

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 32

1 THE DISPUTE TO BE DETERMINED

- 1.1 This is a determination by the Building Industry Authority (“the Authority”) of a dispute referred to it under section 17 of the Building Act 1991 (“the Act”). The applicants are the owner of the property (referred to throughout this document as “the owner”) and the other party is the territorial authority. The application arises from the refusal by the territorial authority to issue a code compliance certificate for a new house unless changes are made to its monolithic cladding system.
- 1.2 The Authority’s task in this determination is to consider whether it is satisfied on reasonable grounds that the external wall cladding as installed (“the cladding”), and which is applied to the walls of this house, complies with the building code (see sections 18 and 20 of the Act). By “external wall cladding as installed” we mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 In making its decision, the Authority has not considered any other aspects of the Building Act or the building code.
- 1.4 The house itself is described in paragraphs 2.1 to 2.4 and paragraph 9 sets out the Authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a part single-storey and part two-storey detached house situated on a slightly sloping site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction on a timber-framed floor supported on piles. The external framing is sheathed in a monolithic cladding. It is of a relatively simple shape but the coated metal tile roof is reasonably complex and there are several main roof/cladding junctions. The house has one raised deck at the first floor level; with the outer edge supported on H5 treated timber posts and H3 treated timber beams and the inner edge attached to the house. The deck, which is constructed with H3 treated timber framing and 100 x 25 mm gapped decking, has an unlined soffit. The deck also has a balustrade constructed with H3 treated framing, lined with monolithic cladding with a 7.5 mm thick backing on its outside face and top, and 4.5 mm thick backing on its inside face. A deck with associated access steps has been constructed at ground floor level to the north and east elevations with gapped timber

decking. The Authority notes that this deck is not shown on the consented plans. The eaves have 600 mm wide projections and the two gable ends have 300 mm wide projections.

- 2.2 The framing in the external walls was specified to be H3 treated timber, however the territorial authority in its submission letter states that the framing is untreated. As the owner has not queried this statement, the Authority accepts the territorial authority's submission.
- 2.3 The cladding system is what is described as monolithic cladding. As specified in its manufacturer's July 1998 technical information manual ("the manufacturer's instructions"), it incorporates fibre-cement backing sheets fixed through the building wrap directly to the framing timbers and finished with a choice of joint and coating systems. The manufacturer's instructions include details for flashings at various junctions (but not all of the junctions actually present in the house). For the purposes of this determination, the manufacturer of the fibre-cement sheets and the flashing kit is regarded as the manufacturer of the system, despite the fact that each of the joint and coating systems is itself proprietary to one of other manufacturers. The manufacturer's instructions identify the joint and coating systems by reference to those other manufacturers and their system brands but give no other information about them. Both the jointing system and the coating system used in this instance are one of those systems referred to in the manufacturer's instructions. The coating in this instance is a coloured acrylic spray textured finish. The Authority notes that the specification calls for a solid plaster stucco finish, but the territorial authority has not queried the departure from the specified finish.
- 2.4 The cladding applicator issued a "Compliance Form" in respect of the cladding jointing and finishing systems.

Sequence of events:

- 2.5 The territorial authority issued a building consent on 23 March 2001.
- 2.6 The territorial authority made various inspections during the course of construction, and approved the pre-plaster cladding inspection once the expansion joint had been confirmed as "OK". On 11 February 2004, the building failed a final inspection. On 12 February 2004, the territorial authority forwarded a letter to the owner identifying matters requiring attention. Two of these related to the cladding and said:

Slope on balcony does not comply min 15%.

In regard to the monolithic cladding applied to your dwelling, and not withstanding the approval in your building consented plans and specifications, recent information has indicated that monolithic claddings that do not have appropriate drainage, adequate ground clearance, reinforcing, control joints, and external joinery flashings including all other weather flashings/deck penetrations will, in the event of leakage and /or residual moisture, cause irrevocable damage to the structural elements of the building. Doubt has arisen to the extent that monolithic claddings that do not have all of these features may not meet the requirements of Clauses B2 and E2 of the NZ Building Code.

As the monolithic cladding system fixed to your building has been individually assessed as being such a cladding, Council needs to be assured that it meets the requirements of the NZ Building Code before a final building code compliance certificate can be issued. If you made an application to the

Building Industry Authority for a determination on this issue under Section 17 of the Building Act 1991, it would decide the matter.

- 2.7 The Authority takes the first comment to relate to the required slope on the top of the balustrade, not the deck itself.
- 2.8 The territorial authority did not issue a notice to rectify as required under section 43(6) of the Act.
- 2.9 The owner applied for a determination on 3 May 2004.

