

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 51

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 of the property 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 2-year old 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 monolithic wall cladding as installed (“the cladding”), to the walls of this house, complies with the building code (see sections 18 and 20 of the Act). By “external monolithic 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 2.3, and paragraph 8 sets out the Authority’s final decision.

2 PROCEDURE

The building

- 2.1 The building is a part one-storey, and a part two-storey, detached house situated on a level excavated site, which while sheltered, is exposed to higher wind conditions from the northerly direction. The house is of conventional light timber frame construction on a concrete block foundation wall. The external walls are sheathed with monolithic cladding. The building is of a relatively simple shape, but has curved roofs at 5 different levels, which are set to varying radii and have numerous junctions with the cladding above them. The roof configuration differs from the consent drawings, which has enabled the planned internal gutters to be omitted. The owner forwarded details of this revision at the request of the territorial authority. There is a small membrane clad flat roof over the main entry. The eaves have 150mm and 300mm wide projections, and the gables have direct fixed barge fascias
- 2.2 The owner provided an invoice to verify that the framing in the external walls is kiln dried H3 LOSP treated.

- 2.3 The external walls of the building are clad with what is described as monolithic cladding. In this instance it incorporates fibre-cement backing sheets fixed through the building wrap directly to the framing timbers and finished with a 14mm to 17 mm thick three-coat solid plaster, reinforced with fibreglass mesh. The plaster in turn is finished with a compatible, vapour-permeable, 100% acrylic paint system. Incorporated in the system are a series of purpose made pvc extrusions that reinforce and waterproof the corners, edges and external joinery unit surrounds. As referred to on the cladding manufacturer's guarantee, the system had been appraised by an independent agency. However, the Authority has learned that the appraisal has since been voluntarily withdrawn.
- 2.4 The manufacturer has provided a 15-year "Manufacturer's Guarantee" for the system, dated 19 May 2004, and the applicator has provided a "Producer Statement" for the cladding, dated 16 January 2004.

Sequence of events:

- 2.5 It appears that the territorial authority issued a building consent in late 2003, but the Authority has seen no evidence as to this.
- 2.6 The owner has stated that the territorial authority has retained the original checklist, which shows that the territorial authority building inspector approved the outside lining and window flashings. However, no documents have been provided verifying what inspections took place. The territorial authority did inspect the house on 18 May 2004, and in a letter of the same date to the owner stated:
1. Provide amended plans of the altered roof layout and detail.
 2. Provide full details of the cladding system used on the building so as to enable Council to ascertain its compliance or otherwise with the requirements of the NZ Building Code. A Producer Statement 'Construction Review' will also be required from the Installer of the cladding system.
 3. Provide energy work certificates for both gas and electricity installations.
 4. Fix the laundry tub to the wall so as to prevent undue movement.
- 2.7 The owner forwarded the "Producer Statement" described in paragraph 2.4 to the territorial authority.
- 2.8 The territorial authority in a letter, dated 3 June 2004, noted that:

Upon the perusal of the exterior cladding system used on the dwelling it appears that it is a monolithic cladding and is by definition a "stucco" plaster system. This is also borne out by the fact that [the applicator] in his producer statement, dated 24 May 2004, states the work was done to comply with NZ Standard 4251, Part 1:1998.

This being so, I wish to advise you that at this time the [territorial authority] is unable to issue a Code of Compliance Certificate for the work as it has not been carried out in accordance with the requirements of E2 of the NZ Building Code. In particular the interim amendment brought in by the Building Industry Authority on 9 February 2004 requires, amongst other things, that a drained cavity is required behind stucco with a non-rigid and rigid backing...

In my opinion there are two ways in which this can be rectified. Either remove the cladding and place a cavity behind it to comply with the requirements of E2

of the NZ Building Industry Authority, or apply to them for a determination pursuant to Section 17 of the Building Act 1991. The path that is to be taken is yours to choose.

2.9 The owner applied for a determination on 25 June 2004.

3 THE SUBMISSIONS

3.1 The owner stated that the “matter of Doubt or Dispute” was the “refusal to issue a code compliance” and provided copies of:

- The building plans, including the amended roof plan;
- The invoice from the timber supplier;
- Correspondence with the territorial authority;
- The cladding manufacturer's guarantee;
- The cladding applicator's “producer statement”; and
- The manufacturer's instructions.

