

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 36

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 two owners of the property (referred to throughout this Determination 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”), 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 Act or the building code.
- 1.4 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 8 sets out the Authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a two-storey detached house situated on a sloping and partly excavated site, which is in a low wind zone and “within spray zone” in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction, partly on a concrete block foundation wall, and partly on a timber framed piled floor. The external walls are sheathed entirely in a monolithic cladding. The house is of a relatively complex shape, resulting in a two-level main roof with numerous intersections. There are roof/cladding junctions where the lower level roof abuts a gable or parapet wall. The house has one large timber framed and close-boarded deck, continuous at the upper level to three elevations, and which is fixed directly to the cladding and also supported on beams and circular timber columns. A glazed metal-framed balustrade runs the full length of the deck. The Authority notes that this deck is more extensive than shown on the consented plans. However, the owner has informed the expert that an amended plan was forwarded to the territorial authority in relation to this. There are also three balcony decks at the upper level,

which are not constructed over living spaces. These are constructed as for the main deck, but also have timber framed balustrades lined on both faces and the top with monolithic cladding. Over the main entrance is a flat roof that is lined with a butyl rubber membrane that adjoins two faces of the cladding and is surrounded on the remaining two edges with a timber framed and monolithic clad parapet wall. This roof is supported on its freestanding corner by a stone veneered timber post. The entrance deck is timber framed and lined with tiles. There are two pergolas consisting of timber posts, beams and rafters that are fixed directly to the cladding. One pergola also has a stone veneered timber post corner support. The eaves, apart from two lengths, have projections that are either 300 or 600 mm wide. The major length without an eaves projection is adjacent to a wall cavity.

- 2.2 The Authority is prepared to accept the expert's assumption, based on a visual inspection, that the framing in the external walls is H1 LOSP treated timber, which is a lower treatment than is specified, and that the framing to the balconies and decks, the balcony balustrades and where used to form a cavity on the south eastern elevation is Tanalised (which the Authority assumes to be equivalent to a H3 treatment level). The Authority notes that this cavity is not shown on the plans and that it is to an area that does not have an eaves projection over it.
- 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 an independent appraisal but give no other information about them. Neither the jointing nor the textured coating has been confirmed as being one or other of those nominated.

Sequence of events:

- 2.4 The territorial authority issued a building consent on 26 August 1998. None of the "Conditions" attached to the consent referred to the cladding.
- 2.5 The territorial authority made various inspections during the course of construction, and on 9 November 1998 carried out a "Preline Building Checklist" that approved all the relevant items on that document. On 6 May 1999, the territorial authority issued two "Development Building Officers Field Memoranda" following a final inspection, which listed items that were in contravention of the building code. The first document stated:

No record exists on file for a plumbing preline or a drainage inspection having been carried out. Also require as built drainage plans and notification form from Registered Drainlayer and Craftsman Plumber.

The second document listed 16 items of contravention. One of these related to pergola post to beam or wall fixings and the other to the fact that the "decks were different to plan - provide amended details".

- 2.6 The territorial authority on an “Inspectors Field Inspection Sheet” set out that there was a Final building “Recheck” inspection’, on 12 January 2002, which noted that “some items still to complete. Gave owner cladding/CCC letter.” Another inspection on 24 March 2002 noted “weathertightness/ wall cladding check”. The territorial authority wrote to the owner on 12 January 2004, notifying the owner that existing properties using any type of cladding will be reviewed on a case-by-case basis before determining whether a code compliance certificate could be issued.
- 2.7 On 2 April 2004, the territorial authority wrote to the owner pointing out that the territorial authority had to ensure that all building work had to meet the building code requirements. The letter stated:

We have received your request for a code compliance certificate (CCC) for a dwelling at the above address.

Before the council can issue a code compliance certificate, we must ensure that all building work meets the NZ Building Code requirements. In particular, the building code specifies that building work must remain durable for given periods of time after the code compliance certificate is issued.

You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.

As your building is face fixed (monolithic) construction with no cavities the Council are unable to issue a code compliance certificate for the dwelling because we are unable to verify that it fully complies with the Building Code requirements, manufacturer’s details application at the time and that it will remain durable for the required period. Visual inspection has also revealed

- 1) No apparent horizontal control joints at mid floor
- 2) Ground contact of cladding
- 3) Outstanding building issues & plumbing & drainage issues (no final recheck)
- 4) Timber treatment not confirmed

There has been recent information and knowledge that face sealed cladding systems without an adequate drainage and ventilation cavity will cause irrevocable damage to structural elements in the event of leakage and/or the effect of residual moisture.

Council cannot be satisfied that the cladding system as installed on the above building will meet the functional requirements of Clause E2 External Moisture of the New Zealand Building Code

- 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 12 May 2004.

3 THE SUBMISSIONS

3.1 The owner noted on the D1 form under the heading of “Matter of doubt or dispute” that:

We have been trying to obtain a code compliance certificate from [the territorial authority]. They gave us a letter stating they would have to inspect it re the cladding. After 3 months they finally inspected see attached letter. We have since completed the ground contact of the cladding to the satisfaction of the council; and the control joint issue. They will not issue a rectification notice and accordingly are seeking a determination.

3.2 The owner also provided copies of:

- The drawings and specifications; and
- The letters from the territorial authority dated 12 January 2004 and 2 April 2004.

3.3 The territorial authority did not make a submission but under a covering letter dated 18 June 2004 to the Authority, provided copies of:

- The building consent documentation;
- The territorial authority’s inspection reports and memoranda;
- The letters from the territorial authority dated 12 January 2004 and 2 April 2004; and
- A set of photographs of the building.

