Building
Industry
Authority

• Proposed Changes to B2/AS1

Report to Building Industry Authority
Appendix E: B2 Durability
Regulatory Impact Statement

November 2003

1.0 Background

Occasional reports of building leaks, followed by timber decay in relatively new houses, started to appear in the late 1990s in New Zealand. These reports commonly involved houses of less than ten years of age with so-called 'monolithic' cladding systems.

After increasing reports of leaking homes and subsequent rotting of timber framing, the BIA commissioned an independent investigation into the weathertightness problem in 2002. The report of this investigation (commonly known as the Hunn Report) found that the weathertightness problem was systemic and that a wide range of factors contributed to the failures. The Hunn report called for issues of weathertightness to be addressed and made recommendations addressing a range of areas.

The Government Administration Committee subsequently held an inquiry into weathertightness and produced a wide range of recommendations - many similar to those in the Hunn report.

A common underlying theme in both reports was the need for more consumer protection and increased robustness in buildings. Both investigations also revealed a systemic failure of the building control system that had implications for all building work. The term 'systemic failure' is intended to illustrate that no one factor led to the failure, rather it was the result of a complex interplay between a number of factors.

The principal factors were:

- Standards of design and construction that were set at the minimum necessary to achieve Code compliance and thus provided no margin for error in the event that either design or construction was inadequate
- Variable performance by those involved in design and construction, often reflecting a lack of information and capability
- Inadequate review of consent applications and inspections of building work, which meant that specific problems were not identified and rectified
- Failures to communicate, which meant that the systemic problems were not identified until the weathertightness problem arose.

Both the Hunn report and the Government Administration Committee report recommended reconsideration of current provisions regarding treatment of timber used in residential dwelling construction.

A number of changes are being made across the building industry in response to weathertightness concerns. These include recently announced changes to the Building Act. Proposed changes relating to the New Zealand Building Code (NZBC) and its Approved Documents need to be assessed in this context.

The Regulatory Framework – Explanation of terms used

- The *Building Act* provides for a performance-based regulatory system.
- The Building Regulations include the *New Zealand Building Code (NZBC), which* sets out specific performance requirements which say what must be achieved but not how to achieve them.
- The *Approved Documents* published by the Building Industry Authority (BIA) are prescriptive means of compliance with the Building Code. These comprise Acceptable Solutions and Verification Methods.
- An *Acceptable Solution* provides detailed instructions (sometimes called "cookbook" instructions) that result in a Building Code compliant building.
- A *Verification Method* provides calculation or test methods to show compliance with the Building Code
- An *Alternative Solution* is one that do not comply with the Approved Documents but which still complies with the Building Code.
- Territorial Authorities (TAs) issue building consents, having checked if they comply with the Approved Documents, or that sufficient evidence, such as certificates from building certifiers, is available for them to assess compliance with the Building Code.

2.0 The Nature And Magnitude Of The Problem And The Need For Action

2.1 General

Little statistical evidence is available on the extent of the weathertightness problem - estimates from industry sources range from tens of millions to $3-4 billion. As at 13 November 2003 there were 2133 active claims registered with the Weathertight Homes Resolution Service, WHRS, with 33 having been resolved. A detailed analysis of eligible cases where an inspection has been carried out and data captured (211 in total) has been considered in the recommended changes to B2/AS1. Other cases have been directed to the courts or settled privately, and are not included in the 2166 WHRS cases. It is unknown how many additional houses may be leaking without their owners being aware. The 2166 claims represent approximately 1% of houses built over the 10-year period.

A predominant number of leaking houses have 'monolithic' claddings (claddings such as fibre cement sheet and plastered polystyrene that provide a seamless appearance achieved by using sheet claddings with textured or plaster finishes). The failures were generally caused by water leakage through defects at junctions or penetrations leading to prolonged wetting of the framing and fungal decay.

Most buildings are likely to experience some degree of leaking during their life. Leaks may not be detected and addressed for some time – possibly years. In many cases of buildings with weathertightness problems, substantial decay of framing timber within the walls had taken place before any leak becomes visible.