3 THE SUBMISSIONS

- 3.1 The owner attached a “Matter of Doubt or Dispute” to its application, which named the plasterer and the contractor, and also stated:

The dwelling is clad in [Named product] and we have been unable to get a finishing certificate from the [territorial authority] as they are now stating that the cladding does not meet current requirements although it did meet all the requirements at the time of construction.

During the process [Named person] the Council Inspector insisted that [the Manufacturer’s representative] be brought on site to inspect the installation of their product in accordance with the [Manufacturer’s] Technical Information Brochure, July 1998, before Plastering commenced.

- 3.2 The owner also provided copies of:

- The drawings and specifications;
- Copies of correspondence from the territorial authority; and
- The Manufacturer’s Technical Information.

- 3.3 The territorial authority wrote a letter dated 25 May 2004 to the Authority as its submission. This letter included the following statements:

The plans and specifications approved by the Council show that a certain plastered [Named] monolithic cladding system was to be used. The [Named product] has been face fixed without a drainage cavity to the untreated timber framing.

While it is appreciated that the [owners] have followed the original plans and specification, doubt has arisen to the extent that monolithic claddings that do not have an appropriate drainage cavity may not meet the requirements of Clauses B2 and E2 of the NZ Building Code. Because of this, the Council is reluctant to issue a building code compliance certificate...

- 3.4 The territorial authority provided the Authority with copies of the “Field Inspection Record” for the house and the 12 February 2004 letter to the owner.
- 3.5 The copies of the submissions and other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submissions of the other party.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with clause E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

Clause E2—EXTERNAL MOISTURE

E2.1 The objective of this provision is to safeguard people from illness or injury, which could result from external moisture entering the building.

E2.2 Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

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

4.2 There are no Acceptable Solutions that have been approved under section 49 of the Act that cover this cladding. The cladding is not accredited under section 59 of the Act. The Authority is therefore of the opinion that the cladding system as installed can be considered to be an alternative solution.

4.3 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.

5 THE EXPERT'S REPORT

5.1 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report, which noted that the general appearance of the cladding appears to be good and in keeping with its age. The texture plaster coating appears to be evenly applied and there was no evidence of bare/over-applied patches. The expert's report made the following specific comments on the cladding:

- There are cracks at the exterior joinery/cladding junctions;
- There are no positive seals to the exterior joinery jambs abutting the cladding
- No sill flashings are installed, however the expert has not considered this to be a remedial requirement;
- There is a hairline crack at the balcony/house wall junction;

- The apron flashings at the gutter end and at the wall/roof junctions are inappropriately finished and lack “kick-outs”;
 - There are no exterior corner moulds installed as required by the manufacturer's instructions;
 - There is generally inadequate ground clearance at unpaved areas;
 - The boundary joist to the high-level deck has been fixed prior to the texturing being carried out, it has not been flashed, and there are indications that moisture is wicking up the backing sheets;
 - The top of the high-level deck balustrade is flat and has several handrail fixing penetrations. However, the expert considers, that as the balustrade at the deck level is open, there is ample ventilation and drainage in the event of cladding failure; and
 - The ground level deck is at a high level in relation to the internal floor level, however, the expert considers that its gapped decking will provide sufficient opportunity for surface water to drain away.
- 5.2 The expert took moisture readings of the interior linings using a non-intrusive meter and no elevated readings were recorded. The expert also used an invasive type moisture meter at 7 locations. Five of these readings ranged from 13.8% to 15.1%, and at a further 2 locations readings of 24.1% and 24.9% were recorded. The Authority notes that the former reading is associated with the apron flashing end finish and the latter reading with the deck boundary joist connection with the cladding. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.
- 5.3 Copies of the expert’s report were provided to each of the parties.

6 THE AUTHORITY’S VIEW

General

- 6.1 The Authority has considered the submissions of the parties, the expert’s report and the other evidence in this matter. The Authority’s approach in determining whether building work complies with clause E2.3.2, is to examine the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing.

Weathertightness risk

- 6.2 Recent New Zealand data and experience indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good and effective design and construction practices are followed.
- 6.3 The installation of exterior cladding to manufacturer’s specifications and to accepted good trade practice is an important but not the only requirement to ensure good weathertightness performance.

- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls:
- 6.5 Important matters for consideration are:
- Data shows a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, the Authority believes that homes in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;
 - Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
 - Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks to directly penetrate into the wall; and
 - Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.
- 6.6 Any likely penetration of moisture through the cladding can then be countered by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. In particular:
- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. The Authority believes that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
 - The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, the Authority believes that the drainage cavity should be not less than 20 mm deep; and
 - The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.
- 6.7 In relation to these characteristics, the Authority finds that this house:
- Has 600 mm wide eaves that reasonably protect the cladding but the 300 mm wide gable overhangs provide only minimal protection;
 - Is in a high wind zone;
 - Is two stories high;

- Has head flashings to the exterior joinery units;
- Has several wall/roof intersections;
- Has an overall envelope that is relatively simple on plan;
- Has one elevated deck and a deck with associated steps at the ground floor level;
- Has no drainage cavity where the cladding is face fixed; and
- Has external walls constructed with untreated timber, which is not effective in delaying the onset of decay.

