

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 48

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 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 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 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 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 is of a simple shape. There is a carport that is supported on posts and beams and is attached to one end of the house. There are narrow eaves projections and the bargeboards, which have associated metal flashings, are fixed directly to the cladding.
- 2.2 Based on the invoices for timber purchased for the construction, as obtained by the Authority’s expert from the builder, the Authority accepts that the framing in the external walls is H1 Boric treated timber.

- 2.3 The building is clad with what is described as monolithic cladding. As far as the expert appointed by the Authority can ascertain, the cladding is a particular proprietary product. As detailed in that manufacturer's instructions ("the instructions"), it incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through building wrap directly to framing timbers and finished with a three-coat fibreglass mesh reinforced lime-cement plaster. The instructions describe the sealing and plaster application and finishing. They also refer to the requirement that flashings are required to heads, jambs and sills to openings. There has been no verification of what sealants or plaster and paint systems were used on this house.

Sequence of events

- 2.4 The territorial authority issued a building consent on 27 November 1997, and the construction work was carried out from December 1997 to December 2003.
- 2.5 The territorial authority made various inspections in the course of construction. On 28 April 2003, a "Pre-Line Building" check was carried out and the status was recorded as "outstanding". A "Final CCC Building" inspection was carried out on 17 December 2003 the status was recorded as "failed". After a second such inspection on 22 December 2003, the status was recorded as "passed inspection". However a third "Final CCC Building" inspection on 7 April 2004 recorded the status as "outstanding". The Authority takes this to mean that the inspector found that some completion work was outstanding.
- 2.6 The owner has referred to the fact that a Notice to Rectify has been issued. However, the Authority has not been forwarded any documentation to verify this.
- 2.7 On 13 April 2004, the owner wrote to the territorial authority and stated:

Some time back we applied for a Completion Certificate for this building but were declined because it had monolithic cladding.

We believe this concern that the Council had has now been addressed and rectified. Enclosed please find a report on this building which we believe should now fall within the BIA's guidelines of acceptability.

Would you pleased supply us now either:

1. A revocation of the Notice of Rectification, and issue a final CODE COMPLIANCE CERTIFICATE, or
2. A restatement of the Notice of Rectification...

- 2.8 The territorial authority responded on 26 April 2004 informing the owner "Councils (sic) policy on this matter still stands".
- 2.9 The owner commissioned a report dated March 2004 from a consultant, which was forwarded to the territorial authority with the 13 April 2004 letter. The consultant stated that reliance was placed "on the local T.A's having made proper and diligent inspections...". Also it "is expected that the preline inspection was properly done and that the Council's inspectors were completely satisfied that the building was weathertight before allowing prelining to proceed". The consultant used a moisture meter in both "scan" and destructive modes. In general, the report stated that:

- The only area where moisture exceeded 18% was a flashing point where the carport abutted the dwelling;

- The head, jamb and sill flashings had been installed as per the manufacturer's detail sheets;
- It was recommended that the carport/ house interface leak be remedied, the scoria be removed where it touched the cladding, the areas damaged by the plumber should be repaired, and that the house would benefit from being repainted.

The consultant concluded that the cladding appeared to have been carried out as required by the approved plans that required the cladding to be installed as per the manufacturer's instructions, which until late in 2003 did not contain any comment regarding cavities.

2.10 The owner applied for this determination on 29 April 2004.

3 THE SUBMISSIONS

3.1 The owner provided a covering letter with its application that confirmed the repair work recommended by the owner's consultant had been carried out. The owner also stated:

[T]here was only one isolated point where there was moisture above an acceptable level in the framing timber, and this was directly attributed to a construction fault...This has been rectified. The building is otherwise quite dry. It is a very basic rectangular gable end home with soffits and no parapets, decks, etc. which could be problem areas. It is also in a sheltered position and has, as expected, remained watertight for the past 6 or 7 years since it was built.

3.2 The owner also provided copies of:

- The consultant's report;
- The owner's letter to the territorial authority of 13 April 2004
- The territorial authority's letter to the owner of 26 April 2004;

3.3 The territorial authority also provide a covering letter with its submission:

Construction of the cladding was not the subject of the changed inspection procedures implemented by the Council as a consequence of the Weathertightness Home Resolution service adjudication...

A cavity has not been installed behind the cladding.

