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B2 Durability overview

In our second article in the building control series, we look at New Zealand Building Code clause B2 *Durability*.

NEW ZEALAND BUILDING CODE clause B2 covers the Acceptable Solutions and Verification Methods used to establish compliance with the durability requirements of the Building Code. The most recent edition is Amendment 8, issued on 14 August 2014.

Objective

The objective of B2 is to ensure that a building will be sufficiently durable to comply with the objectives and functional and performance requirements of the other relevant Building Code clauses such as E2 *External moisture* and B1 *Structure*.

Functional requirements

The building materials and construction methods will be sufficiently durable without major reconstruction or major renovation throughout the life of the building for the designated durability relative to the function and position on the building.

Performance requirements

The performance of the element can be a designated durability period, or where no period is designated, clause B2 sets default time periods of durability that relate to the position and function in the building. These are:

- the life of the building (but not less than 50 years) for:
 - structural elements like floors, walls, bracing or structural fixings
 - items difficult to access or replace
 - building elements where failure would go undetected during normal maintenance of the building

- not less than 15 years for:
 - moderately difficult to replace or access building elements, including the building envelope, exposed plumbing in subfloors and inbuilt chimneys and flues
 - building elements where failure would go undetected during normal use but would be detected during normal maintenance, like wall claddings, exterior doors/windows
- not less than 5 years for:
 - easy to replace building elements, including services and linings and renewable protective coatings
 - building elements where failure would be easily detected during normal use, like exterior gutters, surface-mounted plumbing fixtures (taps).

Standards referenced by B2

Clause B2 references these standards:

- NZS 3101.1:2006 *Concrete structures standard – The design of concrete structures*. Amendments 1, 2.
- NZS 3602:2003 *Timber and wood-based products for use in building*.
- NZS 3604:2011 *Timber-framed buildings*.
- NZS 3640:2003 *Chemical preservation of round and sawn timber*. Amendments 1, 2, 3, 4, 5.
- NZS 4251.1:2007 *Solid plastering – Cement plasters for walls, ceilings and soffits*.
- NZS 4297:1998 *Engineering design for earth buildings*.
- NZS 4299:1998 *Earth buildings not requiring specific design*. Amendment 1.

Some of the above standards are referenced as Acceptable Solutions, subject to modifications by B2/AS1, namely NZS 3101, NZS 3602 and NZS 3640.

Verification Method B2/VM1

The Verification Method B2/VM1 gives options that may be accepted by the consenting authority. These include:

- verifiable in-service history for known systems or materials – known length of service in the same environment, frequency of use without adverse results or other results that demonstrate the required durability
- laboratory testing, verifying degradation rates, testing relevance to the situation of proposed use and durability period, methods of testing and so on
- similar material comparisons – demonstrating similarity in composition, use in the same environment, required maintenance, conditions of use and so on. Where such a direct comparison is not possible, the building element shall be independently assessed to determine the degree of similarity.

B2 Acceptable Solutions

Acceptable Solution B2/AS1 gives guidance on assessing durability:

- a. Elements that are difficult to access or replace must remain durable for the life of the building (but not less than 50 years). For example, structural members, concrete, wall framing, tanking membranes, pipework cast in concrete or under slabs. ➤

- b. Elements that are moderately difficult to access or replace require not less than 15 years. For example, plumbing in walls or skillion roofs, wall or roof claddings.
 - c. Elements that are easy to access and replace require not less than 5 years. For example, door hardware, paint, hot water cylinder elements.
 - d. Elements where failure to comply with the NZ Building Code would go undetected during normal use and maintenance of the building require not less than 50 years. For example, failure of flashings with a brick veneer cladding that could result in damage to structural framing.
 - e. Elements where failure to comply with the Code would go undetected during normal use but would be easily detected during normal maintenance require not less than 15 years. For example, failure of wall or roof claddings.
 - f. Elements where failure to comply with the Code would be easily detected during normal use require not less than 5 years. For example, protective finishes, slip resistant surfaces.
- B2/AS1 Table 1 (page 17) gives the nominated durability of building elements to comply with the Acceptable Solution.

The clause at the top of Table 1 explains that hidden building elements may have a greater durability than given in Table 1 or required in the performance section. This is because hidden elements must be at least as durable as the material that covers them.

