

Determination No 2004/19

Weatherboard Cladding Without Weather Grooves to a Three-storey House

1 BACKGROUND

- 1.1 The matter before the Authority is whether the weatherboard cladding without weather grooves meets the requirements of clause E2 “External moisture” (and consequentially clause B2 “Durability”) of the New Zealand Building Code (“the building code”).
- 1.2 The applicant is the building owner and the only other party is the territorial authority.
- 1.3 The Authority engaged the services of an independent expert (“the expert”) to give advice as to whether the cladding would comply with the building code.
- 1.4 In making its determination, the Authority has not considered any other aspects of the building code.

2 THE BUILDING WORK

- 2.1 The building work in question is the cladding to a three-storey house. The cladding comprises horizontal boards, which do not have weather grooves (“the weatherboards”). The weatherboards although referred to in the submissions as bevel-back weatherboards do not have a bevel.
- 2.2 The weatherboards are ex 150 x 25 rough sawn H3 tanalith treated pinus radiata and overlap each other by 32 mm. The weatherboards are placed over heavy duty building paper and supported by framing at 400 mm centres. The house has 750 mm wide eaves and a 1.2 metre wide deck that provide protection to lower levels on the north side. It is located in a “High” wind zone according to the classifications given in NZS 3604: 1999 “Timber framed buildings” (“NZS 3604”).
- 2.3 The territorial authority issued a building consent for the building work based on advice in the plans and specifications, which indicated that the cladding was “150 x 25 H3 weatherboards on breather paper”.
- 2.4 The territorial authority is refusing to issue a code compliance certificate for the building work as it does not accept that the weatherboards without weather grooves meet the requirements of the building code as regards the prevention of penetration of water.

3 THE LEGISLATION

3.1 The relevant provisions of the building code are:

Clause E2 External moisture

E2.3.2 Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to building elements

Clause B2 Durability

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

(a) The life of the building, being not less than 50 years, if:

(i) Those building elements (including floors, walls, and fixings) provide structural stability to the building

(b) 15 years if:

(i) Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace

4 THE SUBMISSIONS FROM THE PARTIES

General

4.1 The Authority received a submission from the applicant, which included relevant correspondence between the parties, the territorial authority's inspection report, a letter and a subsequent report from the design architect, and a letter from an engineer engaged by the applicant. Included in the applicant's submission was advice received from a staff member of the Authority. The territorial authority indicated that it did not intend making a submission.

The Applicant's Submission

4.2 The applicant confirmed the details of the weatherboards and noted the requirements of weatherboard cladding in acceptable solution E2/AS1, NZS 3617: 1979 "Specification for profiles of weatherboards, fascia boards, and flooring" and NZS 3604. The applicant noted that although profile requirements were clearly detailed in these documents the requirements for a weather groove were not so clear and considered that it "could be concluded that the horizontal weather groove is not specifically required [to meet] the requirements of the NZ Building Code (*sic*) E2/AS1".

4.3 The applicant summarised the advice it had received as follows:

The cladding system has been observed [by the applicant's engineer] in the presence of the Building Control Inspector, to have no water egress (*sic*) during heavy rain and wind.

The undimensioned groove in Fig 3 of NZS 3617 and the partially dimensioned groove shown in Fig 2 of ACCEPTABLE SOLUTIONS E2/AS1 are to one face only and is very small

and ineffective as a water break . . .

There are strong arguments that the weather groove is traditional rather than useful . . .

Rough sawn timber will deter any capillary action . . .

The thickness of the boards (25mm, not 19mm) and the spacing of the framing studs (400mm, not 600mm) will ensure the weatherboards do not flex much, hence restricting "pumping" of water up the gap between weatherboards . . .

Alternative similar weatherboard systems are not required to have a weather groove and have performed successfully for a number of years . . .

The sizing and spacing of the weatherboards and framing studs, and heavy duty building paper are in excess of the minimum requirements of NZS 3604.

The macrocarpa framing has a natural resistance to decay Should there be any leaks then, because of the use of macrocarpa framing, there would be sufficient time for them to be discovered before decay occurs. . . .

