

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 31

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, acting through the builder, 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 two-storey detached house with an attached garage situated on a slightly sloping excavated 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, with the external walls and various columns and beams faced with monolithic cladding. It is constructed on a concrete block foundation wall, which extends at varying heights above ground floor level. The ground floor slab is concrete. It is of a moderately complex shape with a simple roof structure, but with associated wall/roof intersections at varying levels. There is an open full-height portico, the roof over which is supported on one corner by a column. The column and the associated timber arched soffit beams are faced with cladding. The projecting dining room annexe to the north elevation has a rubber membrane lined roof laid over exterior grade plywood. On either side of the annexe is a timber-framed deck, which is supported on timber posts and beams which abut the cladding. There is an open colonnade over each of these decks, consisting of one column and two beams all faced with the cladding. In addition to what is shown on the consented plans, the deck is also returned along the entire length of the west elevation. The house has one upper level balcony attached to the face of the building and supported on timber beams and one

column, all of which are faced with the cladding. The balcony has a ceramic tiled floor fixed to a rubber membrane laid over exterior grade plywood. There is a timber-framed balustrade to the balcony lined with cladding and which originally had a handrail fixed to the top. The owner advised that, following discussions with the territorial authority, the handrails were removed and replaced with a 200 mm high polystyrene extension that may not have any timber framing incorporated in it. A timber framed chimney, faced with the cladding projects from the main wall and intersects with the edge of the upper roof. With the exception of the annexe roof, which has a polystyrene and plastered perimeter fascia, and the chimney intersection, the eaves have 300 mm wide projections with a 130 wide gutter attached.

- 2.2 There is no evidence that the framing in external walls is constructed with treated timber, nor is treated timber specified for these walls.
- 2.3 The building, including the various columns and beams, is clad with what is described as monolithic cladding. As detailed in the 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. At present, no appraisal has been obtained for the system. The plaster has been finished with an external acrylic textured paint system, which varies from the system approved by the manufacturer.
- 2.4 The sealant and plaster finishes supplier issued a "Producer Statement", dated 18 December 2002 and a "Warranty for Coating System" for work completed by 6 September 2002. The plaster applicator issued a "Workmanship Guarantee", dated 24 February 2003.

Sequence of events:

- 2.5 A corporate building certifier issued a "Building Certificate A" on 13 March 2002 in respect of all the design components of the building work and all the plumbing and drainage for the house.
- 2.6 The building certifier made various inspections in the course of construction, but due to a change to its statutory approval, it was unable to certify claddings that were outside those specified in the acceptable solution E2/AS1. The certifier, therefore, was required to ask the territorial authority to inspect and certify the outer cladding and the final plaster coatings. On 20 December 2002, the building certifier issued a building certificate that stated:

The Building Certifier is satisfied on reasonable grounds that the building work complied with the listed provisions of the building code on the date of certification

The "Job Card" associated with the certificate contained the following comments:

Ensure an exterior cladding inspection is called for prior to texture coatings being applied to enable checking of fixings and flashings.

Unable to issue a CCC as the exterior cladding has not been inspected and is outside New Zealand building code E2/AS1.

A producer statement required from the licensed applicator for textured coating.

- 2.7 The building certifier informed the territorial authority that, as the cladding fell outside the scope of its certification, the building certifier was unable to issue a code compliance certificate. The territorial authority therefore inspected the house on 3 March 2003. Following this inspection the territorial authority issued a "Schedule of Defects", which

listed defects that the territorial authority considered made the cladding non-compliant, and other areas of concern. The defects relevant to the cladding were as follows:

1. The head flashings on number of windows are too short.
2. The final discharge deflection of water to the apron flashing over the office is inadequate. Also the upstand of this apron flashing is too short.
3. The window flashing system is completely sealed, which will not allow the egress of any water that may enter.
4. The gutter and fascia system enters into the plaster system where the system butts into the wall
5. The head flashings do not have a clear space between the head of the plaster and the head flashing. In some cases the plaster and coating are in full contact with the head flashing and the space is less than 6mm.
7. The barrier to the deck outside bedroom has the top rail fitted on top of the cladding. The top of this barrier has no slope and at the time of the inspection water was ponding on a portion of the top close to a fitting.

- 2.8 The territorial authority sent a letter to the owner on 20 March 2003, which had the “Schedule of Defects” attached. The letter stated that:

The council had the building consent mentioned above returned to it by [the Building Certifier] under section 57 of the Building Act 1991 along with building certificate [numbered], covering all building work except external wall cladding.