Severe or ongoing leaks may cause fungal decay in timber, which can undermine the structural integrity of buildings and potentially affect the safety of building occupants. Construction sequencing and unforeseen delays can also result in excessive exposure of untreated timber to wetting from rain. Fungal decay can also have negative health impacts for building occupants.

The speed and extent of fungal decay in the presence of leaks varies with the type and treatment of timber.

Additionally, fungal decay in the framing of balconies and parapets raises safety concerns.

2.2 Treatment of Timber

Much of the framing timber used in housing in recent years has been untreated but kiln-dried and planer-gauged, which gives it some protection against insect attack but not against decay. Untreated kiln-dried timber has been a factor in many hundreds of cases of known severe weathertightness problems, where leaks have resulted in moisture contents higher than the acceptable level.

The current Acceptable Solution accepts untreated kiln-dried *Pinus radiata* in situations where the moisture content will not exceed 18 percent, and untreated Douglas fir where the moisture content will not exceed 20 percent.

Where moisture content is high, untreated Radiata pine, whether kiln-dried or not, can deteriorate rapidly – extensive damage can occur in as little as two years. The heartwood of Douglas fir has some resistance to decay but the sapwood is thought to have similar decay resistance to untreated Radiata pine. Up until now there has been no demand or ready capability to treat Douglas fir.

An additional problem has arisen with the Hazard Class classification of treated timber exposed to the weather but not in ground contact – H3. Weatherboards and fascia (with a durability requirement of 15 years) have been treated in recent years using a light organic solvent preservative (LOSP). Because this can be used on kiln-dried Radiata pine, more recently it has been used for framing timber (with a durability requirement of 50 years).

However, current information indicates that H3 LOSP, if exposed to weather and ultra violet light, may only have durability of less than 25 years. This means that H3 LOSP treated timber is unsuitable for exterior structural uses and there is doubt over its use as timber decking. Accordingly, the H3.Hazard Class needs to distinguish between copper based and LOSP treatments.

2.3 Identification of Treated Timber

Identification of timber of differing treatments is an issue because:

The current practice of branding timber at the end with key information (producer, timber, treatment) leads to identification problems once timber has been cut to length. Current practice does not differentiate between the different chemicals used.

These factors increase the risk of inadequately treated timber being used for key building components, and make it difficult to identify the source and treatment in subsequent inspections and checks.

Improvement in the identification of the various types and levels of treatment now available is needed.

3.0 Public Policy Objectives

The Government's objectives are to:

- Safeguard people from possible injury, illness, or loss of amenity in the course of the use of any building
- Provide for the protection of other property from physical damage resulting from the construction, use, and demolition of any building
- Ensure that structural timber framing has a durability required by the NZBC
- Maintain an appropriate level of public confidence in the safety, amenity and durability of buildings and their components.

4.0 Feasible Options

4.1 Non Regulatory options

4.1.1 Status quo

Treatment of timber

Both untreated timber and treated timber are currently available for framing in New Zealand to deal with varying situations of exposure to moisture.

Principally these are:

- Untreated - chemical-free and kiln dried
- H1 Treatment – to achieve resistance to insect attack only, although some formulations provide some resistance to fungal growth and decay. (The level of chemicals required for this has decreased over the years for various reasons)
- H3 Treatment – protected from insect attack, and from decay when exposed to moisture.

Within some classes of treatment there are now alternative treatment methods and chemicals that achieve different levels of resistance to decay. The current treatment grades do not recognise this.

The current requirements for timber wall framing are:

- Wall framing when kept at 20 percent moisture content or less is to be H1 treated Radiata and Corsican pine, H1 treated sapwood Rimu, H1 treated sapwood Matai; untreated heart Rimu and heart Matai, Douglas fir and Larch.
- Wall framing when kept at less than 18 percent moisture content, may be untreated kiln-dried and planer gauged *Pinus radiata*

Under the status quo, untreated kiln-dried timber is in many cases being used in situations where actual moisture content is much higher than the required minimum (e.g. in exterior walls and balconies where there is a likelihood of cladding systems failing and leaks occurring). This has led to extensive fungal decay problems in some cases. This makes the status quo unacceptable.

