

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 23

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 new house unless changes are made to its monolithic cladding system.
- 1.2 The Authority’s task in this determination is to consider whether it is satisfied on reasonable grounds that the external wall cladding as installed (“the cladding”), and which is applied walls and columns of this house, complies with the building code (see sections 18 and 20 of the Act). By “external wall cladding as installed” we mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 In making its decision, the Authority has not considered any other aspects of the Building Act or the building code.
- 1.4 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 9 sets out the Authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a two-storey detached house situated on a slightly sloping site, which is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction on a concrete block foundation wall, which extends at varying heights above ground floor level. The external framing is sheathed in a monolithic cladding. It is of a relatively simple shape but the coated metal tile roof is quite complex and there are 2 main roof/cladding junctions. The house has one raised deck located at two adjoining elevations at the first floor level, with the outer edge supported on columns and the inner edge attached to the house. The deck has a monolithic clad balustrade finished on top with a metal flashing. There is a small enclosed porch at the main entry door. One upper floor window has a semi-circular head and this has a narrow synthetic rubber clad roof over it, finishing under the main roof tiling. Apart from two lengths where the fascia is fixed to the cladding, the eaves have 600 mm wide projections.
- 2.2 The framing in external walls is H3 treated timber.

- 2.3 The cladding system is what is described as monolithic cladding. As specified in its 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 one of other manufacturers. The manufacturer’s instructions identify the joint and coating systems by reference to those other manufacturers and their system brands but give no other information about them. Both the jointing system and the coating system used in this instance are one of those systems referred to in the manufacturer’s instructions. The coating in this instance is a sprayed two-coat textured finished polymer-modified cement based plaster followed by 2 coats of 100% acrylic paint
- 2.4 The cladding applicator issued a producer statement in respect of the cladding jointing and finishing systems.

Sequence of events:

- 2.5 The territorial authority issued a building consent on 23 December 2002 and the attached “Conditions of Building Consent” listed certain conditions which related to the cladding:
 Installation of external cladding shall comply with the manufacturer’s specifications, and recommendations, including correct fixings, jointing, flashing, penetration and function details, type and colour of coating systems where applicable etc. Recommendations of appraisal certificates shall be adhered to.
- 2.6 The territorial authority made various inspections during the course of construction, and on 9 July 2003 carried out the final inspection. Officers noted that the current cladding ground clearance was okay, but that landscaping had not yet been completed.
- 2.7 On 4 March 2004, the owner was advised of the territorial authority’s decision not to issue a code compliance certificate. No notice to rectify was issued.
- 2.8 The Authority received the application for determination on 3 May 2004

3 THE SUBMISSIONS

- 3.1 The applicant was the owner, with the matter of doubt or dispute being referred to as the letter from the territorial authority. The owner provided a copy of a letter from the builder, dated 27 April 2004, which stated:

The house is a two-storey four bedroom home constructed strictly in accordance with the approved Building Consent documents issued by North Shore City Council.

The [Named] sheets were installed in accordance with all the relevant recommendations of the manufacturer... and in accordance with good trade practice.

The texturing was again carried out in accordance with all relevant recommendations of [Named proprietor] and in accordance with good trade practice.

All external framing on this house was treated with LOSP to an H3 equivalent level.

- 3.2 The owner also provided copies of:

- Drawings and specifications;
- Copies of correspondence from the territorial authority; and
- The territorial authority's inspections records and check lists.

3.3 The territorial authority provided the Authority with a copy of all the relevant building consent materials and all correspondence with the owner. This included:

- A checklist entitled "Completed Monolithic Dwellings without a Cavity: Weathertightness Issues." At the conclusion of that checklist a staff member had noted "Appeared a very good [named cladding] job. Sheet layout and timber treatment should still be checked out. Design risk factor low/medium inspection risk factor: low;
- The consent drawings and specifications of the building;
- Inspectors Filed Inspection Sheet;
- Building Consent Requirements; and
- Consent drawings and building specifications.

3.4 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 clause E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

Clause E2—EXTERNAL MOISTURE

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

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

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

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

4.3 In several previous determinations, the Authority has made the following general observations about acceptable solutions and alternative solutions:

- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code.

- Usually, however, when there is non-compliance with one provision of an acceptable solution, it will be necessary to add some other provision to compensate for that in order to comply with the building code.

