

Refusal of a code compliance certificate for a building partly clad with a “monolithic” cladding system: House 38

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 builder acting as agent for the owner and the other party is the territorial authority (“TA”). The application arises from the refusal by the territorial authority to issue a code compliance certificate (“CCC”) 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 external wall cladding as installed on some areas on this house (“the cladding”) complies with the building code (see sections 18 and 20 of the Act). By “monolithic external wall cladding as installed” we mean the components of the monolithic system (such as the backing sheets, the flashings, the joints and the coatings), the way the components have been installed and work together, as well as the junctions of the monolithic external wall cladding with the other cladding materials used .
- 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 8 sets out the authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a single-storey detached house situated on a sloping site. According to the owner the house is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings. The building is of conventional light timber frame construction, on a concrete slab foundation. It has a dual pitched roof with hips above the lounge and master bedroom and a gable above the garage. All roofs are pitched at about 20 degrees and clad with interlocking concrete tiles. There are eaves and verge overhangs of 420 mm, except at the fibre-cement-clad projection to the bedroom closest to the garage where the fascia is fixed to the cladding. The external window joinery is aluminium. Most of the external walls are clad in brick veneer. The small areas of monolithic cladding are on external walls of the garage, front entrance, and the bedroom closest to the garage. They are full height, with vertical junctions between them and the brick veneer. It is those areas of fibre-cement cladding that are the subject of the application for determination. The roof is clad with concrete tiles.

- 2.2 The Authority has not been provided with any evidence of the level of timber treatment to the external framing, although the builder has advised that the timber was treated to an H1.2 level.
- 2.3 The building is partly 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 7.5 mm thick fibre-cement backing sheets fixed through building wrap directly to framing timbers and finished with a proprietary mesh reinforced product plaster system by an applicator approved by the manufacturer of the plaster system.
- 2.4 The supplier of the plaster system provided a producer statement to the owner verifying that the work was carried out according to the supplier's specification.

Sequence of events:

- 2.5 The application for building consent was made in November 2002 and an interim code compliance certificate (interim CCC) was issued in March 2003, at which time the exterior cladding on the house was complete. According to a statement from the builder, at the time the interim code compliance certificate was issued the main bathroom was still to be fitted out. The interim CCC contained some conditions. Relevant to this application for determination were the conditions that the owner was to supply producer statements in respect of "the plaster texturing" and in respect of "windows – medium wind zone".
- 2.6 When that fit-out was completed the owner applied for a CCC for the completed building. At that point the TA declined to issue a CCC on the grounds that it had doubts whether the monolithic cladding system complied with clauses B2 and E2 of the building code. It is not clear whether the TA had received either of the producer statements to which the interim CCC referred.
- 2.7 The territorial authority has not issued a Notice to Rectify as required by section 43(6) of the Act.
- 2.8 On 17 March 2004, the territorial authority wrote to the owner and stated:

An inspection carried out on 16 March 2004 identified the following matters requiring attention.

1 Areas of the dwelling are clad with a no ventilated (sic) texture coated cladding.

2. In regard to the monolithic cladding applied to your dwelling, and notwithstanding 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 irrecoverable 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 New Zealand 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. Enclosed are information and application forms for this purpose.

Please advise Council when the above matters have been resolved so that a further inspection can be arranged to allow the building code compliance certificate to be issued. .

2.9 The builder applied for this Determination, on behalf of the owner, on 29 April 2004.

3 THE SUBMISSIONS

3.1 Supplied with the application for determination were the following documents:

- The TA's letter about the CCC and weathertightness, date 17 March 2004;
- The interim code compliance certificate issued by the TA on 23 March 2003;
- The plaster system supplier's producer statement dated 24 March 2003;
- One A3 sheet depicting the elevations of the house and another showing the floor plan and dimensions. Neither drawing provided any information about the materials specified or any details as to how the various joints and junctions were to be constructed;
- A covering letter from the builder explaining the background to the interim code compliance certificate; and
- A document described by the applicant as a "BRANZ opinion on weathertightness". This document was a BRANZ opinion but it related to an EIFS system produced by the same firm that supplied the plaster system for the house. As no EIFS system was used on the house, the BRANZ opinion was not relevant to the application for determination.

3.2 The territorial authority made no submission.

3.3 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 B2.3.2 or 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.

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 subfloor 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.

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 In the absence of any detailed information about the building, the Authority commissioned an independent expert (“the expert”) to inspect and report on the cladding. The expert could see no cracks in the surface of the cladding, and no areas where the joints were incompletely filled or where the coating was conspicuously incomplete. The quality of finish was described as generally good. It was noted that there were no control joints evident in the walls but it was also pointed out that none were needed, as the panel sizes were not large enough. The expert observed adequate lead apron flashings at the abutment of the garage roof with the house wall. There were no penetrations of the cladding. The window head was flashed and jamb details were observed to comply with the manufacturer’s recommended practice, after the expert cut away the fibre cement coating at one jamb/sill junction. That check revealed that there was no facing to

cladding seal, or flashing at the window sill. It was observed that a sill flashing was not a manufacturer's requirement. The expert noted the following faults with the cladding.

- The ground clearance to the bottom edge of the fibre-cement sheet was too small (less than the minimum 50 mm recommended above the pebbled or paved ground) outside the bedroom, on one side of the garage and at the interior of the entry porch.
- The construction of the horizontal clearance between the fibre-cement cladding and the floor slab had resulted in a variable gap and the manufacturer's recommendation for a seal had not been followed.
- The fibre-cement cladding overlaps the bricks at the junction of the monolithic wall with the garage brick veneer by only 20 mm when the manufacturer's suggested detail shows 50mm overlap.
- At the junction of the fibre-cement cladding with the brick cladding at the bedroom projection the fibre-cement sheet has been carried behind the bricks. The manufacturer's suggested detail for such a junction indicates a flashing and seal that would provide a seal and separation of the potentially wet bricks from the fibre-cement sheet.