Identification of treatment

The current requirements are that:

- Treated timber must be branded with the plant number or trade name of the plant responsible for the preservative treatment, and the hazard class
- This brand must be placed on one end of each piece, or on a broad face 150 mm from an end, or repetitively along the length at 600 mm centres (the last is currently not used very often).

Under the status quo branded information is often lost, for example when squaring off the ends or cutting timber to length, making it difficult to identify the type and

treatment of timber on site. This has led to timber being used in applications not suited to its treatment level.

Within some classes of treatment there are now alternative treatment methods and chemicals that achieve different levels of resistance to decay. The current treatment grades do not recognise this.

4.1.2 Proposed solution

Treatment of timber

Amend the Acceptable Solution to require use of treated timber as follows:

- All exterior wall framing for other than low risk brick veneer clad buildings to be treated to a new level (to be called H1.2) that is higher than the existing H1 and provides insect resistance, and some fungal resistance similar to that introduced in the mid 1950s.
- All structural framing in balconies and parapets to be treated to H3 level, and wall framing supporting balconies and parapets generally to be treated to H1.2.
- H3 treatment is to be divided into H3.1 for LOSP type treatments and H3.2 for copper based treatments. H3.1 LOSP will not be allowed for timber decking and only be allowed for other external situations where the timber is treated in final shape and form and in places where the durability required is not less than 15 years.

Note: Under this option, untreated timber could not be used in external wall framing apart from low risk brick veneer clad building unless approved as an Alternative Solution by the relevant Territorial Authority.

This option is preferred following public consultation, analysis of the extensive comments received, meetings with key stakeholders and technical committees, analysis of weathertight failures and consideration of the current scientific evidence. It will provide an increased level of consumer protection against failure and fungal attack in the event of moisture leaks through cladding where it has been demonstrated that a higher risk occurs. It still allows untreated kiln dried Radiata or Douglas fir in situations of low risk. This option provides the best cost benefit result.

This option addresses the recent concerns by requiring an increased level of treatment for framing to external walls, except for low risk masonry veneer buildings. External wall framing is most at risk from moisture penetration.

Identification of treatment

Require all treated timber to be:

- Branded with the plant number or trade name of the plant responsible for the preservative treatment, the hazard class, and the type of treatment.
- This brand would be placed on one end of each piece, or on a broad face 150 mm from an end, or repetitively along the length at 1500 mm centres.

- In addition to end branding, treated framing timber would be coloured by a dye or pigment specific to the hazard class and treatment unless repetitively branded at 1500 mm centres.

This option would enable industry to identify all treatment of timber on site during construction and for some time after. It will reduce the likelihood of incorrectly treated timber being used in situations that could cause rotten timber.

4.1.3 Alternative Option A (Option 1 from the Consultation Document)

Treatment of timber

Amend the Acceptable Solution to require use of treated timber as follows:

- All (internal and external) wall including bottom plates, and roof framing to be treated to a new level (to be called H1.2) that is higher than the existing H1 and provides insect resistance, and some fungal resistance similar to that introduced in the mid 1950s.
- All framing in balconies and parapets, and framing supporting balconies and parapets, to be treated to H3 level.
- H3 is to be divided into H3.1 for LOSP type treatments and H3.2 for copper based treatments. H3.1 LOSP will not be allowed for timber decking and only be allowed for other external situations where the timber is treated in final shape and form and in places where the durability required is not less than 15 years.

Note: Under this option, untreated timber could not be used in any wall framing or roof framing unless approved as an Alternative Solution by the relevant TA.

This option provides the highest protection against fungal decay throughout the dwelling should a moisture problem occur. However, closer analysis following consultation has not demonstrated the need for treated timber throughout. In low risk situations kiln dried Radiata or Douglas fir has proved sufficiently durable. The costs outweigh the benefits in the CBA. After review of comments received and analysis of available options, this option is not recommended.

