



APPRAISAL

PRODUCT: **TIMBERSAVER BORON treated radiata pine framing**

Appraisal for : **TENON**

as the producer of TIMBERSAVER BORON
treated framing

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Appraisal reference: **2004-03**

TIMBERSAVER BORON Appraisal for TENON, Rainbow Mountain, Rotorua

Appraisal reference: 2004-03

Date: 4 May 2004

PRODUCT

The product is kiln dried radiata pine timber that has been treated in final shape and form by TENON, Rainbow Mountain with PROTIM[®] *TimberSaver*[™], a preservative formulation manufactured and supplied by Osiose New Zealand.

The product is coloured orange and has the words “Origin Timeframe Tenon” on the edge and “TIMBERSAVER BORON 669” imprinted at no more than 1500mm centres along one face of the timber.

The product is intended as an alternative for those situations where New Zealand Standard NZS 3602:2003 “Timber and wood-based products for use in building”, requires treatment to Hazard Class H1.2. It is not suitable in those situations where the Standard requires higher levels of treatment such as to Hazard Class H3.1 or H3.2.

SCOPE AND LIMITATIONS OF APPRAISAL

The product is appraised for use in new building work for end use applications above ground and protected from the weather where the moisture content of timber framing is required to be 20% or less. No claims are made for the situation where the timber is exposed to the elements or subjected to regular wetting in service.

This appraisal relates to the use of the product as framing timber where framing comprises:

- a) sub-floor framing, excluding piles, exposed to ground atmosphere but not to the weather in situations where the sub-floor ventilation requirements of Clause 6.14 of NZS 3604: 1999 have been met, and
- b) other components detailed in Table 1 of NZS 3602:2003 where a H1.1 or H1.2 level of preservative treatment is specified.

This appraisal is limited to a maximum cross section timber dimension of 90 x 45 mm. Until sold to its end user the treated timber shall be protected from the weather.

In the case where the product is to be used in an exterior wall, the Appraisal applies irrespective of the cladding type, provided that the cladding complies with the New Zealand Building Code and is maintained in that condition throughout its life.

NEW ZEALAND BUILDING CODE –GENERAL CLAIMS OF COMPLIANCE

In the opinion of the appraiser the product if used in accordance with this Appraisal will meet certain Performances of the following New Zealand Building Code (NZBC) Clauses:

- B1 “Structure”; B2 “Durability”; and F2 “Hazardous Building Materials”.

See later in Appraisal for specific details of compliance.

TIMBERSAVER BORON Appraisal for TENON, Rainbow Mountain, Rotorua

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TECHNICAL DESCRIPTION

The product is radiata pine timber framing that after kiln drying to 18% moisture content or less and after machining to its final cross-section dimension has been preservative treated with the PROTIM® *TimberSaver*™ liquid boron formulation. This preservative is formulated in a glycol solvent which allows some diffusion from timber surfaces into the kiln dry timber resulting in a treated envelope.

The preservative treatment is applied to all timber surfaces and faces by dipping boards and achieves a 3 mm or more envelope penetration zone and a total cross-section concentration of boric acid of 0.4% mm (on an oven dry basis). This concentration being the level generally accepted as necessary to afford protection from decay for the framing timbers covered by the Appraisal and recognised in Hazard Class 1.2 of NZS3640:2003 “Chemical Preservation of round and sawn timber”.

In the event of the framing becoming damp during subsequent handling, storage or in-use, such as can occur when a cladding fails or a water pipe leaks in a wall at any time in the life of the structure, then the preservative will diffuse in the affected area. In this manner short term protection is given to damp wood allowing time for leaks to be detected and repairs to be conducted without there being a risk of deterioration from decay and therefore alleviating the need to replace the framing. The preservative treatment also provides protection from wood borer damage.

The point of difference between traditional borate treatments and PROTIM® *TimberSaver*™ is that the latter is a surface treatment applied to kiln dry timber that has already been machined to its final shape and form. The PROTIM® *TimberSaver*™ preservative treatment will result in a borate concentration gradient through the cross-section. The borate compound is at a higher concentration on the outer surface envelope where decay might be expected to become established but also can diffuse throughout the timber cross-section should the timber become damp during construction or at any time through its service life. Sufficient PROTIM® *TimberSaver*™ is applied to the dry timber framing so that in the event of the framing becoming damp the boron can diffuse.