5.2 The expert used a non-invasive moisture meter to test for moisture in the internal wall linings adjacent to the monolithic external wall claddings, and obtained no readings in the "damp" range. Further invasive moisture meter measurements were carried out at external locations where the monolithic cladding had been used. Measurements of 14.8% were obtained at bottom plate level on both sides of the garage door, and 13.3% in the framing at the junction of the bathroom and the bedroom adjacent to the garage. A reading of 18.9% was obtained at the bottom plate level of the porch garden wall. 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 made no comment. The builder provided the following information in response to the expert's report:

The porch wall is built on a concrete nib wall which rises to the height of the house floor slab

The absence of a sealant at the window sill is in accordance with BRANZ advice that leaving the sill/cladding junction unsealed is desirable because it allows pressure equalisation to occur and moisture to escape.

At the vertical junction of the monolithic-clad porch wall with the brick cladding of the house, the bricks are continuous behind the framing of the porch wall and the abutting stud was wrapped with damp course prior to bricking and fixing of the monolithic 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 to determining whether building work complies with clause E2.3.2 and B2.3.1 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 420mm eaves overhangs to most of the walls, and gable overhangs, but no overhang protection and therefore no effective shielding to one small area of the cladding;
- Is in a medium wind zone;
- Is constructed to one level;
- Has no external deck attached to the external framing;
- Has one wall/roof intersection;
- Has a small proportion of face-fixed cladding with no drainage cavity; and
- Has external walls that are constructed from timber, which is assumed to be untreated and therefore will provide no protection from decay.

Weathertightness performance

- 6.8 The Authority finds that the monolithic cladding in general appears to have been installed according to good trade practice. It has been effective to date in preventing the penetration of water. There are, however, defects as generally set out in paragraph 5.1, which if not remedied will, in the opinion of the Authority, eventually allow the ingress of moisture behind the cladding.
- 6.9 The Authority considers on the basis of the expert's report that the cladding demonstrates a number of discrete faults in the way the details are constructed. Those faults relate primarily to some ground clearances and the way that the fibre cement cladding has been interfaced with the brick veneer.
- 6.10 The Authority accepts the expert's conclusion that control joints are not required in any of the monolithic wall panels on this house.
- 6.11 The Authority finds that the detail in the entrance porch interior wall to floor junction is not acceptable, notwithstanding the nib wall at its base, because there is a risk of moisture blowing into the porch and wicking into the lower edges of the fibre-cement sheet when

the existing junction between the cladding and the paved floor is not protected by proper anti-capillary design.

- 6.12 Notwithstanding the fact that the cladding is fixed directly to the framing, the Authority finds that the building has compensating factors that can assist in preventing moisture from entering the building. These are:
- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
 - The building demonstrates a low weathertightness risk in terms of the E2/AS1 risk matrix; and
 - There is moisture evident in only one location at the base of the porch entry wall.
- 6.13 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.
- 6.14 As the recently approved new E2 /AS1 makes clear, there are circumstances where the combination of risk factors applying to a particular building on a particular site may mean that the building will perform satisfactorily, and therefore be code compliant, without a drained and ventilated wall cavity. The Authority believes it is essential that buildings are considered on a case –by-case basis to ensure that all the circumstances are considered properly.
- 6.15 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.

7 CONCLUSION

- 7.1 The Authority finds that the expert's report establishes that as at the time of this determination there is evidence of external moisture entering the building . Accordingly, the authority finds that the cladding on this particular building does not comply with clause E2
- 7.2 The building is also required to comply with the durability requirements of clause B2. Clause B2 requires that a building continue to satisfy all the objectives of the building 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 listed below have been satisfactorily rectified this house should be able to remain weathertight and thus comply with clause B2. Those faults are:

- The cladding is too close to ground level at either side of the garage door, outside the bedroom, garage and at the interior of the front porch; and
- The various vertical junctions between the cladding and the brick veneer are not sealed adequately against the ingress of moisture.

The Authority also considers that because these faults are discrete and can be easily identified, it is able to conclude that targeted rectification of the faults is likely to bring the cladding into compliance.

- 7.4 The Authority finds that the horizontal gap between the inside face of the cladding and the concrete footing varies and is bigger than the manufacturer's recommendations. It considers, however, that the weathertightness of the base will not be adversely affected by this larger gap because there is adequate overlap of the bottom plate and adequate ventilation if moisture does splash up into the gap. It therefore finds that the larger gap, in itself, is not a reason for the cladding to be non compliant
- 7.5 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 the cladding to be subject to "normal maintenance." That term is not defined, so 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, repainting, replacing sealants, and so on.
- 7.6 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.
- 7.7 The Authority declines to incorporate any waiver or modification of the building code in its determination.

8 WHAT IS TO BE DONE?

- 8.1 If the territorial authority chooses to issue a Notice to Rectify, the owner is obliged to bring the house into compliance with the building code. It is not for the Authority to dictate how the defects listed in paragraph 7.3 are to be remedied. How that is done 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 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.
- 9.2 In accordance with section 20 of the Act, the Authority determines that the monolithic cladding does not comply with clause E2 because of the leak at the porch bottom plate. There are also a number of defects to be remedied to ensure it remains weathertight, and thus meet the durability requirements of the code and the Authority finds that the cladding does not comply with clause B2. Accordingly, it upholds the territorial authority's decision to refuse to issue the code compliance certificate
- 9.3 The Authority finds that once the defects described in 7.3 have been 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 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 23 September 2004.



John Ryan
Chief Executive