In the absence of the additional inspections implemented as a consequence of [the] changed inspection procedures, and in the absence of a cavity as a first line of defence, the Council does not believe that it is able to be satisfied on reasonable grounds that the cladding applied to this dwelling will achieve the functional requirements of Clause E.2.2, or the performance requirements of Clause E2.3.2, of the Building Code.

The territorial authority also provided copies of the "Field Sheet" inspection reports.

- 3.4 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 parties.

The Authority noted that the approved consent drawings were not submitted by either party, despite a specific request that they be submitted.

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 on the grounds that 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 current Acceptable Solutions that have been approved under section 49 of the Act that cover this cladding. The cladding is not currently 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 territorial authority's inspection reports did not provide sufficient information on the condition of the cladding and how it had been installed, the Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert stated that quality of finish was reasonable and no significant cracking was noticed. The expert's report made the following specific comments on the as-built cladding details:
- Much of the cladding was close to or buried in the ground;
 - There is a weatherproofing problem at the rear bedroom window that may be attributed to the jamb/sill junction;

- A vertical soil stack is partly buried in the cladding and this detail is extremely difficult to waterproof;
- The east corner fence is nailed through the cladding without any sealant;
- The weatherproofing flashing detail above the ribbon plate of the carport where it joins the house is poorly executed;
- There was no “kick out” flashing to the carport to house junction and the subsequent modification was unsuccessful; and
- The window head flashings were easy to see and were present in all cases. The jamb and sill flashings could be noted in a couple of representative areas.

The expert also had concerns about the shower waterproofing and considered that leaking from the shower may have contributed to some of the high moisture contents in the immediate areas. The expert was also concerned about the land contour diverting water towards the front and uphill side of the house.

- 5.2 The expert used a non-invasive moisture meter to internal areas that were considered to be high risk for moisture ingress. All four internal readings taken in the bathroom area indicated excessive moisture. The expert also took further readings using an invasive moisture meter and obtained 21 readings over 18%. The average over those 21 readings was 31% and the highest readings were 40%. One additional reading under a window corner was off the scale. The wood shavings extracted from the drill bit at this area indicated that there was fungal decay in the timber. 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 owner commented in response on his surprise at the high moisture levels and the importance of correctly identifying the reasons for the water ingress identified in the expert’s report. The owner under a covering letter, dated 26 October 2004, forwarded a copy of a letter from the cladding manufacturer, dated 24 September 2004. Tests by the manufacturer indicated that moisture was entering through a window flange mitre. A copy of a letter to the aluminium joinery manufacturer informing them of the results of the cladding manufacturer’s investigations was also attached to the owner’s covering letter.

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 to 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, consideration 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 Experience suggests it is important to note 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% 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. Desirable characteristics of a wall system are that:
- 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 only minimal eaves overhangs and no gable overhangs, and, therefore, there is no effective way of shielding the cladding;
- Is in a low wind zone;
- Is constructed to one level;
- Has a carport fixed to the building;
- Has face-fixed cladding with no drainage cavity; and
- Has external walls that are constructed from H1 Boric-treated timber, which provides some initial protection from decay.

Weathertightness 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. As a result, there are numerous defects, which are set out in paragraph 5.1 and could contribute to the penetration of the moisture that is already evident.
- 6.9 The Authority finds that while the building design is relatively simple and, apart from a lack of eaves and a cavity, has compensating factors that can assist in preventing moisture from entering the building, the cladding has not been installed well. In particular, the house has high moisture levels around windows (possibly due to a malfunction in the flashings) and high moisture levels in external frame bottom plates (probably due to direct contact between cladding and the external ground). In addition, even if it has H1Boric-treated timber in the external walls that in itself is not sufficient to counter the effect of the faults set out in paragraph 5.1.

7 CONCLUSION

- 7.1 The Authority finds that as 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 WHAT IS TO BE DONE?

- 8.1 It is not for the Authority to decide how the cladding is to be 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.
- 8.2 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 maintain 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. If the territorial authority issues a notice to rectify requiring that the cladding be made compliant, the owner is required to rectify the building work not done in accordance with the code.

- 8.3 The Authority also notes the expert's concern that leakages in the shower area are causing decay to the internal timber trim, and may be contributing to the ingress of external moisture. Accordingly, while this issue is not related to the cladding considerations the Authority suggests it should be investigated to ensure to be code compliance in terms of clause E3 of the building code.

9 THE AUTHORITY'S DECISION

- 9.1 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.

Signed for and on behalf of the **Building Industry Authority** on 2 November 2004.



John Ryan
Chief Executive