4.1.4 Alternative Option B (Option 2 from the Consultation Document)

Treatment of timber

Amend the Acceptable Solution to require use of treated timber as follows:

- All exterior wall framing and bottom plates of all interior wall framing to be treated to a new level (to be called H1.2) that is higher than the existing H1 and provides insect resistance, and some fungal resistance similar to that introduced in the mid 1950s.
- All structural framing in balconies and parapets, and framing supporting balconies and parapets, to be treated to H3 level.
- H3 treatment is to be divided into H3.1 for LOSP type treatments and H3.2 for copper based treatments. H3.1 LOSP will not be allowed for timber decking and only be allowed for other external situations where the timber is treated in

final shape and form and in places where the durability required is not less than 15 years.

Note: Under this option, untreated timber could not be used in external wall framing and bottom plates of internal framing unless approved as an Alternative Solution by the relevant TA.

This was the alternative option in the public consultation document. It requires treated timber in some locations considered to be of low risk to the ingress of moisture. Therefore a cost benefit analysis would prove to be less beneficial than the proposed solution.

5.0 Statement of Net Benefits of Proposal

5.1 Government

The changes may result in some increase in costs to local government from processing approvals of alternative solutions. The increased use of solvents and preservative in treating timber could result in some increase in workloads relating to discharge consents (Regional Councils) and land use consents (Territorial Authorities), and in more designated treated timber waste disposal sites but the incremental impact is not likely to be substantial. In both cases, the additional costs would be recovered through user-fees, and so the net cost to local government is likely to be very small.

5.2 Industry

5.2.1 Timber suppliers

The amount of timber required to be treated is less than that already being treated in the market at this time. However, it is unlikely that this usage is uniformly distributed across the country and some regions may experience an increase in the use of treated timber and other a decrease. In general timber suppliers do not treat timber themselves. Timber suppliers may experience some increase in production costs as a result of the change, either by increasing the costs of managing contracts with timber treatment suppliers or if they expand operations into timber treatment as a result of the proposed changes – in practice these costs are not expected to be substantial. Some moderate increase in storage, handling and compliance costs is also likely. We would expect increased costs to be passed on to customers in prices.

The preferred option is expected to result in approximately 20-30% of wall framing requiring treatment. The proposed change would result in limited substitution away from Douglas fir (which is not currently available to be treated) in the South Island in some exterior walls and high-risk applications such as balconies/parapets. Douglas fir is also not included in sub-floor applications but the market is predominantly concrete slab (81 % in houses and 90 % in multi-unit) so this is not expected to have much impact.

As a result volumes and revenues for suppliers of Douglas fir may suffer some reduction but options to compete with untreated kiln dried Radiata pine the option to develop H1.2 treated Douglas fir offer opportunities offset this.

If the volume of Douglas fir did drop, suppliers of other timbers may experience a corresponding benefit. (As this benefit would be spread across a larger number of firms, the impact per firm may be less perceptible than the detriment to Douglas fir suppliers).

5.2.2 Timber treatment suppliers

Timber treatment suppliers may benefit from increased sales. The new treatment Standard and requirement to identify treated timber by dyeing or repetitive branding may increase production costs, but this impact is likely to be small as the capacity is already largely in place. Treatment suppliers may also incur some incremental compliance costs related to resource management and occupational safety and health

processes. The additional costs are expected to be passed on in prices. Note that the net benefits of the changes from H3 to two classes of H3.1 and H3.2 have not been considered because of the minor nature of the change.

5.2.3 Others

Frame and truss manufacturers, timber merchants and construction firms / builders would incur a moderate to large increase in storage and handling costs associated with holding and using different timber types, and may also incur some (relatively small) incremental compliance costs related to resource management and occupational safety and health processes. This may be offset to the extent that greater ease of timber identification reduces handling costs. Again, we would expect the increased costs to be passed on to customers in prices.

The cost impact for building designers and architects is likely to be small. They will incur some incremental compliance costs. The number of applications for Alternative Solutions (using untreated timber) may increase, but where such applications are managed by the building designer or architect the processing fees and time spent are likely to be included in the fee to the house purchaser.