3.2 The territorial authority in a letter to the Authority, dated 29 July 2004, said:

- The building cladding was not considered as an alternative solution as the cladding was stucco by definition and did not appear to comply with the requirements of E2, the NZ Building Code after February 2004. The cladding did not have a cavity.
- The [territorial authority] have not issued a Notice to Rectify for the work but feels it has met its obligations under Section 43 by notifying the applicant in writing specifying the reasons why it refused to issue a Code Compliance Certificate. Refer to section 43(5) of the Building Act 1991. Copies of the letters dated 18 May 2004 and 3 June 2004 supporting this stance are enclosed. The B.I.A. already have a copy of this correspondence.
- I have also enclosed copies of the correspondence from [the applicator] regarding the cladding. I note that [the manufacturer] advertising states that plaster system has been [Independent organisation] approved but I am advised that this appraisal is no longer valid.

The territorial authority attached copies of the correspondence referred to in this letter.

3.3 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. The relevant 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 (“the expert”) to inspect and report on the cladding. The expert inspected the building and furnished a report. The report noted that the cladding appears visually to be in good condition, the plaster was of good quality and of the required thickness, and the paint finish appears sound and evenly applied with no evidence of bare/over-applied patches. With the exception of some window sill cracks,

there was no evidence of cracking, flaking or staining. The expert removed two small sections of the plaster to examine a sill/jamb intersection and a head/jamb intersection of one exterior joinery unit, and the Authority accepts that these intersections are typical for the remaining units. The expert was unable to ascertain whether a sill tray had been installed. The expert's report made the following specific comments on the cladding:

- There was evidence of hairline cracking to the cladding at some of the junctions between the plaster and the joinery sill profiles;
- No vertical control joints are evident to any of the elevations, despite the wall dimensions in some instances exceeding the limits set out in the manufacturer's instructions. However, there is no evidence of cracking in the main areas of the cladding;
- There are several gutter/wall junctions where the cladding is not appropriately waterproofed;
- The abutment of the plaster with the fascia along the west elevation of the garage is a water ingress risk;
- There are no kick-outs applied to the ends of the apron flashings and the fascias and gutters are buried in the cladding;
- A bottom edge pvc profile is not installed over the head flashings and there is no sill flashing tape applied at the sill/jamb junctions;
- There is insufficient clearance to the base of the cladding at 3 locations; and
- There is no flashing to the top of the pergola column, and there is an unsealed joint between the column post and the cladding.

5.2 The expert carried out a series of invasive moisture tests through the cladding to access the timber framing throughout the building using a meter with extended electrodes. The expert took readings at a total of 7 locations, and only one of these exceeded 18 %. This was under the window of the east elevation bedroom, where the reading was 28%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. The expert also tested for the presence of moisture through the interior of the dwelling with a non-invasive meter and no elevated readings were recorded.

5.3 Copies of the expert's report were provided to each of the parties. The territorial authority did not respond, but the owner forwarded a response from the cladding manufacturer, which raised the following issues:

- Jamb and sill flashings were installed to the manufacturer specifications;
- There is a requirement that a sealant be applied at the junction of sill flashings and the plaster to prevent the formation of hairline cracks;
- As the sill reveals were only 13 to 15 mm wide, the fact that the slope was less than 15 degrees would not contribute to the failure of the cladding;
- The ends of the apron flashings required kickouts;

- The builder and the applicator claimed that the gutters and fascias were installed after the plaster had been applied;
- The cladding system required the appropriate control joints and these had not been installed; and
- The correct ground clearances have not been achieved.

The manufacturer also stated that the cladding had performed well and the hairline cracks could be attributed to settlement of the building.

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 research and experience, both international and local, 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 eaves with 150 mm and 300 mm wide projections and gables with no projections, none of which provide adequate protection to the cladding;
 - Is on a relatively sheltered site, but is exposed to higher wind from one direction;
 - Is two stories high in places;
 - Has flashings to the heads and sills of the exterior joinery units and while the expert could not verify the presence of sill trays, the cladding manufacturer claims that they were installed;
 - Has an overall envelope that is relatively simple on plan, but has a complex roof structure with roofs at 5 different levels;
 - Has no decks or balconies; and
 - Has external walls constructed with timber that is H3 LOSP treated, which will provide good resistance to decay.

