Determination 2004/43

Refusal of a code compliance certificate for a building with a "monolithic" cladding system: House 29

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 8 sets out the Authority's final decision.

2 PROCEDURE

The building.

2.1 The building is a two-storey detached house situated on a 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. It has a steep roof profile with 2 gables and a valley gutter between them. The house has a combination of eaves and flush gables. Aside from the complex roof structure, it has a simple shape. There is an internal garage on a concrete slab foundation while the rest of the house is supported by a suspended floor over a timber pile system. Part of the 2nd level floor is cantilevered out 600mm over the ground floor wall. There is a slatted deck on the northern corner of level 1 that is supported by the external framing and timber piles. Some walls are sheltered by eaves projections of about 600mm (gutter width included) and the gable ends are flush finished. The joinery is largely aluminium and the roof is clad with concrete tiles.

2.2 The designer's specification required the use of "pressure treated Boric" for the timber frame except where the timber would be exposed externally or in contact with the ground, when "Tanalised brands" was specified. On the basis that there is no submission to the contrary, 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. The cladding is a particular proprietary product, installed in accordance with the manufacturer's instructions, which include flashings to heads, jambs, sills, trims and corners. 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 proprietary mesh reinforced product plaster system supplied by the manufacturer of the backing sheet system.

2.4 The supplier of the cladding and the textured coating provided a warranty to the owner and the approved applicator of the combined cladding and plaster system verified that the work was carried out according to the manufacturer's specification.

Sequence of events:

2.5 The territorial authority issued a building consent on March 2000, and the construction work was completed in November 2000, apart from the deck that was completed later.

2.6 The territorial authority made various inspections in the course of construction. On 19th September 2000 the territorial authority completed a "Pre-Line Building Checklist" which noted that the wall insulation was to be "poly". It also recorded the word "later" against the heading related to the clearance between the cladding and adjacent ground. The "Post-line/Bracing checklist", completed on 28th September 2000 made no comment on cladding matters. A final inspection was made on 8th December 2003 at the owner's request, for the purpose of obtaining a code compliance certificate (CCC). A code compliance certificate was not issued but the owner was handed a letter advising that the issuing of the CCC was to be considered by a team of senior territorial authority staff.

2.7 The territorial authority has not issued a notice to rectify as required by section 43 of the Act.

2.8 On 26th February 2004, the territorial authority wrote to the owner and stated:

> We have received your request for a code compliance certificate (CCC) for a dwelling at the above address.
>
> Before the council can issue a code compliance certificate, we must ensure that all building work meets the NZ Building Code requirements. In particular, the building code specifies that building work must remain durable for given periods of time after the code compliance certificate is issued.
>
> You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.
>
> As your building is face fixed (monolithic) construction with no cavities the Council are unable to issue a code compliance certificate for the dwelling because we are unable to verify that it fully complies with the Building Code requirements, manufacturer's details application at the time and that it will remain durable for the required period.

> There has been recent information and knowledge that face sealed cladding systems without an adequate drainage and ventilation cavity will cause irrevocable damage to structural elements in the event of leakage and/or the effect of residual moisture.
>
> Council cannot be satisfied that the cladding system as installed on the above building will meet the functional requirements of Clause E2 External Moisture of the New Zealand Building Code.
>
> If you still wish to seek a code compliance certificate, you may request a determination from the Building Industry Authority as per section 17 0f the Building Act 1991.

2.9 The owner applied for this determination on 24th March 2004 (although the application was, apparently inadvertently, dated 24th March 2003).

3 THE SUBMISSIONS

3.1 The owner provided a covering letter with his application that outlined the events from the issuing of the consent until the application for determination. The letter says that as the 26th February 2004 letter from the territorial authority failed to identify any specific areas of concern, the owner had telephone conversations with the team leader of the territorial authority's "resolution committee" and two building officials. The owner says those conversations identified two areas of concern:

- The absence of roof overhangs to two gable ends;
- The face fixed cladding, specifically the Council's inability to determine the existence of proprietary flashings, to openings (these are specified in the Fosroc manual, supplied to (named TA building official)

3.2 The owner's letter and application was supported by:

- The plans and specifications for the house;
- The Council's letter about CCC and weathertightness;
- The Council's CCC refusal letter;
- The cladding supplier's warrantee and technical information on products and maintenance;
- The cladding supplier's inspection letter;
- The cladding contractor's Producer Statements;
- BRANZ appraisal certificate;
- The Council's field memoranda;
- The cladding supplier's installation manual;
- A statement from a geotechnical consultant on the design of the timber pile footings and a producer statement stating that they had been engaged to inspect the foundation excavations and that they comply with clause B1 of the code.

- A letter from the owner stating that a waterproofing membrane had been applied at the tile/cladding interface in the front entry porch.

- A revised plan of the deck; and

- Photographs numbered 1-12.

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

- A copy of the letter dated 26th February 2004 sent to the owner and outlining the reasons for not issuing a code compliance certificate; and

- A copy of all relevant building consent documents and correspondence.

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.