[The Building Certifiers] have informed us that they are unable to issue code compliance certificates for the above consent as the external cladding system, being a proprietary system, falls outside the scope of their certification. Limitations as to the certifier’s scope of certification were introduced by the Building Industry Authority on December 2002 and you are one of the applicants affected by this change.

The council has considered all documentation relating to your building consent, which is available to it. Unfortunately, the available documentation has not provided the council with reasonable grounds to believe that the installed cladding system complies with the relevant clauses of the building code.

Of particular concern to the council is the method of cladding installation on your building. It appears that a licensed installer did not install the cladding system as intended by [an appraisal]. The council’s external inspection has obvious serious defects associated with it. (*sic*)

The council was not involved in the inspection process prior to the completion of the cladding installation and has been provided with insufficient information to enable it to assess the extent of all possible defects, which may be associated with the cladding and its installation. Consequently, the council is unable to issue a code compliance certificate or a notice of rectification with respect to the cladding.

- 2.9 The owner applied for this Determination on 16 January 2004.

3 THE SUBMISSIONS

- 3.1 The owner did not make a formal submission, but noted on the D1 Form that, as requested, a producer statement for the exterior cladding had been supplied to the building certifier but it was not accepted. The owner also pointed out that a cavity was not a cladding requirement when the cladding was installed on this house.

- 3.2 The owner also provided copies of:
- The building plans;
 - The territorial authority’s letter to the owner of 20 March 2003;
 - The Producer Statement”, “Warranty”, and “Guarantee” described in paragraph 2.4; and
 - The coversheet to a weathertightness test carried out on the manufacture’s cladding system. The results of the test itself were not submitted;
- 3.3 The territorial authority in a submission dated 19 April 2004, noted that the building certifier’s certification had been amended, and that despite ample opportunity to do so, the building certifier had not advised the owner of the situation that had arisen. After visiting the site and viewing all the documentation, the Council could not be satisfied on reasonable grounds that the building works complied with the requirements of the building code.
- 3.4 The territorial authority also submitted copies of:
- The territorial authority’s letter to the owner of 20 March 2003;
 - The “Schedule of Defects”
 - Two of the consent plans; and
 - The building certifier’s Building Certificates “A” and “B”, and the building certifier’s “Job Cards” relating to these.
- 3.5 The 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 clauses B2.3.1 and E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

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.

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 described the quality of surface finish as being a consistent trowelled finish. It noted that there were no cracks in the cladding. There are a small number of areas where the paint has separated from the plaster. However, the expert considered that these appear to be isolated areas of damage or defect, rather than a systemic problem. The expert removed areas of the cladding adjacent to one head/jamb junction and one sill/jamb junction of a window to ascertain the flashing and sealant installation. From this inspection, the expert determined that there are head, jamb and sill flashings and adequate sealing to the exterior joinery. The expert found the following specific faults during the inspection:
- The external beams forming the colonnade to the decks at ground level have flat top surfaces which should be sloped to ensure they shed water, as required for the top of the balcony balustrade (below).
 - The top of the balcony balustrade wall currently slopes at 5 to 7 degrees compared to the 15 degrees indicated in the manufacturer’s detail to ensure that water is properly shed from the top of the balustrade.
 - The polystyrene fascia to the flat roof above the dining room terminates with a PVC extrusion to its top edge. The covering plaster system and mesh has not been carried over the top and sealed to the upstand on the edge of the roof, nor has a cap flashing been installed to waterproof the junction.
 - The clearance between roof finishes and the underside of the polystyrene cladding is less than the 40mm recommended by the manufacturer.
 - Ground clearances to the underside of the cladding are less than the 100mm recommended by the manufacturer.

- Attachments for the down-pipes and the fence to the cladding are not sealed against water ingress.
- The polystyrene had not been plastered behind the stop-ends of some gutters.
- There is reported leakage to the dining area windows and the front door.
- The balcony has been extended 200mm in height, reportedly using polystyrene without timber framing.

The occupants of the house informed the expert that the external joinery units to the dining area and the front door are leaking. The expert was of the opinion that these leaks were caused by a combination of a poor air seal and an open joint at the heads of the joinery. The expert also noted that there is only a single outlet to the flat roof and no overflow.

