



Determination 2010/131

Durability of H1.2 Boron treated framing timber in a flat profile roof at 9 Ardsley Lane, Masterton

1. Introduction

- 1.1 This is a Determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department.
- 1.2 The parties to this determination are:
- the owner, Peter Ryan, acting via Premier Design, an architectural design company (“the applicant”),
 - the Masterton District Council carrying out its duties and functions as a territorial authority and a building consent authority (“the authority”).
- 1.3 The determination sought is whether the use of H1.2 Boron treated timber framing for a skillion roof meets the durability requirements of the NZ Building Code.

2. The matter to be determined

- 2.1 I consider that the matter for determination under section² 177(1)(a) of the Act, is whether the use H1.2 Boron treated timber framing if substituted for H3.1 LOSP treated timber as proposed for the building will satisfy the durability requirements defined within Clause B2 of the NZ Building Code, as an Alternative Solution to NZS 3602:2003³.
- 2.2 In making my decision I have considered the submissions from the parties and the other evidence in this matter.

¹ The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243.

² In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

³ NZS 3602:2003 Timber and wood based products for buildings

3. The Building work

- 3.1 The building work is a detached single story house and garage of a total of 367 square metres.
- 3.2 The building has skillion roofs with slopes of less than 10°.

4. Background

- 4.1 On 9 February 2010 the authority issued a building consent (No. 090588) under the Building Act 2004 for the construction of the dwelling. The authority's submission (refer paragraph 5.2) notes that in the consent documents the means of compliance with the building code were declared as B2/AS1, NZS 3602 and NZS 3604 and that no alternative solutions were declared.
- 4.2 During construction a routine building inspection undertaken by the Authority concluded that the skillion roof structures had been constructed using framing timber boron treated to H1.2 instead of H3.1. The authority then advised that this was not in accord with NZS 3602 and did not comply with the Building Code.
- 4.3 The applicant responded to the authority that SCION⁴ had undertaken research which showed that boron treated H1.2 was equivalent to H3.1
- 4.4 On 20 July 2010 the applicant sought the advice of SCION, in order to establish a means of compliance with the building code that would avoid having to rebuild the roof. In response SCION provided a copy of an unaddressed pro-forma letter, dated 1 May 2009, confirming their professional opinion, based on their own research, that H1.2 boron treatment for framing timber in flat roofs would be equally appropriate as H3.1.
- 4.5 The authority was not prepared, on the basis of this opinion, in the absence of a determination from the Department, to depart from the Acceptable Solution defined in NZS 3602 (i.e. H3.1). This was apparently advised by email on or around 20 July 2010.
- 4.6 The application for a determination was received on 23 July 2010. The applicant has advised that the timber was subsequently removed and replaced with H3.1 treated timber. Despite that action, the applicant did not wish to withdraw the application for a determination.

⁴ SCION is the trading name of the Forest Research Institute, a Crown Research Institute

5. Submissions

5.1 The applicant submitted copies of:

- a SCION PowerPoint presentation dated September 2006 entitled “Recent and Planned Changes to Standards”
- a SCION fax and cover letter dated 1 May 2009
- a BUILD Magazine article on Boron treated radiata dated April/May 2009]. (I note that this appears to be drawn from the research underpinning the other two submissions.)

I have summarised the relevant content of these submissions in paragraph 6.

5.2 In a submission dated 26 July 2010 the authority maintained the opinion that it could not be satisfied that the substituted timber would meet the durability requirements of the code; noting that:

The intended roof pitch varies from 3 to 5 degrees.

The [roofing] panels are to be replaced with profile metal roofing, increasing the risk of moisture build up under the roof cladding.

5.3 A draft determination was issued to the parties for comment on 30 September 2010. Both parties accepted the draft without comment.

5.4 On 30 November 2010 the owner confirmed the appointment of the person who filed the application as their agent.

6. Scion research

6.1 No expert has been engaged to report on the technical aspects of this matter. I note that SCION represents highly competent technical expertise available in NZ in relation to this subject and I accept the technical input from SCION as provided within the applicant’s submissions.

6.2 The relevant information provided by the submissions may be summarised as follows:

- Testing conducted by SCION over the period since 2003 to 2009 has shown that H1.2 Boron is just as effective as H3.1 LOSP when exposed to a warm damp atmosphere with intermittent wetting.

In the view of the letter writer [Project Leader, Wood Preservation, SCION] H1.2 Boron treatment for framing timber in flat roofs would be equally appropriate as H3.1.

- Findings from experiments conducted over six years comparing the degradation of untreated and treated radiata pine. Testing comprised of two groups of samples, one at mean retention of 0.30% boric acid equivalent [BAE] and one at 0.40% BAE, exposed to a warm moist and intermittently wetted environment. Whereas after the six year exposure the untreated pine had failed, all treated samples had resisted attack by inoculated brown rot fungi; and soft rot decay, associated with high timber

moisture content, was present in some more susceptible elements (being more in the wettest area of the test arrangements).

- Accelerated framing tests established that after four years in a warm wet environment, there was little difference in the performance of H3.1 LOSP and H1.2 Boron. I note the BAE in the test was 0.50%.

This also notes that a minimum 50 year durability is primarily achieved in framing through the timber remaining dry: treatment is only a back up measure for inadvertent and temporary wetting.

7. Discussion

- 7.1 The matter to be determined brings to the fore the wider issue of whether there is sufficient evidence to demonstrate that the general applications identified in NZS 3602 as requiring H3.1 LOSP treated framing timbers to meet the durability requirements defined in the Building Code can be satisfied by the use of H1.2 Boron treated timber.
- 7.2 I accept the findings of SCION as material and reliable evidence that over a five year period H1.2 Boron treated timber provides essentially the same durability as H3.1 LOSP treated timber in a continuously moist, humid, and intermittently wetted environment.
- 7.3 The findings of SCION are strong evidence that H1.2 Boron treated timber can be expected to provide essentially the same durability as H3.1 LOSP treated timber where required to be durable for at least 50 years when used for the same applications defined in NZS 3602.
- 7.4 The fact that the experiments upon which the SCION findings are based were conducted over periods significantly less than 50 years does not in my view reduce their applicability: for the entire period of the experiment the samples were subject to moisture, humidity and wetting. It is the intention of NZS 3602 that H3.1 LOSP treated timber be used where members are protected from weather and moisture penetration is a risk. I distinguish that environment from a continuously wetted environment where it is possible that the performance over 50 years between the two levels of treatment might [but not necessarily so] be more pronounced.
- 7.5 I note the expert opinion within the letter from SCION dated 1 May 2009 that the use of H1.2 Boron treated timber is considered appropriate for framing timber in flat roofs.
- 7.6 In conclusion, I am of the view that the use of H1.2 Boron treated timber meets the durability requirements of the Building Code in this instance. It is emphasized that each determination is conducted on a case-by-case basis. Accordingly, the fact that the level of treatment of the framing has been established as being code compliant in relation to this particular building does not necessarily mean that the same level of treatment will be code compliant in another situation.

- 7.7 In addition, I note that the Department is in the process of reviewing the acceptance of H1.2 Boron treated timber as an Acceptable Solution to a wider range of requirements and has sought and received comment from industry on this matter; though no change has yet been formalised.

8. The decision

- 8.1 In accordance with section 188 of the Act, I hereby determine that the H1.2 boron treated framing as originally proposed for the skillion roof complies with Clause B2 of the Building Code.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 20 December 2010.

John Gardiner
Manager Determinations