



- **Proposed Changes to B2/AS1**
Report to Building Industry Authority
Appendix D: B2 Durability Working Group
Minutes (Final)

November 2003

MEETING OF B2 WORKING GROUP

Date: 4 September 2003

Venue: SNZ, Wellington

Present:

David Hopkins	BIA, consultant technical advisor (Chair)
Claire Bengé	BIA, architect
Adrian Bennett	BIA/BRANZ, durability scientist
Gary Piper	Frame & Truss Manufacturers Assoc.
Graeme Coe	Master Builders' Federation
Janie Annear	Consumer representative
Simon Tonkin	Invercargill CC, building official
Mick Hedley	Forest Research
Jeanette Drysdale	Timber treatment consultant
Kevin Hing	NZ Timber Industry Federation
James Blackburne	NZIA, architect
Guy Cavanagh	Timber Industry, engineer
Scott Gibbons	Timber Industry, producer
Sue Clark	Consultant to BIA, architect (minutes)

*Attachments: Letter from R L Knowles, Manager, Douglas Fir Research Cooperative, Forest Research.
Graph on recent moisture content tests*

1 Working Group Role in B2/AS1 Review

David Hopkins opened the meeting with introductions and an outline of the aims:

- a) The aim is not to vote on overall decisions; that is the responsibility of the Authority. The aim is to give guidance to the Authority.
- b) The meeting may come up with recommendations and reasons for change, together with identifying any further work that may need to be done
- c) It is inevitable that decisions will have to be based on imperfect information, and with acknowledgement of varying sectorial interests that may be associated with issues.

2 Extent of Application and Relationship to Standards:

a) *Regulatory context*

Claire Bengé demonstrated the framework within which the B2 proposals will sit, describing it as a pyramid with the Building Act at the apex, supported by the Regulations and then the Building Code (including Clause B2 Durability). Below that are the Acceptable Solutions, and the Standards that they reference. Acceptable Solution B2/AS1 references NZS 3602 and through it MP 3640. These are currently under review as DZ 3602 and DZ 3640. Comments on these will be considered by the associated Standards committee.

Claire pointed out that it is important to understand that DZ 3602 includes housing, but is not limited to housing.

In a similar fashion, the Acceptable Solution to B2 (B2/AS1) covers all types of

buildings, not just housing. The decision as to whether Standards are called up (in part or in full) by B2/AS1 is made by the Authority.

b) ***The interrelationship between B2 and E2 Weathertightness.***

- i) Guy Cavanagh expressed his view that the E2 proposals must be finalised prior to those of B2, as the robustness of the exterior envelope should set the level of robustness considered necessary for the timber framing of a house.
- ii) Adrian Bennett outlined the views of the E2 working group. He explained that E2 deals with the exterior envelope, and that completely intertwining the relative risks for framing and envelope is not considered to be wise. He believes that there is misunderstanding of the relationship between envelope and structure.
- iii) In the development of E2 proposals, treatment of the framing timber has been assumed for detailed requirements. However there is consumer choice involved in the use of treated timber. Builders may also choose to simplify by maintaining a single level of treatment, regardless of what variety of levels may be finally required.
- iv) Future changes are also an important factor. If the relationship between the envelope and the framing is too interdependent, a change in one ingredient of the matrix may risk overall performance outcomes.
- v) Agreed that the interrelationship between E2, B2, NZS 3602/3640 be examined more closely to determine to what extent separation of the progress on B2 and E2 work.

-HOPKINS

c) ***Scope of the proposed changes***

There was general discussion on the types of buildings that proposed changes apply to.

- i) While the Hunn Report focused on housing, many comments raise some basic questions, such as:
 - Is housing a separate issue?
 - Should requirements apply to all buildings?
 - What are the relative risks and consequences?
 - Should different buildings be considered differently?
- ii) It was pointed out that both clauses B2 and E2 cover all buildings, although the proposed E2/AS1 limits its scope to essentially NZS3604 type buildings. For the proposed changes to B2/AS1, although the commentary refers primarily to housing as the main driver, it is only in the referenced draft standards that distinctions emerge. These distinctions aim to satisfy relative risks and consequences associated with parts of different types of buildings.
- iii) The general conclusion was that there should be no differentiation between building classification when considering the treatment of timber, as light commercial buildings can be constructed to NZS 3604.