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 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert said there was no visual evidence of cracks in the surface and the paint was free from any shadowing or discolouration. The expert also said that generally the finished surface was good and appeared to be defect free. He noted that there were no control joints evident in the walls, but that according to the manufacturer's specification, the panels in this house did not require them. He confirmed that the flush fascias were installed before the plaster finish, but that the gap between fascia and EIFS panel was sealed over a backing rod and was protected from UV exposure. He noted that all penetrations through the cladding appeared to have been adequately fixed and sealed. He removed sections of plaster coating at a randomly selected window and determined that the PVC jamb and sill flashings were in place according to manufacturer's recommendations. He also noted that the junction between the horizontal and vertical surfaces of the jambs and sills were also flashed with a black bituminous saddle flashing. This detail is not part of the manufacturer's recommendations. The head flashings were evident and invasive testing was not required to confirm their presence. The expert noted 2 specific faults with the cladding, both relating to ground clearance. He commented that in his view there was no apparent evidence of performance failure because of these faults. The specific faults were:

- The slatted timber floor of the deck is too close to the cladding in some areas.
- The ground clearances between cladding and concrete paving adjacent to the garage door and the front entry porch are less than those required by the manufacturer and may result in moisture ingress. He particularly noted that although the cladding was taken down onto the tiles in the entrance foyer, the owner advised that a waterproof membrane had been applied at this interface.

5.2 The expert used a non-invasive moisture meter to internal areas that were considered to be high risk for moisture ingress. No moisture was detected in any area. Consequently no invasive moisture meter readings were taken.

5.3 Copies of the expert's report were provided to each of the parties. Neither of the parties commented on the report.

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 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. 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 600mm eaves overhangs to only some of the walls and no gable overhangs, and therefore has little effective shielding of a large area of the cladding;
- Is in a low wind zone;
- Incorporates a central valley gutter;
- Is constructed to two levels;
- Has an external deck attached to the external framing;
- Has one wall/roof intersection;
- Has face-fixed cladding with no drainage cavity;
- Has external walls that are constructed from H1 Boric-treated timber, which provides some initial protection from decay, and
- Has a small elevated balcony built into the roof structure.
- Has external walls constructed with timber treated to an H1.2 specification, a level that will delay the onset of timber decay.

Weathertightness performance

6.8 The Authority finds that the cladding in general appears to have been installed according to good trade practice and, apart from some of the clearances to the concrete paving, to the manufacturer's instructions. It can, therefore be considered to be effective in preventing the ingress of water.

6.9 The Authority accepts the expert's conclusion that relief joints are not required in any of the wall panels on this house.

6.10 The Authority accepts the expert's conclusion that the small ground clearances to the perimeter concrete paving at the front of the garage and at the entrance foyer do not fall below the performance requirements of the building code. The Authority finds that the detail in the entrance foyer is acceptable because the:

- The area is covered and therefore the amount of rainwater hitting the cladding will be small;
- The tiles fall away out away from the cladding, and
- The tile/cladding interface has been sealed with a waterproofing membrane placed behind the cladding and under the tiles.

The Authority finds that the clearances between the cladding and concrete paving at the left hand side of the garage door is acceptable because the concrete paving slopes steeply back to a drainage channel that runs across the face of the garage door.

6.11 The Authority accepts the expert's conclusion that the small gap between the slatted timber deck and the cladding is not likely to result in the ingress of moisture because the plaster is continuous behind the deck timbers and the open design of the slatted deck will mean that very little free water will build up on its surface.

6.12 The Authority finds that while the building design lacks eaves protection of some walls and lacks a cavity, it has compensating factors that can assist in preventing moisture from entering the building. Notably the cladding has generally been installed well, and in accordance with the manufacturer's instructions with regard to both the polystyrene substrate and the approved plaster system. Flashings have been installed and there are no defects in the cladding finish. In addition, there is no evidence that moisture is entering the building through the cladding at any point.

6.13 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 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 inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.

6.14 The Authority has noted the presence of the internal valley gutter and the second level enclosed balcony. It considers that both details can, unless designed and constructed appropriately, increase the risk of weathertightness failure. The Authority has not been asked to determine the compliance of these parts of the structure because they are not part of the wall cladding. Furthermore the Authority notes that the territorial authority has approved these details as part of its inspection processes. The Authority therefore makes no comment on the compliance of these details with clause E2, but does emphasise the risks inherent in these details if not designed and constructed appropriately.

7 CONCLUSION

7.1 The Authority finds that the expert's report establishes that as at the time of this determination:

- There is no evidence of external moisture entering the building,
- The lack of clearance between cladding and concrete paving at the garage door and the entrance foyer and between the timber deck and the cladding is not likely to result in moisture ingress, and
- The cladding is well installed

Accordingly, the Authority finds that the cladding on this particular building complies with clause E2.

7.2 The Authority emphasises that each determination is conducted on a case-by case basis. 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.

8 THE AUTHORITY'S DECISION

8.1 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. In accordance with section 20 of the Building Act, the Authority determines that the cladding as installed complies with clause E2.3.2 of the building code. Accordingly, it reverses the territorial authority's decision to refuse to issue the code compliance certificate.

8.2 While the Authority has found the cladding to be code compliant, it considers that the cladding will require on-going maintenance to ensure future compliance.

Signed for and on behalf of the **Building Industry Authority** on 25 August 2004.

John Ryan
Chief Executive