The Territorial Authority's Inspection Report

4.4 The territorial authority's inspection report stated:

No work to commence until weather issue has been resolved with NZS 3604 NZS 3617 E2/AS1

4.5 In correspondence to the applicant the territorial authority said:

Unfortunately you have not given any evidence of the rusticated (*sic*) bevel back weatherboard without a weather groove being able to prevent water ingress between the boards and subsequently damaging the building paper and the Macrocarpa framing

[The territorial authority confirms] the need to obtain a determination from the Building Industry Authority (BIA) to use weatherboards without the weather-groove as required by the Standard.

Other information

4.6 In the course of the determination the applicant:

- Provided a detailed cross-section through the exterior walls and advice as to the building's wind zone and location;
- Provided advice as to the internal linings that had been, or were to be, used. These comprised a combination of ex 150mm x 25 mm TG&V macrocarpa and plasterboard;
- Provided topographical plans, various photographs of the house, and details of local rainfall;
- Noted satisfactory performance of the cladding in the storm events of February 2004 which the applicant described as a 100 year storm. The applicant noted that he was able to check for signs of water ingress in the wall cavity itself as, in places, the internal wall linings had yet to be installed;

- Advised that other than the H3 treatment “There is no paint or other treatment used on [the weatherboards]”; and
- Advised that joints in the weatherboards were mitred and covered with copper soakers.

4.7 In addition, the applicant advised that from the time the territorial authority has noted its concerns regarding the lack of weather grooves “ a 6 mm x 6mm horizontal weathergroove, as instructed by [the territorial authority] was provided in the subsequently installed weatherboards to all of the ground floor walls and the SW wall of the 1st floor”.

5 THE EXPERT’S REPORT

5.1 The expert provided detailed technical discussion on the theory of the performance of weatherboard claddings, together with its own observations on the issue. Those discussions are complex and not included here, however, the expert concluded:

Weathergrooves and capillary breaks are common in facade jointing and have a long history of application. Theoretical arguments support their use in the lap joints in weatherboard walls and it is recommended by BRANZ that weathergrooves continue to be factored into weatherboard designs. There will be cases where a capillary break can be achieved in another way (as is the case in bevel backed weatherboards) and it may be unnecessary to machine additional grooves into the overlapping joint. Some further work may be necessary before generalised changes to E2/AS1 can be recommended.

The subject of this determination is a three level weatherboard house in a high wind zone. In our opinion, the weathertight performance of the wall is likely to be limited more by leakage paths through defects in the weatherboards and corner joints, than by the absence of weathergrooves in the lap joints. The weatherboards are unpainted and it has to be anticipated that the lap joints will hold rain water. For this reason it is important that the cladding timber quality meets NZS 3602:1995 section 110.2. We are happy that the bevel backed profile creates a natural capillary break at the top of the lap joint and that water held in the joint will not wick through to framing or any other absorbent material. We note that the cladding is thicker than 19 mm specified for bevel backed weather boards in E2/AS1 and is fixed at 400 mm centres. In our opinion the existing weatherboards on this particular house will meet the performance requirements of E2 without a weathergroove machined into the body of the lap joint. Other key factors and requirements in this decision are:

- The 32 mm overlap dimension between the weatherboards.
- The generous eaves protection – especially on the W orientation.
- That the framing timber meets the 50 year durability requirement of the NZBC and the treatment specification in NZS 3602 requiring all sapwood to be treated to H1.
- That the cladding meets current timber grading rules and in particular, NZS 3631 as modified by NZS 3602:1995 with respect to freedom from cracks, splits and other defects.

5.2 The expert’s report was copied to the parties for their information. No response was received from the territorial authority but the applicant made the following comments:

. . . the framing is Macrocarpa heartwood & did not require treatment to H1. As a further precaution the bottom plate on the ground floor is H3 Pinus Radiata.

The cladding was selected to be free of cracks, splits, & other defects.