3 B2 Durability

The meeting discussed issues involved in the proposed durability table, and the periods

required for different elements.

- a) Many comments related to broad issues that need consideration and resolution. Concerns include that:
 - i) Periods are generally too low, and should be increased. Many considered that the 5 year period should be dropped.
 - ii) There are too few periods with many items inappropriately assigned to a durability period of 15 years, only because the jump to 50 years is too high.
 - iii) There should be an interim period added in between 15 and 50 years. Suggestions for such an interim level generally ranged between 25 and 30 years.
- b) There were also many comments on interpretations and definitions of accessibility and ease of inspection that will need consideration. Claire Bengé explained that the performance clauses were qualitative by nature, so were difficult to tie down to specifics. What the table does is to translate performance criteria into prescriptive requirements that are then deemed to comply with the Code.
- c) Moving some items covered by the table (for example, the window system and associated flashings) from 15 years to say 25 years would have some cost consequences, so potential benefits must be balanced against such costs.
- d) There was a question as to what constituted 'normal maintenance' needed to achieve required durability. Graeme Coe commented that, while this may be the owner's responsibility, the results of poor maintenance usually came back to second or third parties eg the builder, designer, manufacturer etc.
- e) Incorporation of an appropriate interim period will be investigated, and a proposed amendment will be brought back to the workgroup for consideration. It is unlikely however that there will be any changes to clause B2 at this stage, because this would require a new period of consultation, but any recommendations made by the workgroup would be used for a review of clause B2 next year as required by the proposed new Bill currently before Parliament.

-BENGE

4 Timber Treatment Issues

a) ***Treatment Levels***

There was general agreement that the range of timber treatment levels shown in the B2/AS1 was satisfactory.

b) ***Identification of Treatment:***

- i) There was general discussion around comments received and options available. The aim of identification at a building site level is that distinct standard colours should provide a quick visual reference for both the builder and the TA or certifier responsible for ensuring code compliance.
- ii) The primary aim of identification was agreed to be the avoidance of confusion. Any concerns raised in regard to this would be taken back to the Standards Committee to be considered for incorporation into the standards cited by B2. **-BENGE**
- iii) The proposed colours were discussed, and Jeanette Drysdale expressed concern on the possibility of any green colour for H3.1 being confused with the green colour used in the past for 'tanalised pine'. There was also concern at H3.1

being left clear, and therefore indistinguishable from untreated timber. It was considered that this was not a problem with reference to H1.1, as this grade will tend to disappear in the future.

- iv) Guy Cavanagh explained the concern as to the practicality of achieving edge branding at the centres proposed in the draft standard, and how this is currently not possible at many mills. Similar comments have been received, although these showed a range of opinion - with some indicating that the problem was limited to the spacing of the brands.
- v) The issue of identification of treatment type, and the brand required by the draft standard was also discussed. Many comments had discussed the impracticalities of fitting the treatment formulation brand on the end of timber. The group generally agreed that it would be preferable to use the Australian two digit code system for practical reasons and for consistency of requirements for NZ and Australian markets. The system of treatments referred to by each number will be followed up. -BENGE
- vi) Overall consensus appeared to be for timber to have **colour plus end marking**.
 - **For end marking**, the Australian code numbers should be used for identification of treatment formulation.
 - **For identification of hazard class**, the colours must be readily distinguishable, with no possibility of confusion between classes.
 - Under the current quality control systems marking of treated timber must be done at the time of treatment, not prior to it.

5 Probability of High Moisture Content

The meeting discussed the probability of occurrence of high moisture content during different stages of the construction process.

a) *Supply chain risks:*

Discussion revolved around the variety of risks involved in the process of supplying, delivering, storing and erecting timber framing, prior to it being closed into the final form of the house.

- i) Several commented that treatment gives some level of confidence that the timber will remain in good condition leading up to and during construction, quite apart from protection after completion. It was also commented that it is uncommon to have decay starting before a house is closed in.
- ii) There was some argument that this is not necessarily a problem, if the timber then remained dry. Guy Cavanagh stated a view in common with a number of responses; that it is weathertightness that is the problem, not the timber. However, Jeanette Drysdale commented that, once the timber had early damage, it then took very little additional moisture to cause further rapid deterioration.
- iii) Graeme Coe commented that, at the construction site level, there can be no guarantee of good workmanship and trade practices as many current house building systems tended to be 'piecework', using labour-only contracts with little traditional overall quality management This is not necessarily a new

concern, as Mick Hedley read out a text dating from the 1960s that lamented a perceived decline in standards of workmanship.