Weathertightness performance

- 6.8 Generally the cladding appears to have been installed according to good trade practice and to manufacturer's instructions. It can be considered to be reasonably effective in preventing the penetration of water. There are, however, defects as set out in paragraph 5.1, which have allowed the ingress of moisture behind the cladding.
- 6.9 The Authority considers on the basis of the expert's report that the key defects relate to the cladding/external joinery jamb junctions, the apron flashings, ground clearances and the high-level deck boundary joist and cladding junction.
- 6.10 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting ventilation behind the cladding sheets and the design of the house has some high risk factors, the Authority finds that there are compensating provisions that assist the performance of the cladding in this particular case. These are:
- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
 - The building has eaves that in the main are effectively 600 mm wide, which offer reasonable protection to the building; and
 - The 2 areas where high moisture levels indicate that external moisture may have entered the building are discrete and the moisture can be directly attributable to defined defects.
- 6.11 The Authority considers that these other provisions adequately compensate for the lack of a drainage cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.
- 6.12 The Authority accepts the expert's conclusion that, while the top of the high-level deck balustrade is flat and penetrated by handrail fixings, there is ample ventilation and drainage in the event of cladding failure because the balustrade at the deck level is open.
- 6.13 The Authority also accepts the expert's contention that despite the ground level deck being at a high level in relation to the internal floor level, its gapped decking will provide sufficient opportunity for surface water to drain away,
- 6.14 The Authority notes that there is visual confirmation that the vertical control joint had been installed on the south elevation. There was also evidence of a horizontal control joint at intermediate level. It has no evidence of the presence of any other vertical control joints.

However the Authority also notes that the control joints were subjected to special scrutiny by the territorial authority's inspector as evidenced by the note on the pre-plaster check. There is no evidence of any cracking in the main body of the cladding and the expert has not considered control joints to be a problem. Accordingly, the Authority accepts that appropriate control joints have been installed.

7 CONCLUSION

- 7.1 The Authority accepts that the expert's report establishes that the cladding complies in most respects with the manufacturer's instructions. However, as there is evidence of external moisture entering the building, the Authority finds that the cladding on this particular building does not comply with clause E2.
- 7.2 The Authority also finds that when the cladding faults have been satisfactorily rectified this house should be able to remain weathertight and will thus comply with clause E2. It is essential that all the required items of rectification, which are detailed specifically in paragraph 5.1, and noted in the expert's report, be competently carried out to ensure such compliance.
- 7.3 The Authority notes that any rectification will require that the face fixed window joinery be appropriately sealed to the cladding. It draws the party's attention to the revised Acceptable Solution E2/AS1 that requires sill flashings to be provided to face fixed external joinery units in fibre cement walls. It suggests that this detail is an appropriate benchmark for use in this case.
- 7.4 The Authority emphasises that each determination is conducted on a case-by case basis. Accordingly, the fact that a particular cladding system has been established as being code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.
- 7.5 The Authority declines to incorporate any waiver or modification of the building code in its determination.
- 7.6 The Authority notes the importance of the owners' responsibility for ongoing maintenance to this cladding. The code assumes that the normal maintenance necessary to ensure the durability of the cladding is carried out. For that reason clause B2.3.1 of the building code requires that the cladding be subject to "normal maintenance". That term is not defined and the Authority takes the view that it must be given its ordinary and natural meaning in context. In other words, normal maintenance of the cladding means inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.

8 WHAT IS TO BE DONE?

- 8.1 It is not for the Authority to dictate how the defects listed in paragraph 5.1 are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Authority for another determination.

9 THE AUTHORITY'S DECISION

- 9.1 In accordance with section 20 of the Building Act, the Authority determines that the house does not comply with clause E2. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 9.2 The Authority finds that because of the compensating factors in this case, the lack of a drained cavity behind the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.
- 9.3 The Authority, therefore, finds that once the items of non-compliance, which are listed in the expert's report and summarised in paragraph 5.1, are rectified to the approval of the territorial authority, together with any other instances of non-compliance that become apparent in the course of rectification, the cladding as installed on the house will comply with the building code, notwithstanding the lack of a drainage cavity.
- 9.4 The Authority considers that the cladding will require on-going maintenance to ensure its continuing code compliance, and that this maintenance programme should be undertaken after consultation with the territorial authority.

Signed for and on behalf of the **Building Industry Authority** on 13 September 2004.

A handwritten signature in black ink, appearing to read 'John Ryan', with a large, stylized flourish at the end.

John Ryan
Chief Executive