5 THE EXPERT'S REPORT

5.1 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report, which noted that the texture plaster coating appeared to be well applied and evenly finished, however, the paintwork appears to be patchy and poorly applied. With the exception of one crack in the area of the curved window, there was no evidence of cracking in the cladding. The expert removed the plaster coating at the head and sill junctions of one window jamb and one junction. The Authority is prepared to accept that this sample examination could typify the general standard of finish in other similar situations in the same building. The expert's report made the following specific comments on the cladding:

- There is a crack in the cladding adjacent to one top corner of the curved window;
- There are no vertical control joints in the cladding;
- There is inadequate ground clearance at one small area adjacent to the garage;
- The texture coating of the cladding is not continued behind the perimeter joist of the deck or behind the gutter above the garage;
- The sealant as used at the balcony balustrade/wall junctions and at the ends of the curved window flashings is not an effective weatherproofing method;
- With regard to the external joinery, and based on the intrusive inspection:
 - a) The building paper is fitted behind the head flashing upstand,
 - b) There is no continuous in-seal strip between the 45 mm high head flashing upstand and the cladding or where the jamb overlaps the cladding, and
 - c) There are no sill flashings or sill flashing upstands installed; and
- There is no drip bead to the underside of the coved roof.

5.2 The expert took moisture readings of the interior linings using a non-intrusive meter and no elevated readings were recorded. The expert also used an invasive type moisture meter at 8 bottom plate positions. These readings ranged from 15.7% to 24% averaging 18.6% over the 8 positions. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.3 Copies of the expert's report were provided to each of the parties. The territorial authority did not comment on the report but the owner responded by a letter dated 9 July 2004. In summary, the owner stated;

- That a hand applied texture not a spray texture was used;
- There was no mandatory requirement in the manufacturer's instructions for sill flashings;
- It was optional whether a in-seal strip or a paintable sealant was used to the window jambs and in this instance, the owner correctly installed a silicone sealer;

- While the texture finish had been omitted where the cladding and the deck adjoin, the area in question had received the same weatherproofing as the balance of the house; and
- Even if the silicone sealant used at the junction of the balustrade and kitchen window was to fail, as the house wall is waterproofed, the water would escape to the base of the deck rail and not enter the cladding.

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 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 using design measures that minimise the effects of the rain impacting on the walls:
- 6.5 Important matters for consideration are:
- Data shows a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, the Authority believes that homes in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;
 - Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
 - Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks to directly penetrate into the wall; and
 - Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.

- 6.6 Any likely penetration of moisture through the cladding can then be countered by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. In particular:
- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. The Authority believes that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
 - The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, the Authority believes that the drainage cavity should be not less than 20 mm deep; and
 - The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.
- 6.7 In relation to these characteristics, the Authority finds that this house:
- Has, with two minor exception, 600 mm wide eaves that reasonably protect the cladding;
 - Is in a medium wind zone;
 - Is two storey;
 - Has head flashings to the exterior joinery units;
 - Has two wall/roof intersections;
 - Has an overall envelope that is relatively simple on plan;
 - Has one elevated deck and a small enclosed porch;
 - Has a synthetic rubber covering over the semi-circular head of a window;
 - Has no drainage cavity where the cladding is face fixed; and
 - Has external walls that are framed up in H3 treated timber, which would be effective in delaying the onset of decay.

Weathertightness performance

- 6.8 Generally the cladding appears to have been installed according to good trade practice and to manufacturer's instructions. It can be considered to be reasonably effective in preventing the penetration of water. There are, however, defects as set out in paragraph 5.1, which have allowed the ingress of moisture behind the cladding. All these defects are required to be rectified to ensure ongoing weathertightness.
- 6.9 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:
- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
 - The building does not display to any significant extent any of the weathertightness risk factors;

- The building has eaves that in the main are effectively 600 mm wide, which offer reasonable protection to the building; and
 - There are only 2 areas where the moisture levels are over the 18% limit that indicate that external moisture may have entered the building.
- 6.10 The Authority considers that these other provisions adequately compensate for the lack of a drainage cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.

7 CONCLUSION

- 7.1 The Authority accepts that the expert's report establishes that the cladding complies in most respects with the manufacturer's instructions. However, as there is evidence of external moisture entering the building, the Authority finds that the cladding on this particular building does not comply with clause E2.
- 7.2 The Authority also finds that when the cladding faults have been satisfactorily rectified this house should be able to remain weathertight and will thus comply with clause E2. It is essential that all the required items of rectification, which are detailed specifically in paragraph 5.1, be competently carried out to ensure such compliance.
- 7.3 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.
- 7.4 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 dictate how the defects listed in paragraph 5.1 are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Authority for another determination.

9 THE AUTHORITY'S DECISION

- 9.1 In accordance with section 20 of the Building Act, the Authority determines that the house does not comply with clause E2. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 9.2 The Authority finds that because of the compensating factors in this case, the lack of a drained cavity behind the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.
- 9.3 The Authority, therefore, finds that once the items of non-compliance 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 that 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 loop at the bottom.

John Ryan
Chief Executive