Weathertightness performance

- 6.8 The Authority finds that generally, the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions. However, this does not apply to a limited number of localised areas where the cladding has been ineffective in preventing the penetration of water into the wall structure. These areas being:

- The hairline cracking to the cladding at some of the junctions between the plaster reveals and the pvc joinery sill profiles;
- The lack of vertical control joints, which the cladding manufacturer accepts as being required;
- The inappropriate waterproofing of several gutter/wall junctions;
- The lack of kick-outs to the ends of the apron flashings;
- The fascias and gutters are buried in the cladding;
- The lack of a gap between the sill flanges of the exterior joinery units and the pvc sill profile;
- The insufficient clearance to the base of the cladding at 3 locations; and
- There lack of a flashing to the top of the pergola column, and the unsealed joint between the column post and the cladding.

6.9 The Authority considers that, if the limited number of faults described in paragraph 6.8, causing, or likely to cause, moisture penetration through the cladding are remedied satisfactorily, the cladding will comply with the relevant requirements of the building code.

6.10 Notwithstanding the fact that the fibre-cement sheets are fixed directly to the timber framing, so restricting ventilation behind the cladding, the Authority finds that there are compensating factors that assist the performance of the cladding in this particular case. These are:

- The house has no attached decks or balconies; and
- The house has external wall framing that is H3 LOSP treated.

6.11 The Authority considers that these factors adequately compensate for the lack of a drained and ventilated cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.

6.12 The Authority notes that when assessed against the risk matrix incorporated in the Acceptable Solution E2/AS1, this house presents a risk of weathertightness failure that is moderate on two elevations and low on the other two elevations. The matrix is an assessment tool that is intended to be used at the time of application for consent, but must be supplemented at the time of issuing a code compliance certificate by careful inspection of the building as actually built.

7 CONCLUSION

7.1 The Authority is satisfied that the performance of the cladding has been reduced because it is currently allowing water penetration into the wall framing at one location. Consequently, the Authority is not satisfied that the cladding system as installed complies with clause E2.3.2 of the building code.

- 7.2 The Authority finds that, because the faults that have been identified with this cladding occur in discrete areas, it is able to conclude that satisfactory rectification of the items outlined in paragraph 6.8 is likely to result in the building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity
- 7.3 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 that the cladding 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, re-painting, replacing sealants, and so on. The Authority recognises that a territorial authority does not have any statutory responsibility for the ongoing maintenance of a building. However, the maintenance programme adopted by the owner could be undertaken after consultation with the territorial authority, bearing in mind that any comments or advice provided by the territorial authority to the owner are likely to be accompanied by appropriate disclaimers.
- 7.4 The Authority notes that the territorial authority considered that as the cladding was stucco and did not have a cavity it did not appear to comply with the requirements of E2, nor could it be considered as an alternative solution. The latest E2/AS1 document does show a cavity behind cladding, but the Authority points out that E2/AS1 is only one method of achieving code compliance and stucco cladding systems without a cavity must be considered on their merits as alternative solutions. The Authority is also concerned that some of the notations by the territorial authority as stamped on the drawings have incorrect references to interpretations set out in the Act.
- 7.5 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.
- 7.6 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 1991 the Authority hereby determines that the cladding system as installed does not comply with clause E2.3.1 of the building code. There are also a number of items to be remedied to ensure that the building remains weathertight and thus meet the durability requirement of the code. Consequently the Authority finds that the house does not comply with clause B2. Accordingly, it confirms the territorial authority's decision to refuse to issue a code compliance certificate.
- 8.2 The Authority finds that because the faults that have been identified with this cladding occur in discrete areas, it is able to conclude that rectification of the items outlined in paragraph 6.8 to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, is likely to result in the building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.

- 8.3 The Authority notes that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then 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.
- 8.4 The Authority considers that the cladding on the building will require on-going maintenance to ensure its continuing building code compliance.

Signed for and on behalf of the **Building Industry Authority** on 11 November 2004.

A handwritten signature in black ink, appearing to read 'J. Ryan', with a large, sweeping loop at the bottom.

John Ryan
Chief Executive