

Determination: 2004/16

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 8

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 applicant is 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 (CCC) for a new house unless changes are made to its monolithic cladding system.
- 1.2 There are both weatherboards and monolithic external wall claddings fixed to the house. However, the Authority’s task in this determination is to consider whether it is satisfied on reasonable grounds that only the monolithic cladding as installed (“the cladding”) on this house complies with the building code (see sections 18 and 20 of the Act). By “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 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 9 sets out the Authority’s final decision.

2 PROCEDURE

The Building.

- 2.1 The building is a single storey detached house on a sloping site that is in a very high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. It is of conventional light timber frame construction and is of a relatively simple shape. The house is generally clad with fibre-cement weatherboards, apart from two wall feature panels and the upper high level walls and their returns, which are clad with a monolithic system. The house has three pergolas, only one of which is fixed directly to the monolithic cladding. There is a deck at ground floor level to one elevation and one return, which finishes hard against the cladding. One elevation of the building has 300 mm wide eaves and a second elevation has 600 mm wide eaves, apart from one minor section that has no projection. The high level walls to the remaining two elevations have no projections.
- 2.2 The framing in external walls is H3 treated kiln dried timber.
- 2.3 The cladding that is being considered in this determination is known as a monolithic cladding system. 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. There is no verification that either the jointing or the acrylic plaster systems applied to this building is one of those described in the instructions.

Sequence of Events:

- 2.4 The territorial authority issued a building consent on 29 August 2001.
- 2.5 The territorial authority made various inspections in the course of construction and a final inspection was carried out on 11 March 2002.
- 2.6 On 11 March 2002, the territorial authority issued "Interim Notice to Rectify 2791", which contained details of items requiring rectification and completion. None of the items listed related to the exterior cladding.
- 2.7 In a letter to the owner dated 29 January 2004, the territorial authority stated that an inspection carried out on 27 January 2004 identified two matters requiring attention. One of these stated:

In regard to monolithic cladding applied to your dwelling, and notwithstanding approval in your 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 weather flashings will, in the event of leakage and/or residual moisture, cause irrecoverable damage to the structural elements of the building. Doubt has arisen to the extent that monolithic claddings that do not have 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 code compliance certificate can be issued...

- 2.8 The territorial authority did not issue a further Notice to Rectify as required under section 42 of the Act.
- 2.9 The owner applied for this determination on 3 February 2004.

3 THE SUBMISSIONS

- 3.1 The owner provided:
 - Copies of 4 drawings, which were only part of the full set of plans, together with the specification;
 - A letter from a company providing a building guarantee, which indicated that following an inspection, there were a few minor items to be completed on the home;
 - The territorial authority inspection reports;
 - A Variation to Contract order from the builder setting out an extra cost for providing H3 treated kiln dried timber to exterior walls;

- A copy of the 11 November 2002 Interim Notice to Rectify;
 - Copies of the building consent, required inspections and the 29 January 2004 letter issued by the territorial authority; and
 - A page of explanatory notes; on which the owner stated that they were not originally aware of the requirement for a code compliance certificate nor did they receive a copy of the Interim Notice to Rectify from the builder. These factors explained the delay in applying for a code compliance certificate.
- 3.2 Following a request from the owner, the builder sent a letter to the Authority dated 23 March 2004. This stated that:
- The house was “constructed strictly in accordance with the approved Building Consent documents issued by the [territorial authority]”;
 - The cladding sheets were “installed in accordance with the recommendations of the manufacturer and in accordance with good trade practice”; and.
 - The house was “inspected at all times by the [territorial authority] to ensure compliance with the Building Consent documents and the Building Code”.
- 3.3 The territorial authority made a submission, which had details of the territorial authority’s record of building inspections and a copy of the building consent attached. The submission noted that the territorial authority:
- “[H]as doubts as to the complying nature of the monolithic cladding that had been fixed to the dwelling – in particular, compliance with Building Code Clause E2 – External Moisture – to the extent that it should not now issue the final code compliance certificate unless it is satisfied on reasonable grounds that it should do so.
- 3.4 The Authority commissioned an independent expert to inspect and report on the cladding.
- 3.5 The copies of the submissions and other evidence were provided to each of the parties. Neither the applicant 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 clauses B2.3.1 and E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

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, or
 - (ii) Those building elements are difficult to access or replace, or
 - (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of 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, or

(ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

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 to inspect and report on the cladding. The expert inspected the building and provided a report that stated that the exterior finish of the cladding is generally of good quality except where noted otherwise, and that the plaster coating and painting is of good standard. The expert also noted the following faults during the inspection:

- There are no vertical control joints where the cladding panels are more than the specified 5.4 metre minimum width;
- Cracking is evident at 8 wall cladding locations and there is multiple cracking around the cladding to high level walls and returns;
- One pergola is fixed directly to the monolithic cladding;
- There is no overlap on two elevations between the cladding and the weatherboard linings and no air gap at the horizontal junction of these two cladding types;
- There is inadequate clearance between the cladding and roof flashings on the upstands between the various roof levels;