Typically traditional boron treatments are applied to fresh green sawn timber and the borate penetrates slowly by diffusion and drying, or a pressure process is used on dry timber but the uptake of a water solvent is problematical for subsequent drying. An in-line application of PROTIM® *TimberSaver*™ adds little moisture to dry timber thereby eliminating dimensional changes and the need for a second kiln drying step. The presence of the PROTIM® *TimberSaver*™ in radiata pine framing increases the equilibrium moisture content by 1% when compared to untreated pine.

Where processing of the product on site exceeds specified limits (see the “Installation” section of this Appraisal) then a liberal brush application of PROTIM® *FrameSaver*™ needs to be applied to exposed surfaces to reinstate the lost surface treatment. PROTIM® *FrameSaver*™ is an identical product to PROTIM® *TimberSaver*™ and is supplied by Osmose New Zealand in 5 and 20 litres containers in either clear or red-dyed form. For this application the red-dyed form is used so as to provide evidence of coverage.

TIMBERSAVER BORON Appraisal for TENON, Rainbow Mountain, Rotorua

Appraisal reference: 2004-03

Date: 4 May 2004

HANDLING AND STORAGE

The product leaves TENON, Rainbow Mountain in packets wrapped in a polythene protective wrap labelled to identify the treater, the type of treatment and its date of application.

The product shall be protected from the weather and if stored outside it must be kept on bearers up off the ground, free from vegetation and not exposed to ground ponding of water. The integrity of the polythene protective wrap shall be maintained to avoid rain from leaching the preservative from timber surfaces.

The product shall not be exposed to the weather for more than 2 months. This period includes any time that the product is unprotected during transportation, storage or building construction.

The product can be used by builders without any additional precautions when compared to untreated or other preservative treated framing. Protection of eyes, avoiding inhalation of wood dust and the use of gloves to prevent splinters are normal recommended precautions for handling any timber product.

Osrose New Zealand provide a safety data sheet for the product; **“PROTIM® TimberSaver™** treated radiata pine”, dated July 2003 which will be available at the point of sale or directly from Osrose by calling 0800 78 70 70.

Treated timber off-cuts should not be used as fuel for barbeques or heating fires, garden mulch or animal bedding but can be disposed to landfill.

NEW ZEALAND BUILDING CODE –SPECIFIC CLAIMS OF COMPLIANCE

Clause B1 “Structure”

The product shall be used as framing that has been designed in accordance with Verification Method B1/VM1 in the B1 Approved Document. In other words, by specific design with design loadings taken from NZS 4203:1992 “Code of practice for general structural design and design loadings for buildings” and material properties from NZS 3603:1993 “ Timber Structures Standard”.

When this criteria is met the product will comply with NZBC Clauses B1.3.1, B1.3.2 and B1.3.4 for B1.3.3 (a), (b), (f), (g) and (h).

This Appraisal relates more to the durability of the product than its structural design. However, durability as required in the NZBC relates to the ongoing ability of the product to continue to satisfy the other provisions of the NZBC. In this case, the product will be durable in respect of its structural performance but only when its structural performance is adequate in the first place.

TIMBERSAVER BORON Appraisal for TENON, Rainbow Mountain, Rotorua

Appraisal reference: 2004-03

Date: 4 May 2004

Clause B2 “Durability”

When used in accordance with this Appraisal the product will meet NZBC Clause B2.3.1 (a). In other words, the product will be durable for the life of the building, being not less than 50 years.

The product will be resistant to attack from wood boring insects and prevent degradation by decay fungi should timber framing become damp during the life of the building provided it is used within the scope and limitations given earlier in this Appraisal.

Although the product has to be used in dry locations it can withstand limited exposure to dampness, such as could occur during the construction phase (see limitations given in “Handling and Storage” section of this Appraisal) or in-service as a result of a failure in the cladding or an internal leak, such as from a burst water pipe. The claims made in this Appraisal are conditional on any such exposure of damp framing in-service being limited to 2 years. It is considered that this gives ample time for a problem to be detected and remedied without there being the need to replace the product itself.

Maintenance

In the normal course of events no maintenance is necessary to the treated timber frame. In the case of timber framing exceeding a moisture content of 20% then the source of the dampness or leak must be identified and eliminated.

Where it is ascertained that throughout its life the TIMBERSAVER BORON treated framing has not been damp or exposed to leaks for more than 2 years then the frame shall be dried and the walls relined without further remedial actions being necessary.