6 THE AUTHORITY'S VIEW

- 6.1 To the Authority's knowledge, the territorial authority has not written officially to the applicant advising that the code compliance certificate will not be issued nor has it issued a notice to rectify. The Authority notes that these are the appropriate actions required under the Building Act. Notwithstanding that, and for the purposes of this Determination, the Authority accepts that the note on the territorial authority's inspection report and its letters to the applicant (see 4.4 and 4.5 above) amount to the same thing.
- 6.2 In several previous determinations, the Authority has made the following general observations about acceptable solutions and alternative solutions:
- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code.
 - Usually, however, when there is non-compliance with one provision of an acceptable solution it will be necessary to add some other provision to compensate for that in order to comply with the building code.
- 6.3 The Authority agrees with the opinion of the expert, subject to confirmation of the issues discussed further in 6.8 and 6.9 below, that the weatherboards meet the requirements of clauses E2 and B2 of the building code. While the Authority acknowledges that the profile does not comply with the relevant sections of NZS 3604 or NZS 3617 or with acceptable solution E2/AS1 as noted by the territorial authority, it nevertheless considers that in the circumstances of this particular case, sufficient compensating factors exist which enable code compliance to be achieved.
- 6.4 Those compensating factors include those mentioned above by the expert, namely that:
- a) The particular weatherboard profile creates a natural weather groove at the top of the lap joint;
 - b) The cladding has a 32 mm overlap;
 - c) The weatherboards are thicker than required by the Standards and E2/AS1 and are fixed at 400 mm centres; and
 - d) The house has generous eaves protection.
- 6.5 In addition to these factors, the Authority notes that the weatherboards are fixed over a heavy duty paper. A further factor the Authority has taken into consideration is the satisfactory performance of the cladding, in some cases without installed internal wall linings (a more severe situation), as observed by the applicant and its experts, in adverse weather conditions, including the events of February 2004.
- 6.6 The Authority notes the expert's views are subject to conditions that in essence require the framing be durable and the weatherboards be suitably graded (see last two bullet points in 5.1 above). The Authority agrees these are important considerations that need to be checked and confirmed by the territorial authority before the code compliance certificate can be

issued. In addition, the Authority considers that the treatment of the weatherboards which is simply described as “H3 tanalith” needs to be checked to confirm its adequacy.

- 6.7 With respect to these issues NZS 3602: 2003 *Timber and wood-based products for use in building* (“NZS 3602”), cited in the Authority’s acceptable solution B2/AS1, is the relevant Standard.
- 6.8 NZS 3602 allows the use of both sapwood or heart macrocarpa in framing that is required to “provide structural stability to achieve a 50-year durability”¹. The Standard notes that heart does not require treatment whereas sapwood must be treated to H1.2. The importance of “buying time” to carry out repairs should claddings experience leaks or otherwise become wet, through circumstances such as leaking pipes, during their life has been acknowledged in the recently issued acceptable solution B2/AS1 and in NZS 3602. As it is clear that the macrocarpa used has not been treated it is important to confirm that heart, and not sapwood, has been used for the framing.
- 6.9 With respect to the grading and treatment requirements of the weatherboards the Authority notes that although the expert refers to the 1995 version of NZS 3602 the requirements in the 2003 version are similar and are as follows:

111.2.3

Grading requirements additional to those set out in NZS 3631 are as follows:

- (a) All holes, resin and bark pockets shall be excluded;
- (b) Knot size shall not exceed 50 mm, or 25 mm for spike knots.

C111.2.3

Dressing grade plus the additional requirements of set out above is the lowest grade regarded as suitable in these locations. Where appearance is of major concern, the specification of superior grades should be considered.

111.2.5

For “no finish” . . . the following species are permitted; . . . sawn H3.2 treated Radiata pine.

As the weatherboards are not intended to be painted it is important to confirm not only that the grading requirements have been met but also that the treatment provided is to the correct level.

- 6.10 The Authority concludes, therefore, that despite being in a “High” wind zone and departing from the Standards and acceptable solution E2/AS1, and subject to confirming the acceptability of the framing material and the grading and treatment of the weatherboards as discussed in 6.8 and 6.9 above, the weatherboards will meet the requirements of clause E2, and consequentially clause B2 of the building code.
- 6.11 Whether the provisions set out in 6.8 and 6.9 above are met is for the applicant to substantiate and for the territorial authority to approve with any further disputes being able to be forwarded to the Authority for resolution.

¹ The Authority recognises that reference to “50 year durability” is shorthand for the requirement of clause B2.3.1(a) that the building element concerned must, with only normal maintenance, continue to satisfy the performance requirements of the building code for the life of the building, being not less than 50 years.

7 THE AUTHORITY'S DECISION

- 7.1 In accordance with section 20 of the Building Act, the Authority hereby determines that, subject to the confirmations required in 6.8 and 6.9 above, the weatherboards, without weather grooves meet the requirements of the building code. On that basis, the Authority reverses the decision of the territorial authority to refuse to issue a code compliance certificate for the building work.

Signed for and on behalf of the Building Industry Authority on 18 May 2004

John Ryan
Chief Executive