The reduction in risk from the proposed changes may flow through into a reduction in the cost of indemnity insurance, which building certifiers are required to hold under the Building Act. In practice this impact may be relatively small.

5.3 Community

5.3.1 New house purchasers

The actual costs of treating timber to the extent required by the proposed change are quite modest, and significantly less than for Option 1 of the Consultation documents. The increased costs are likely to be passed through to new house purchasers as an increase in the cost of a new house.

This increase in costs would be offset by a reduction in the risk of structural damage from leaks or other moisture problems. In those cases where leaks did occur the potential for safety to be compromised would be reduced, and the cost to repair the damage and likely impact on the market value of the dwelling would be considerably lower than under the status quo.

5.3.2 Employees

Employees, primarily employees of timber treatment suppliers and possibly employees further downstream in the timber supply chain, may face some incremental risk of health impacts from contact with solvents and preservatives. This impact would only occur to the extent that business process and occupational safety and health regulation do not currently adequately address health risks, and would reflect the increased volume of treated timber used. The proposed solution requires considerably less use of treated timber than Option 1 of the Consultation documents on which most comments were based.

Overall it is considered that the additional impact is likely to be small and manageable.

5.3.3 Wider community

To the extent that business processes and resource management do not address increased environmental impacts, some incremental environmental damage may occur. Similarly, spillover impacts on the public health system are possible if employees' health is adversely affected, although we would expect these to be small.

6.0 Consultation Programme

Consultation with industry representatives has been ongoing since 2001, in conjunction with consultation on the proposed revisions to the section on clause E2 External Moisture.

Draft proposals for amendments to the Durability Acceptable Solution were issued for public comment in mid-2002 proposing treatment in high-risk applications. Comment was received but no action taken pending the outcome of investigations into weathertightness problems.

The current proposed revisions have been developed in tandem with almost identical proposed changes to DZ 3602 *Timber and Wood Based Products for Use in Buildings* and DZ 3640 *Timber Preservation of Round and Sawn Timber*. Proposed draft standards for both NZS 3602 and MP 3640, which incorporate almost all of the preferred option, are currently in the final stages of approval by Standards New Zealand. BIA will have access to public comments received.

A document describing the proposed changes to the Building Code, with reference to both the status quo and the preferred options was circulated inviting public and industry input over a period of eight weeks. The public, all territorial authorities, manufacturers, designers, builders and merchants and other interested parties were included in this process.

Since the close of the public consultation period in August the BIA has reviewed and considered comments from over 300 individuals and organisations. A special Working Group consisting of a cross section of industry and consumer representatives was convened to review comments received and to make recommendations to BIA. Limited contact has been made with some key commentators to inform the process. BIA has also obtained information from WHRS that has been used to as part of a risk matrix approach to analyse the various contributing factors to recent concerns and to determine appropriate recommendations.

7.0 Business Compliance Costs Statement

7.1 Sources of compliance costs and parties likely to be affected

The sources of compliance costs under the proposal, and parties likely to be affected in respect of each source, are identified below:

Sources of compliance costs	Parties affected
Familiarising key staff with the new Alternative Solution and new treatment standard	Timber suppliers, treatment suppliers, truss and frame manufacturers, timber merchants, residential construction firms / builders, designers / architects, building certifiers
Testing treated timber to ensure compliance with the required standards	Timber suppliers, treatment suppliers
Obtaining expert advice (e.g. legal advice) on compliance issues, particularly in relation to the resource management and occupational safety and health implications of proposed changes	The impact would be greatest for timber treatment suppliers, but all industry participants could be affected to some extent
Interacting with local government to ensure discharge / land use consents are not breached as a result of increased volumes of treated timber or the new treatment standard	Timber treatment suppliers. Possibly (but to a lesser extent) timber suppliers, truss and frame manufacturers, timber merchants and residential construction firms / builders
Interacting with the Department of Labour and amending process for compliance with occupational safety and health ('OSH') regulation	Timber treatment suppliers. Possibly (but to a lesser extent) timber suppliers, truss and frame manufacturers, timber merchants and residential construction firms / builders.