Where the TIMBERSAVER BORON treated framing has been exposed to leaks for more than 2 years or it cannot be ascertained that its exposure has been for less than 2 years, then an inspection by a professional such as a building surveyor is required to determine if the timber is free of decay and suitable for continued service.

Walls shall not be relined until the timber frame is less than 20% moisture content.

Clause F2 “Hazardous building materials”.

The PROTIM® TimberSaver™ timber preservative is a legal existing substance under the HSNO Act 1996.

When used in accordance with this Appraisal the product will meet Clause F2.3.1.

The TIMBERSAVER BORON treated framing is not considered a hazardous substance. No volatiles, vapour emissions or solid particles are given off from the product in service. The preservative components remain by necessity as residues in the framing timber.

In the event of a cladding failure or burst water pipe that results in a flow of water across timber surfaces, then any leaching of the boron from timber would be slow and the leachate would not pose a risk to the occupants or the environment.

INSTALLATION

Installation is essentially the same as for any other timber framing, however, because the product only has a surface treatment the following requirements with respect of cutting, drilling, machining, rebating, notching, ripping or planing must be met:

- **Cutting**
Any cut exposed surfaces greater in area than 1.5 times the cross-section area shall be protected with a liberal brush-on coating of PROTIM® *FrameSaver*™. In practice this means that square cuts, 45 degree mitre cuts or any angle of cut between these limits do not require further protection. Cuts that are beyond a 45 degree mitre cut must be protected by a liberal brush-on coating of PROTIM® *FrameSaver*™.
- **Drilling**
Drilling of holes shall be permitted with a 25 mm diameter limit, e.g. for electric wiring. For larger holes, the exposed cut surfaces must be protected with a liberal brush-on coating of PROTIM® *FrameSaver*™.
- **Machining, rebating, notching, ripping or planing**
Where machining, rebating, notching, ripping or planing of surfaces occurs, the newly exposed surfaces shall be protected with a liberal brush-on coating of PROTIM® *FrameSaver*™.

The liberal brush-on coating of PROTIM® *FrameSaver*™ shall be applied at a rate of at least 200 ml per m² of surface treated. Red-dyed PROTIM® *FrameSaver*™ must be used so as to provide evidence of coverage.

Where these requirements for a brush-on application of preservative to fresh sawn or exposed surfaces have not been met then the use of the product is outside of the scope of this Appraisal and the product's suitability for use needs to be demonstrated by other means.

Framing shall not be closed in until its moisture content is less than or equal to 20%.

The PROTIM® *TimberSaver*™ treatment does impact on the accuracy of the moisture meter readings for both conductivity (resistance) and capacitance-type moisture meters. Provided the apparent reading by such moisture meters is 38% or less, an actual wood moisture content of 20% or less has been achieved.

TIMBERSAVER BORON Appraisal for TENON, Rainbow Mountain, Rotorua

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BASIS OF APPRAISAL

NZBC Clause B1 “Structure”

The claims in this Appraisal for structural strength are based on the designs complying with the B1 Approved Document.

Tests performed by *Forest Research* have adequately demonstrated that the PROTIM® *TimberSaver*TM treatment has no significant effect on the strength properties of radiata pine framing when compared with kiln dried untreated timber.

NZBC Clause F2 “Hazardous building materials”.

The assessment of the hazardous nature of timber treated with PROTIM® *TimberSaver*TM has been made on:

1. Information contained in the PROTIM® *TimberSaver*TM preservative and treated timber Material Safety Data Sheets (July 2003). No volatiles or emissions are given off by the treated timber that present any hazardous risks.
2. The history of overseas use as a remedial timber preservative for approximately 20 years without any documented adverse effects.
3. Consideration of potential adverse effects from exposure to the product based on the threshold classifications for the preservative by ERMA (Transfer report, June 2003) .

NZBC Clause B2 “Durability”.

The claims in this Appraisal with respect to durability are based on:

1. The history of use and effectiveness of boron -based treatment products in New Zealand and overseas.
2. Work undertaken by BRANZ, including its Appraisal Certificate No. 428 (2002) which indicated there are no adverse effects on metal components resulting from the use of PROTIM® *TimberSaver*TM and other similar products.
3. Osmose New Zealand’s technical information, supporting documents and reports.
4. Testing undertaken by Osmose New Zealand and *Forest Research* (FR).