- iv) The need was identified for some clarification of the chain of responsibility for protection of timber once it is milled. Consideration is to be given to finding a means of creating an audit trail for timber to ensure that it is handled correctly by whoever has control of the stock at the time.

The general view was that supply chain risks were a significant consideration. Timber could be exposed for considerable periods of time, for example in the case of construction delays.

b) ***Design, materials and workmanship***

Adrian Bennett described the background to the risk analysis that forms the basis of the E2 proposal to require a 20mm drained cavity for high risk situations.

- i) He explained that the available historical data is sparse, and limited information on only 176 houses has been made available to date from the Weathertight Homes Resolution Service (WHRS). This is despite the fact that there are now more than 2,000 applications to the WHRS. Decisions must therefore be made based on imperfect data.
- ii) A great many factors have lead to current problems, and the cure cannot be limited to one or two simple solutions. A whole package of changes are required, including education, upskilling, increased accountabilities, and improved code requirements such as those proposed for clauses B2 and E2 and their supporting documents.
- iii) One of the key arguments is whether risks involved in what are commonly considered low-risk situations (with reference to design and/or materials) warrant the level of treatment proposed in B2.

c) ***Interior leaks***

- i) It was generally agreed that internal leaks tend to be more easily discovered, more confined, cause less damage, and are usually easier to repair than leaks through, and resulting damage to, the external walls.
- ii) It was pointed out, however, that this depends on the design and detailing of the building (for example, a roof truss in a open attic space, in contrast to a closed skillion roof).
- iii) It was generally agreed that interior leaks are much less common than those through the external walls.

d) ***Internal moisture***

This relates to management of moisture that is generated within the house, rather than the ingress of water from the outside.

- i) While it is acknowledged that NZ houses commonly suffer from dampness and condensation problems, this has not been identified as leading to decay of timber framing.
- ii) Internal moisture is a problem that is distinct from that of moisture ingress through the envelope. It is a problem that can be handled separately, and one that

does not have the same potential consequences as external leaks.

- iii) It was commented that, if internally generated moisture levels are high enough to cause decay, then a house will be uninhabitable.
- e) ***Insect attack***
 - i) The probability of significant damage due to insect attack was considered low by the meeting. Few commentators had raised this issue. Cases of borer in untreated timber are rare, though there has been a limited time exposure to this hazard.
 - ii) Insect attack is generally considered to be to be less of a problem to timber than external leaks, though potential exists for problems to increase in the event of new species of insects from overseas becoming established in NZ.

6 Consequences of High Moisture Content

The meeting discussed the likely consequences of high moisture content, on the assumption that it had occurred.

- a) ***Moisture content/exposure time***

It was generally agreed that leaks mostly produced high moisture contents well in excess of 18%, or that moisture contents were well below that level. Mick Hedley commented that below 18% decay was highly unlikely for most timbers. Between 18 and 30% it was likely and above 30% almost certain to occur.
- b) ***Health issues***
 - i) Some commentators had expressed concern at the volumes of solvent and toxic chemicals involved in timber treatment and had argued that treatment should be kept to a minimum. This applied particularly to LOSP treatments.
 - ii) The meeting agreed with this overall approach. However, if treatment and handling was done in accordance with standards requirements, the health effects should not be a critical consideration.

7 Insect attack

- a) Jeanette Drysdale pointed out that the likely consequences resulting from imported timber-eating insects would be very high.
- b) It was commented that particle board flooring can be attacked by borer, although this is rare. Replacement of particle board floors would involve significant cost. Because detection of problems was likely, consequences could be reduced.