3.4 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 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 sub floor 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 Because the information provided by the parties contained insufficient detail on how the building had been constructed, 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 cladding coating is in very good condition, having recently been painted, and all visible areas have a high quality finish. The exterior joinery units had metal head flashings and the pre-plastered polystyrene perimeter trims to these units were similar to those in a manufacturer's instructions and provided good protection. The expert’s report made the following specific comments on the cladding:
 - There are no horizontal control joints and at least one sheet join was in a high stress area, which could indicate that the sheet layout in other areas may not be correct. The Authority notes that according to the owner some hairline cracks had recently been ground out and replastered. The Authority also notes that vertical joints are required to the wall of the master bedroom and the side wall to the garage;

- The bottom edge of the cladding is too close to the ground in the area of the garage where an additional internal concrete slab has been poured and where the timber bottom plates are rotting;
- The ribbon plate securing the entrance deck was fixed directly to the cladding, prior to the sealing and painting of the cladding;
- The close boarded flooring to the deck and balconies and the tiling to the entrance deck all butt up tightly to the cladding, which can lead to moisture “wicking” up the backing, especially where there is no coating behind the ribbon plate;
- The ribbon plates to the pergolas are not sealed against the cladding;
- There is cracking between the wooden garage door jamb facings and the cladding;
- There are no “kick-out” flashings to the ends of the roof apron flashings, though they are carefully sealed and there is no evidence of moisture ingress at these points;
- The bolts securing the deck plates to the house have not been sealed through the cladding; and
- As regards the entrance roof:
 - a) There is no capillary gap behind the cladding over the roof membrane upstand and the backing sheet is delaminating due to its saturation,
 - b) The plastered top of the parapet wall is flat, has no flashing and is penetrated by fixings, which may be causing the timber framing to decay; and
 - c) The slope on the roof itself is inadequate and holds water.

- 5.2 The expert took moisture readings around the external walls, using a resistance type meter with insulated metal prongs at 15 locations. At 12 locations readings of 18% and above were recorded, up to a maximum of 40%+. The main areas that are affected are the walls adjacent to the garage door, the parapet above the front door porch, under the entry porch, the framing under the rear deck ribbon plate and the south-east side of the building. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.
- 5.3 The expert also noted that some of the remedial work undertaken by the owner by the garage door did not prevent diffusion from carrying moisture to the bottom plates from the driveway concrete. In addition, the rotted bottom plates had not been replaced.
- 5.4 Copies of the expert’s report were provided to each of the parties. The owner responded by letter on 5 August 2004, accepting the findings of the expert and stating that a qualified building contractor had been engaged to view the property with a view to making good the expert’s recommendations. However, the owner was not proceeding with any rectification work until such work had been designed by an approved person recognised by the territorial authority and the Authority. The Authority points out that it has no authority to approve the appointment of designers or other building consultants.

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 buildings 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, apart from two lengths, the major one of which is protected by a cavity, 600 mm wide eaves that reasonably protect the cladding;
- Is in a low wind zone and is also within a spray zone;
- Is two stories high;
- The exterior joinery units have head flashings and adequately protected jambs and sills;
- Has wall/roof intersections;
- Has an overall envelope that is relatively complex on plan, with a roof that has numerous intersections;
- Has one large deck and three balconies at the upper level;
- Has a flat roof with parapet walls over the entrance;
- Has two pergolas fixed to the building;
- Has, except for one of its exterior walls, no drainage cavity where the cladding is face fixed; and
- Has external walls constructed with either H1 LOSP treated timber, which is ineffective in preventing the onset of decay, or H3 treated timber which is very effective in preventing such decay.

Weather-tightness 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. There are a number of identified defects, which are set out generally in paragraph 5.1 and summarised

more fully in the expert's report that have contributed to the penetration of the moisture already evident in several areas. There are numerous faults that have been identified in the cladding and there is evidence of moisture in the external walls in certain areas that cannot be attributed to any specific fault. The Authority also notes that the plans lack information as to the crucial weatherproofing details for the house. Accordingly, the Authority has no confidence that the cladding will comply with the requirements of clause E2, even when all the faults set out in the experts report have been repaired.

- 6.9 The Authority finds that, with the exception of the cavity wall on the south-east elevation, the design and construction of this building lacks sufficient compensating factors that can assist in preventing moisture from entering the building.
- 6.10 The Authority notes that two elevations of this house demonstrate a moderate weathertightness risk rating and that the other two elevations demonstrate a low weathertightness risk rating as measured by the risk matrix in E2/AS1.
- 6.11 The Authority notes the importance of the owner's responsibility for ongoing maintenance to the cladding. The code assumes that normal maintenance necessary to ensure the durability of the cladding is carried out, and thus clause B2.3.1 of the building code requires the cladding to be subject to "normal maintenance". That term is not defined, so 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, repainting, replacing sealants, and so on.

7 CONCLUSION

- 7.1 The Authority finds that at the time of this determination there is evidence of external moisture entering the building, and, therefore, the cladding on this particular building does not comply with clause E2.
- 7.2 In the circumstances, the Authority declines to incorporate any waiver or modification of the building code in its determination.

8 THE AUTHORITY'S DECISION

- 8.1 In accordance with section 20 of the Building Act, the Authority determines that the cladding as installed does not comply with clause E2.3.2 of the building code. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 8.2 The Authority notes that the territorial authority has not issued a Notice to Rectify. However, if the territorial authority chooses to do so, the owner is obliged to bring the house up to compliance with the building code. It is not for the Authority to decide directly how the defects 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.

- 8.3 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 rectified to establish 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 rectified and that an agreed regular monitoring and maintenance programme be put in place to extend the life of the building by identifying and rectifying new leaks before they cause other damage.
- 8.4 The Authority considers that the cladding on 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 23 September 2004.

A handwritten signature in black ink, appearing to read 'J. Ryan', with a large, sweeping underline stroke.

John Ryan
Chief Executive