

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 26

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 original owner of the property acting on behalf of the existing 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”) on 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 single-storey detached house situated on a level section, which has been described by the Authority’s expert as being in a medium/high wind area. The house is of conventional light timber frame construction on a concrete masonry foundation wall and the external framing is sheathed in a monolithic cladding. It is of a relatively simple L-shape and there is one short length of roof/cladding junction. The house has a raised open timber deck located at three adjoining elevations at floor level, having a maximum height of 1300 above the ground. The deck is not constructed over a living space. The outer edge of the deck is supported on timber posts and beams and the inner edge is attached to the masonry bond beam. The main roof oversails two lengths of the deck via a low pitch extension of the roofing. These roof projections form a veranda 1400 mm wide, with the edge of the roofing supported on beams and 100 mm x 100 mm timber posts. The remaining deck elevation has no eaves protection. There is a small open porch at the main entry door formed by cantilevering the roof. Apart from the two gable ends where the barge boards are fixed to the cladding, and the 1400 mm wide veranda and porch overhangs, the eaves have 600 mm wide projections. The Authority notes that the porch

and entry configuration and the veranda column construction differ from those shown on the consent plans.

- 2.2 While there is no verification that the framing in the external walls has been treated, the minimum treatment requirement at the time the house was constructed was H1 Boric.
- 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. There has been no verification that the jointing system and the drag plaster and painted coating system used in this instance are any one of those systems referred to in the manufacturer's instructions.

Sequence of events:

- 2.4 The territorial authority issued a building consent on 12 December 1994.
- 2.5 The territorial authority made various inspections in the course of construction. A final inspection took place on 9 March 2004 and on the "Final Inspection" sheet, the E2 External Moisture clause of the building code was signed off. However, Under the "Additional Notes" on the sheet, it was noted:

All work on this dwelling as specified has been completed and is in very good condition however the exterior cladding on the dwelling is Monolithic so therefore a C-C-C cannot be issued. Failed inspection.

- 2.6 The territorial authority did not issue a Notice to Rectify as required by section 43(6).
- 2.7 The owner applied for this determination on 14 April 2004.

3 THE SUBMISSIONS

- 3.1 The owner did not make a detailed submission. However, under paragraph 3 of the Form D1, the owner stated:

- (1) 12 Dec 1994 - No final inspection was requested - no code of compliance certificate (sic) issued at that time
- (2) 9 March 2004 – Requested final inspection when omission was advised on LIM – failed – see inspectors report...

- 3.2 The owner also provided copies of:

- The consent drawings;
- Some of the consent documentation;
- The territorial authority's inspection sheets; and
- A set of 7 photographs of the house.

- 3.3 The territorial authority did not make a submission.
- 3.4 Copies of the submissions, and other evidence were provided to each of the parties.

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 plaster coating appears to be well applied and evenly finished, and there is no evidence of bare/over-applied patches. With the exception of one crack at the left-hand corner of the dining room window, the general condition of the cladding appears visually in sound condition and in keeping with its age, hence the sheet layout could not be confirmed. However, it appears that the cladding has not been repainted since it was installed. The expert removed a section of cladding at the bottom plate level below the window of bedroom 2 and at the top left-hand corner of the lounge double doors located on the southeast elevation. 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 at the top left-hand corner of the dining room window;

- There are no vertical control joints evident in the cladding and the manufacturer's instructions require them where there are cladding dimensions in excess of 5.4 metres;
 - There is inadequate ground clearance to most areas of the cladding;
 - The base of the cladding does not extend a sufficient distance below the base of the bottom plate of the framing;
 - The cladding is extended down onto the level of the deck, and especially in areas where there are no eaves projections, there is the risk of moisture wicking up the cladding;
 - There is no insole strip applied to the external joinery jamb overlaps nor has the required bead of silicone been applied before fixing the window;
 - There is no "kick back" fitted to the apron flashing at the sloping roof/cladding intersection;
 - A gutter end is buried in the plaster coating; and
 - It is essential to repaint the cladding with an approved quality paint system.
- 5.2 The expert used a moisture meter with extended electrodes applied to pilot holes drilled through the cladding to access the framing. Six readings were taken, recording moisture content readings of 19%, 22%, 25%, 26.5%, 31.3%, and 32.5% respectively. The expert also took non-invasive readings throughout the interior of the exterior walls, and no elevated readings were recorded. 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.

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 houses 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 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 the two gable ends where there is no such protection, 600 mm or 1400 mm wide eaves that effectively protect the cladding;
- Is in a medium/high wind zone;
- Is single storey;
- Has head flashings, but no jamb or sill flashings to the exterior joinery units;
- Has only one small length of wall/roof intersection;
- Has an overall L-shaped envelope that is relatively simple on plan;
- Has one external deck, which is not constructed over a living space;
- Has a small open porch;
- Has no drainage cavity where the cladding is face fixed; and
- Has external walls that are likely to be constructed with H1 Boric treated timber, which would be reasonably 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:
- Apart from the faults identified by the expert, 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 or 1400 mm wide, which offer reasonable protection to those areas of the building where they occur; and
- 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.
- 6.11 The Authority also notes the expert's observation that the deck, which is a maximum of 1400 mm above the ground level, has no provisions to prevent people from falling. As this is not in accordance with the requirements of the building code, this is a matter of concern to the Authority. Accordingly, the Authority urges the territorial authority to look into this matter and in conjunction with the owner alleviate the risk of people falling from the deck.

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 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 5 August 2004

John Ryan

Chief Executive