8 Timber type and treatment

- a) The meeting generally agreed that treatment of timber increased the chances of detecting moisture and repairing leaks before damage becomes significant.
- b) Douglas Fir is likely to decay more slowly than untreated radiata due to the lower uptake in moisture.
- c) The question of other timber species was raised, and Adrian Bennett explained that 3602 covers these. He also explained that the Standards Committee will be

considering the same submissions as received on B2 and, whatever conclusions are reached, the aim is to correspond the requirements of the standards with those of B2.

d) ***Particle board floors***

- i) A number of comments related to the question of potential degradation of floor edges sandwiched under the bottom plate of the wall framing.
- ii) There seems to be little awareness of any major problems stemming from degradation of the floor in relation to decay of the adjacent wall framing.
- iii) Noted that consideration should be given that particle board floor should not go under bottom plates on external walls, although the proposed E2/AS1 details it as 10 mm back from the face of the stud which may be sufficient.

It was agreed that feedback on particle board flooring will be sought from BRANZ advisors.

-HOPKINS

9 Cost consequences

- a) This was recognised as being a function of the extent of rot before detection.
- b) Consequences would also vary less with the type of elements affected (eg external framing, internal framing, roof trusses, floors) on the basis that those elements became wet. (The key difference in consequences between these elements is related to probability of getting and staying wet enough for decay to occur.)

10 Douglas Fir

- a) The largest single group commenting on the proposed changes comprised forest owners, timber mills, and suppliers of Douglas fir to the building industry. It is clear from the comments received that the potential effect would be severe, and grave concerns were raised as to the continuing viability of some operations. Scott Gibbons expanded further on some of these concerns.
- b) One question that arose was whether Douglas fir framing used today is the same as it was in the past (eg whether it now contains more sapwood or is younger when harvested), as there appears to be differences of opinion regarding this issue.
- c) It was noted that there had been no research into the relative durability of North American Douglas Fir and NZ-grown Douglas Fir.
- d) Mick Hedley tabled a letter from R L Knowles, Manager, Douglas Fir Research Cooperative, Forest Research. (Copy attached) This letter aims to correct some impressions that seem to have arisen in regard to the nature of NZ's Douglas fir resource. Included in the letter were the following points:
 - i) Overall, there has been very little change in the nature of the age-class distribution of the resource for local sawn timber supply over the past 40 years.
 - ii) The maintenance of significant areas up to 40 years shows few if any stands are felled prior to this age
 - iii) Most stands are felled by 50 years (with a few 'old' stands left)
 - iv) Recent investment over the past 10 years has been quite significant – mostly in the South Island. It is based on New Zealand's reputation of growing good

quality product in a reliable investment environment.

- v) The conclusion drawn in the letter is that the industry still cuts 40 year old timber, with 80% being used in framing.
- e) Mick Hedley then tabled a graph (copy attached) on recent moisture content tests that gave some early indicative comparisons between untreated pinus radiata and Douglas fir in regard to their respective moisture take-up rates, measured over 35 days exposure to rainfall. The graphs indicated that:
 - i) The moisture content of radiata rose rapidly to the point where decay can be initiated, passing that moisture content at around the 6th day of exposure.
 - ii) The radiata remained above that point for the remaining period, continuing to rise in response to periods of rainfall, and falling during dryer times. By the end of the period, its moisture content appeared to be around an extra 10% beyond the decay point percentage.
 - iii) The moisture content of the Douglas fir also rose, but at a considerably slower rate, remaining some 5% less than the moisture content decay point by the end of the period.
 - iv) Mike stressed that the tests were preliminary so that they are indicative results only, and that a series of further controlled tests are necessary. However, the indications are that Douglas fir takes up moisture at a considerably slower rate than pine.
- f) The meeting agreed that these results are important, and that further tests allowing for varying conditions and sapwood contents should be carried out. It was generally felt that there is a need to more fully understand the behaviour of both timbers – including drying rates once they are enclosed.
- g) Based on these early indications, it seems that it may be possible to explore varying risk scenarios and some of these were discussed:
 - i) The definition of risk areas can be complicated, and supply chain problems must be taken into account.
 - ii) There may be no reason to exclude Douglas fir from use in low risk situations such as roof trusses, internal walls, and possibly standard brick and tile construction. Scott Gibbons and Gary Piper commented that some building companies were starting to use treated Radiata bottom plates with Douglas Fir framing.
 - iii) Gary Piper indicated that few problems have been experienced with Douglas fir trusses, although a weak point is eaves rafters, where end grains are exposed.
- h) It was generally agreed that the use or partial use of Douglas fir framing merited further consideration.
- i) ***Overseas experience***

Discussions turned to experiences in North America, particularly in Vancouver.

