standards Council to be an amendment to NZS 3640:2003.

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