The *Forest Research* testing demonstrated the ability of the product to prevent decay after 2 years exposure under severe exposure conditions. The samples tested had fresh cut ends, moisture contents exceeding 40% and were pre-inoculated with two decay fungi. The exposure conditions could be described as representing a worst case scenario for a situation for framing timber under circumstances that would not comply with the NZBC such as the localised failure of building elements to meet Clause E2.3.2. Identical tests were also conducted by FR on the more conventional (complete sapwood penetration) boron treatment described as H1.2 in NZS3640:2003 and comparisons between the two indicated very similar levels of performance.

The critical element for B2 Durability was to determine whether an envelope treatment of this type provides effective fungicidal protection in an at-risk framing situation. Testing performed by Osmose New Zealand has demonstrated that if the dry treated timber is subsequently wetted up then the boron will diffuse deeper into the cross-section. As decay can also be expected to develop where the moisture is present then the mobility of the boron treatment is an advantage.

Borate compounds are approved for protection of timber from wood boring insects in NZS 3640:2003 provided complete sapwood penetration by the preservative is achieved. No specific testing with insects has been carried out with the product, however, it will be kiln dried prior to the treatment and the timber will have been effectively sterilised and at a moisture content to less than 18%. While the borate preservative treatment will initially increase this moisture content and then only be an envelope of protection if timber stays dry, no specific risk of borer attack has been identified that would compromise the structure and minimum 50 year service life of the framing. Furthermore untreated kiln dried framing (less than 18% m.c.) is widely acknowledged as an acceptable product.

Other Investigations.

The specifications and quality assurance measures pertaining to the manufacture of Osmose's PROTIM® *TimberSaver*™ treated framing have been investigated and are considered acceptable:

Osmose New Zealand and TENON, Rainbow Mountain have demonstrated PROTIM® *TimberSaver*™ can be applied by dipping to kiln dried machined pine framing and that the limiting criteria with respect to target uptakes and boric acid equivalent retentions are readily achievable.

The specifications and quality assurance measures pertaining to the manufacture of TIMBERSAVER BORON treated framing as noted below and put in place by TENON, Rainbow Mountain have been investigated and considered acceptable. These documents require commissioning, with input and acceptance from Osmose, and the establishment of process controls to ensure nominated treatment criteria are met. In production there are checks per shift on preservative coverage, penetration, and amount of chemical used. If

these checks detect problems then nominated corrective actions are instigated and faulty timber re-treated. On a monthly basis retention tests are conducted off site to confirm the appropriateness of the process controls determined during the commissioning phase. If problems are detected this requires re-commissioning of the plant. All procedures are subject to a 3 monthly external and independent audit:

1. Osmose New Zealand:
Code of Practice for the Use of *TimberSaver*[™] as a treatment for Pine Framing. 7 April, 2004.
2. TENON, Rainbow Mountain;
SITE QUALITY MANUAL, TIMBERSAVER[™] DIP SYSTEM
30 April, 2004.
3. TENON, Rainbow Mountain;
PROCESS CONTROL PROCEDURES
TIMBERSAVER[™] DIPPING SYSTEM,
30 April, 2004.

CONDITIONS OF APPRAISAL

1. The preservative PROTIM® *TimberSaver*[™] continues to comply with the manufacturing specifications and quality assurance measures of Osmose New Zealand. These specifications and quality assurance measures are as viewed and accepted by the Appraiser.
2. The manufacture of product continues to comply with the Osmose New Zealand Code of Practice and the TENON Quality and Process Control Procedures Manuals as identified in the Basis of Appraisal section. These specifications and quality assurance measures are as viewed and accepted by the Appraiser.
3. The use of the product complies with the conditions of this Appraisal.
4. TENON, Rainbow Mountain and Osmose New Zealand continue to have the manufacture of the product and the preservative reviewed by the Appraiser.
5. The overall quality and expected performance of the preservative PROTIM® *TimberSaver*[™] and the product are maintained. Any changes to the specifications and quality assurance measures for the preservative or the product must be advised to and approved by the Appraiser before being put in place.
6. TENON, Rainbow Mountain shall notify the Appraiser immediately of any product that fails to meet the monthly verification required by TENON Site Quality Manual.

7. TENON shall on receipt forward to the Appraiser a copy of the quarterly external audit reports required by the TENON Quality Manual.
8. TENON, Rainbow Mountain shall keep recorded the volumes of preservative used and framing product produced.
9. The opinion expressed in the Appraisal relates to compliance with the New Zealand Building Code and is in respect of the building code in force at the date of issue of this Appraisal.

Signed: JA Drysdale
JA DRYSDALE

Dated: 4 May 2004