- 5.2 The expert tested the moisture level of the interior linings of the exterior walls and obtained no readings in the “damp” range. The expert also used an-invasive type moisture meter applied through the exterior cladding to detect areas of moisture ingress. The moisture readings ranged from 9.1% to 15.7% at 12 locations, with an average of 13%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.
- 5.3 The expert also commented on the points raised by the territorial authority in its schedule of defects.
- The expert considered that the head flashings to the windows were adequate. The extension of the jamb flashings above the head flashing is a typical detail in EIFS systems because of the way the window is recessed into the cladding and the flashings are completely sealed.
 - Many EIFS systems involve window flashings which are completely sealed and the performance of this detail has been proven in practice.
 - The manufacturer's instructions showed plaster in contact with the head flashing and the as built head flashing detail was acceptable.
 - Other points raised by the territorial authority were endorsed and covered in more detail in the report.
- 5.4 Copies of the expert’s report were provided to each of the parties. The owner responded by saying that the leakage at the windows is not a cladding problem and that it had now been solved by the formation of new drainage holes. He also stated that crew fixings to the cladding had been sealed.

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 clauses B2.3.1 and 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 Some important matters for consideration are 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. 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 the exception of the dining room annexe and taking into account the spouting projection, 430 mm wide eaves that are reasonably effective in protecting the cladding;

- Is in a medium wind zone;
- Is two storey;
- Has several wall/roof intersections;
- Has an overall envelope that is moderately complex in plan although the roof plan is reasonably simple;
- Has a full-height portico over the main entrance
- Has decks to two elevations of the house with an open colonnade over two deck areas;
- Has an elevated balcony not constructed over a habitable space;
- Has flashings to the heads, jambs and sills of the external joinery;
- Has no drainage cavity where the cladding is face fixed; and
- Has external walls that are constructed with untreated timber, which would not delay 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, therefore, be considered to be reasonably effective in preventing the penetration of water. There are, however, defects, which are set out in paragraph 5.1, that are likely with time to allow the ingress of moisture behind the cladding.
- 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. These are:
- Apart from the faults identified by the expert, the cladding generally appears to have been installed according to good trade practice and to manufacturer's specifications;
 - The building has some features that can reduce the weathertightness risk factors, including the use of flashings all round the exterior joinery units, and the presence of eaves projections; and
 - The moisture level readings do not indicate any undue moisture ingress behind the cladding at this time.
- 6.10 The Authority notes the expert's comments on the potential leakage through the window and door joinery units. These units should be repaired to ensure ongoing weathertightness.
- 6.11 The Authority notes that the cladding has not been constructed with any vertical or horizontal control joints. The manufacturer's instructions allow for up to 20 metres between joints in this cladding, although not all other similar systems are specified with a panel size of up to 20 metres. Correctly installed thin plaster EIFS systems have a greater ability to respond to movement caused by heat gradients or ground movement than other more rigid fibre cement systems. Although the panel sizes in this house are large, the Authority finds that the lack of control joints is not of itself a reason for non compliance.
- 6.12 The Authority notes the owner's comments on the way the second level balcony balustrade was extended. It is important that the safety of this balustrade be assessed.

- 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. Normal maintenance should also include in this case the regular cleaning of the drain to the flat roof over the dining area.
- 6.14 The Authority has reviewed the consent drawings and considers that the level of detail given in the drawings, particularly of some of the more complex wall/roof intersections to be inadequate. The Authority encourages the territorial authority to require a greater level of detail on future consent applications.
- 6.15 The Authority notes that the cladding system installed was not the system specified in the consent drawings. It is not aware of any approving documentation from the certifier or the territorial authority to support this change. It is important that the consenting authority for the cladding (the territorial authority in this case) be advised of such a change so that consent conditions and inspection procedures can be modified accordingly.

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. As there is no evidence of external moisture entering the building, the Authority finds that the cladding on this particular building complies with clause E2.
- 7.2 While the building does not show any signs of water ingress at the present time, this building will also have to comply with the durability requirements of clause B2. B2 requires that a building continue to satisfy all the objectives of the 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 have been satisfactorily rectified this house should be able to remain weathertight and will thus comply with clause B2 even though it has not been constructed with a cavity. It is essential that all the required items of rectification which are detailed specifically in paragraphs 5.1, 6.10 and 6.11, be competently carried out to ensure such compliance.
- 7.4 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.
- 7.5 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 directly how the defects listed in paragraphs 5.1 and 6.10 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 is weathertight now and therefore the cladding complies with clause E2. However, as there are a number of items to be remedied to ensure it remains weathertight and thus meet the durability requirements of the code, the Authority finds that the house does not comply with clause B2. 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 paragraphs 5.1 and 6.10 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 also notes that, while the safety of the balustrade was not an issue raised as a dispute by the parties and thus a subject for this determination, its safety should be determined before any final CCC is issued.
- 9.5 The Authority considers that the cladding will require on-going maintenance to ensure its continuing code compliance.

Signed for and on behalf of the **Building Industry Authority** on 13 September 2004.



John Ryan
Chief Executive