Maintenance

Maintenance is regular work required to achieve the expected durability of building elements. It depends on the geographic location, position in the building and may involve replacement of components subject to wear.

The specifier has the responsibility of nominating maintenance requirements of elements of a building. This is likely to be influenced by warranties by suppliers and will include inspections. Some of these will require extra effort to inspect where they are not easily observed. Examples are elements at height, washing, painting, checking of sealants, checking items of wear, servicing as required and emergency equipment inspections.

Where buildings have compliance schedules for building systems, such as lifts, these would be expected to be operational throughout the life of the building and perform as designed at all times. Full replacement may be required.

B2/AS1 and concrete

NZS 3101.1:2006 section 3 is an Acceptable Solution for meeting the durability requirements of concrete building elements subject to using only quantified terms in the standard.

Where unquantified terms – such as special studies, manufacturer’s advice, references to methods that are appropriate, acceptable, applicable are used – it must be treated as an alternative method.

B2/AS1 and timber and wood-based products

NZS 3602:2003 and NZS 3640:2003 as modified by B2/AS1 are an Acceptable Solution for meeting durability requirements for timber.

NZS 3604:2011 is also modified as it references NZS 3602:2003 and NZS 3640:2003 in their current form. B2/AS1 requires that NZS 3602 and 3640 are referenced as modified by B2/AS1.

B2/AS1 Tables 1A and 2A and clause 3.2.2 change tables in NZS 3602:2003 where the tables reference radiata pine or Douglas fir to:

- a minimum treatment of H1.2 for radiata pine and Douglas fir solid timber framing (other timbers are unchanged)
- remove the option of H3.1 radiata pine as a structural or framing timber
- permit H3.1 (LOSP azoles as required in NZS 3640 Table 6.2) treatment for LVL pine to satisfy the requirement of H1.2 as a minimum treatment for radiata pine and Douglas fir.

Changes implemented by B2/AS1 Table 1A replace categories C, D and E and Table 2 category B of NZS 3602 with Tables 1A and 2A, which are required to be read in conjunction with NZS 3602 sections 108 to 111 inclusive.

NZS 3602 Table 1 categories A and B, Table 2 category A and Table 3 are unaltered by B2/AS1.

Douglas fir

There is an exception. Untreated Douglas fir can

be used for structural framing where the design meets all 10 clauses in B2/AS1 clause 3.2.2.2 to reduce the risk of framing failure as a result of water entry. This option is given for those not wanting to use chemically treated timber in their home.

When untreated Douglas fir is proposed for other structural building uses, for example, commercial framing, it is outside the scope of the Acceptable Solution and will need to be considered as an alternative method on a case-by-case basis.

Framing

Clause 3.2.2.3 in B2/AS1 modifies Table 1A and Table 2A to replace structural supporting timber, previously required to be H3.1, with H1.2 treated radiata pine or Douglas fir. This also applies to timber framing exposed on both faces such as parapets and solid deck barriers or framing that is used to box in exterior beams, columns or flues.

Where NZS 3602:2003 previously required the use of H3.1, there is now a minimum requirement of H1.2. Parapet and enclosed barrier framing is required to have claddings installed over cavities regardless of the weathertightness risk matrix score in E2/AS1.

NZS 3602 previously permitted untreated pine or Douglas fir interior framing. B1/AS1 now requires a minimum of H1.2 treatment unless Douglas fir is used and the building meets all of the 10 clauses for exemptions.

Timber in wet area flooring

NZS 3602 requires the use of H3 treated plywood flooring in wet areas where maintenance of impervious coatings cannot be assured. B2/AS1 modifies this to permit H1.2 treated solid radiata pine or Douglas fir flooring to be used in this situation.

B2/AS1 modifications to NZS 3640

Clause 3.2.3 in B2/AS1 deletes the use of H3.1 for structural timber. It now only permits H1.2, H3.2, H4, H5 and H6 structural timbers as an Acceptable Solution.

It also modifies the sapwood penetration of preservatives for H1.2 treated timber and requires that ‘complete sapwood penetration shall be achieved’.

For more Download clause B2, B2/VM1 and B2/AS1 from www.dbh.govt.nz/compliance-documents#B2.