- There is no clearance, plaster or paint to the cladding at the junction of walls and adjacent spoutings at 3 locations;
 - There is no clearance where the deck adjoins the cladding;
 - The TV aerial is fixed into the cladding;
 - The end of one metal fascia is buried into the cladding; and
 - There is no protection between the cladding and some penetrations.
- 5.2 The expert also used a non-invasive type moisture meter applied to the internal face of external walls to detect areas of moisture ingress. The moisture readings varied between 10.1% and 16.8%. While a moisture reading of less than 18% does not of itself indicate that the cladding is code compliant, it is indicative of the efficiency of the cladding in preventing moisture ingress to date.
- 5.3 The Authority is concerned that the territorial authority did not discover these significant faults during its inspections while the building was being constructed. In the case of this house, the inspection regime could have been better implemented. In particular, the lack of control joints should have been identified in the final inspection report.
- 5.4 Copies of the expert's report were provided to each of the parties. Both the territorial authority and the owner made comments but neither comment was relevant to the technical content of the report.

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 clauses B2.3.1 and 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 a fundamental requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by utilising design measures that minimise the effects of the rain impacting on the walls:
- 6.5 The main areas 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 incidents;
 - 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 higher 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 out from the external walls are the most frequent location for water leaks.

6.6 Any penetration of moisture through the cladding can then be addressed by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. These factors being:

- 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 eaves projections to only two of its four elevations. One elevation has eaves that are 300 mm wide and another elevation has eaves that are 600 mm wide, with the exception of one minor length. The overall eaves configuration of this building can be considered as being only marginally effective in shielding the cladding;
- Is in a very high wind zone;
- Is constructed to one level, although the high level walls give an additional height to one elevation and the roof returns;
- Has wall/roof intersections due to the multi levelled nature of the roof;
- Has an overall envelope that is relatively simple on plan, but has a complex roof configuration that increases the weathertightness risk;
- Uses fibre cement to clad the shallow roof upstands;
- Has a deck which finishes directly against the cladding;
- Has a pergola fixed directly to the cladding;
- Has flashings over the window heads;
- Has numerous transitions between the weatherboards and the cladding;
- Has no drainage cavity where the cladding is face fixed; and

- Has external walls constructed from H3-treated timber, which is an effective treatment for delaying the onset of decay.

Weathertightness performance

- 6.8 The Authority finds that the cladding in general does not appear to have been installed according to good trade practice and to the manufacturer's instructions. As a result, there are numerous defects which could contribute to the penetration of water. These include:
- A lack of control joints, resulting in multiple cracking which will with time significantly increase the risk of water penetration;
 - Use of fibre cement to clad the roof upstands, which, because of the elongated shape of the panels, is prone to cracking;
 - Problems where the different cladding materials adjoin;
 - The directly fixed pergola and the adjoining deck; and
 - Poorly constructed terminations and penetrations.
- 6.9 In addition, the Authority finds that the design of this building shows a lack of those compensating factors that can assist in preventing moisture from entering the building. The Authority considers that the use of upstands to the various roof sections, the absence of some eave projections, complex transitions between the weatherboard and monolithic claddings and the absence of any drainage cavity are significant factors that increase the weathertightness risk, and which are not sufficiently offset by the use of H3 treated timber in the external walls.
- 6.10 The Authority also notes that the statement made by the territorial authority as reported in paragraph 2.7, appears to describe a policy on monolithic claddings. The Authority emphasises that the use of such a policy in circumstances such as this is contrary to the requirements of the Act. The Act requires that decisions on whether an alternative solution is code compliant have to be taken with due regard to the performance of the building (and any element of it) in its as built condition and environment. In other words, it requires the territorial authority to assess performance on a case-by case basis. In this instance, the territorial authority does not appear to have followed such a process.

7 CONCLUSION

- 7.1 The Authority therefore finds that as at the time of this determination there is no evidence of external moisture entering the building and that the cladding on this particular building therefore complies with clause E2.
- 7.2 While the building does not show any signs of water ingress at the present time, this building will also have to comply with the durability requirements of clause B2. B2 requires that a building continue to satisfy all the objectives of the code throughout its life, and that includes the requirement for the building to remain weathertight for its prescribed life. Because the many cladding faults in this building are likely to allow the ingress of moisture in the future, the building does not achieve the durability requirements of B2, notwithstanding the use of H3 treated timber in the external frames
- 7.3 In the circumstances, the Authority also declines to incorporate any waiver or modification of the building code in its determination.

8 WHAT IS TO BE DONE?

- 8.1 It is not for the Authority to finally decide how the cladding is to be 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.
- 8.2 The Authority suggests that the Council and the owner together examine options that could improve the performance of the cladding. Clearly the faults in the cladding will need to be addressed to maintain the weathertightness of the building. The owner may decide to remove and reinstate some or all of the exterior cladding, and reapply for a code compliance certificate. If the owner does not wish to apply for a code compliance certificate, we would strongly recommend that the faults be remediated and that an agreed regular monitoring and maintenance program be put in place to extend the life of the building by identifying and remediating new leaks before they caused other damage. If the territorial authority issues a notice to rectify requiring that the cladding be made compliant, the owner is required to rectify the building work not done in accordance with the code.

9 THE AUTHORITY'S DECISION

- 9.1 In accordance with section 20 of the Building Act, the Authority determines that the cladding as installed does not comply with clause B2.3.1 of the building code. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.

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

John Ryan
Chief Executive