

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 24

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 in question and the other party is the territorial authority. The application for determination 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 monolithic wall cladding that is installed in parts of this house (“the cladding”) complies with the building code (see sections 18 and 20 of the Act). By “monolithic wall cladding” 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 9 sets out the Authority’s final decision.

2 PROCEDURE

The building

- 2.1 The building is a single-storey detached house, which is located on a slightly sloping site in a low wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The building is of conventional light timber frame construction and approximately 25% of the external wall area is sheathed in a monolithic cladding. The remainder of the external wall area is faced with a brick veneer. The external envelope is a simple shape and there are no balconies or wall to roof intersections. The cladding is protected by a combination of 130, 420, 690 and 1720 mm wide eaves. There is a timber deck attached to the brick veneer on one elevation.
- 2.2 The Authority’s expert was advised that the framing in the external walls is H1 treated timber. However this matter has not been verified
- 2.3 The cladding system is what is described as monolithic cladding. As specified in the manufacturer’s 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 other manufacturers. The manufacturer's instructions identify the joint and coating systems by reference to those other manufacturers and their systems. There has been no evidence provided to show whether the jointing and coating systems used on this building are one of those described in the manufacturer's instructions.

Sequence of events

- 2.4 The building work was consented on the 4 July 2000.
- 2.5 The territorial authority made various inspections in the course of construction, and on 31 July 2000, the pre-lining inspection was approved. On 25 October, an Interim Final inspection was carried out. A further Final Inspection was carried out on 27 February 2004 was not approved.
- 2.6 On the 1 March 2003 the territorial authority wrote to the owner stating that:

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 weather flashings 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 owner applied for a determination on 2 March 2004.

3 THE SUBMISSIONS

- 3.1 The owner provided a copy of the consent drawings and specifications. They also provided a copy of the Field Inspection records and correspondence from the territorial authority.
- 3.2 The territorial authority wrote a letter to the Authority on 22 March 2004 as its submission. The letter stated that the dwelling was:

Partially clad in a fibre cement monolithic cladding material that has been fixed directly to the framing without a drainage cavity...

No further technical argument was given. No Notice to Rectify was issued.

- 3.3 Copies of the submissions were provided to each of the parties. Neither party made further comment.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

- 4.1 The dispute for determination is whether the territorial authority was correct to refuse to issue a code compliance certificate for the house 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). 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 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. He noted that the jointing, and the thickness of the plaster finish was of very good quality. He also noted that, generally the manufacturer's instructions had been followed and that good trade practice was evident. However, the following specific faults were noted:
- A control joint on the corner of a bathroom window appeared to be allowing moisture ingress, and had already resulted in some staining to the cladding;
 - There are higher moisture levels in the area of the two bathroom windows;
 - The head flashings on some windows and doors did not extend the required 30mm past the edge of the window or door jamb;
 - The bottom of the cladding sheets were not coated to seal the sheets;
 - Sill flashings, which the manufacturer's instructions advise will give good long term protection, were not installed;
 - The west wall exceeds the manufacturer's instructions, for maximum length before requiring a vertical control joint, by 400 mm;
 - The cladding around the entry and adjacent east elevation is too close to the paving; and
 - One mitred corner of the bathroom window had a slightly open joint.
- 5.2 The expert noted that the lack of a vertical control joint in one location, as outlined above, had not resulted in the cracking of the cladding. The expert also noted that where the cladding was closer to the ground than was recommended by the manufacturer, that the paving in the area sloped away from the dwelling and that 1720 mm eaves protected the area.
- 5.3 The expert also used an invasive type moisture meter applied through the exterior cladding to detect areas of moisture ingress. The moisture readings were generally acceptable with the maximum readings of 19% and 22% taken below the jambs on two windows on the eastern face. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.
- 5.4 Copies of the expert's report were provided to each of the parties. The owner made comment that they did not agree with the report, but made no further argument.

6 THE AUTHORITY'S VIEW

General

- 6.1 The Authority has considered the submissions of the parties and the expert's report on this matter. The Authority's approach to determining whether building work complies with clause 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 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 permeate the cladding by utilising design measures that minimise the effects of the rain impacting on the walls.

The main areas of concern are that:

- 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 percent 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 larger 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.
- 6.5 Any 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 three 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 percent.

6.6 In relation to these characteristics, the Authority finds that this house:

- Is in a low wind zone;
- Is constructed to one level;
- Has an overall envelope that is simple in shape and incorporates no wall/roof intersections
- Has eaves of varying width all around the perimeter, which provide reasonable protection to the cladding;
- Has one deck attached to the brick veneer
- Even if there is H1 treated timber framing in external walls, this only provides very little protection against decay; and
- Has face fixed cladding with no drainage cavity.

Weathertightness performance

6.7 The Authority finds that the cladding, subject to the findings of the expert's report detailed in 5.1, is installed according to good trade practice and to the manufacturer's instructions. It can be considered to be reasonably effective in preventing the penetration of water. However, there are defects that will, with time, allow the ingress of moisture behind the cladding. Most notably, these are the defects to the windows on the eastern face of the building.

6.8 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting ventilation behind the cladding sheets, the Authority finds that there are compensating provisions that assist the performance of the cladding in this particular case. These are:

- The cladding appears to have been generally installed according to good trade practice and to the manufacturer's specifications;
- Apart from the fact that if the external wall framing is treated, it is only to H1 level, the building does not display to any great extent any of the weathertightness risk factors.

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. Apart from one area, there is no evidence of external moisture entering the building. Accordingly the Authority finds that the cladding on this particular building complies with clause E2.

7.2 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 effective life, and that includes the requirement for the building to remain weathertight. Because the 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 clause B2.

- 7.3 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 B2. It is essential that all the required items of rectification, which are detailed specifically in paragraph 5.1, be competently carried out to ensure such compliance.
- 7.4 Clause B2.3.1 of the building code requires the cladding be subject to “normal maintenance”. That term is not defined, so that 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 such inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.
- 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 WHAT IS TO BE DONE?

- 8.1 It is not for the Authority to decide exactly how the cladding is to be brought into 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 building apart possibly from that area displaying a higher moisture reading, is weathertight now and therefore complies with clause E2. However, as there are a number of items to be remedied to ensure it remains weathertight and thus meet the durability requirements of the code, the Authority finds that the house does not comply with clause B2 of the code. 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 ventilated cavity behind the fibre cement panels 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 that are listed 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 this maintenance programme should be undertaken after consultation with the territorial authority.

Signed for and on behalf of the **Building Industry Authority** on 26 July 2004.

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

John Ryan
Chief Executive