 - i) Guy Cavanagh stressed the point that no treatment is required in Vancouver apart from cavity battens. There, cavities alone are relied on to manage external moisture.

- ii) However, Adrian Bennett commented that overseas experience cannot be directly transferred to NZ conditions, and that it is not valid to assume that our situation will reflect the same experience.

11 Cost Benefit Issues

The meeting focused on the Cost Benefit Report, with the aim of providing feedback on the costs of E2 and B2 proposals

- a) Some commentators had priced the proposals at a very high level. This was discussed and it was generally agreed that those very high estimates were well over what should be expected.
- b) There was some debate as to the likely costs, but the figures discussed tended to be in the order of \$4,000 to \$10,000, rather than the \$25,000 to \$50,000 suggested by some commentators.
- c) Graeme Coe indicated that, based on recent experience, the additional costs of treatment may be quite low (less than \$2,000). It was also noted that, as requirements became standard practice, costs would be expected to fall.
- d) In relation to OSH issues regarding treated timbers, Jeanette Drysdale pointed out that requirements were already in place, and industry must follow these and tighten up their handling processes, methods of dealing with treated sawdust etc. In other words, they need to do what they should be doing now, rather than needing to add new systems.
- e) Some commentators considered that estimates focused too much on treatment costs, and perhaps underestimated other costs associated with both B2 and E2 proposals. Such costs may include additional:
 - i) supervision
 - ii) flashings, changes in details, addition of cavities etc
 - iii) education needed right through the supply chain
 - iv) disposal costs of treated off cuts, as hazardous waste
 - v) health costs related to solvent use
- f) In terms of benefits, the aim is to avoid or at least reduce future repair costs.
 - i) This is difficult to quantify, as variations can be very large
 - ii) There is also the problem of existing houses that may have had problems that were settled confidentially
 - iii) Another unquantifiable area is those existing houses that do not yet show sign of problems, but which may fail in the future. With the present numbers of applications to the WHRS over 2100, the number of potential future failures is concerning.

12 Building Industry Aims

The aims of any changes were discussed by the meeting, and the following points emerged:

- a) The Acceptable Solution must be considered as a minimum catch-all that is designed

to achieve an adequate level of protection acceptable to the community.

- b) Requirements must be clear and simple
- c) Access to the use of Alternative Solutions should be readily available.
- d) Guidance documents are needed for Alternative Solutions
- e) There are concerns as to the excessive influence of legal, insurance and liability factors on industry and regulatory practices. This applies also to situations outside of the Acceptable Solutions.
- f) There are concerns, resulting from the influences noted above, as to the risk-averse nature of Territorial Authorities in regard to decision-making.
- g) The need for homeowners to accept some responsibility for living with the consequences of their own decisions eg owner supervision, choice of house types/materials etc. In particular there is a need to raise awareness of the importance of proper maintenance.
- h) The minimum expected levels of quality and competencies.

13 Miscellaneous comments

- a) It was considered that, while the risk of decay may be low in some situations, the consequences are potentially very high.
- b) The state of the timber export market should not be seen as an excuse not to solve problems here. In fact, it is thought that the situation in regard to NZ's reputation is more likely to be worse if the current situation is not satisfactorily resolved.
- c) The recent FRI results as tabled by Mick Hedley suggest that there may be an argument for regarding Douglas fir as suitable for some framing, providing certain risk areas are taken care of with suitably treated timber.
- d) There was some disagreement as to the need for treated pine in low risk situations.
 - i) Guy Cavanagh believes that, in regard to uncertainty about untreated radiata in internal walls, there is low probability and low consequence (although this view was disagreed with by some others in the group). David Hopkins said he thought that the FRI results indicated that for a given moisture regime, DF would probably show superior performance. The key issue was the acceptability of the risk of unacceptable decay occurring. (probability times consequences)
 - ii) Guy Cavanagh believes the focus must be on weathertightness, not on treatment
- e) The issue of construction moisture must be improved, from the source right through the supply chain to the stage that the framing timber is closed in at an appropriate moisture content.
- f) At the site level, simplicity is needed, which must be balanced against the relevant risks and the level of potential consequences.

14 Close of meeting:

The meeting closed at approximately 5.30pm.