

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 37

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 applicants are the owners acting through the builder as their agent (and referred to throughout this determination as ‘the owner’) 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 near 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 section 8 sets out the Authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a two-storey timber-framed detached house of a relatively simple shape with a 25 degree pitched roof construction, a suspended timber upper floor and a reinforced concrete raft ground floor. The main roof cladding is concrete tiles with hips, valleys and gable end features. There are 300mm roof overhangs (eaves) to the perimeters of the main roof and garage roof. There are low level pitched roof abutments on all elevations and these rely on lead flashings for weathertightness at these junctions. The window and door joinery is made of aluminium. There are no in-built balconies or enclosed handrails. The house is situated on a moderately sloping site in a low wind zone in terms of NZS 3604: 1999 “Timber framed buildings.
- 2.2 The documents at the time of consent specify that the external framing is to be 90 x 35 mm kiln-dried chemical free (ie untreated) timber. In the absence of any evidence to the

contrary in the submissions received from the territorial authority (TA) and the applicant, the Authority accepts that the house was constructed using such timber.

- 2.3 The building is clad with what is described as monolithic cladding. The cladding is a particular proprietary product, largely 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 system (polystyrene and coating system) issued a "Materials Components Guarantee" and a "Workmanship Guarantee" both on 27 March 2003. The guarantee states that the date of completion of the cladding system was March 2003. The Authority notes that the "Materials Components Guarantee" contains a clause which reads, "(Proprietary system supplier) and the members of its Licensed Contractors network will not accept responsibility of any kind for consequential damage to any building component that has occurred as a result of the use of untreated framing" and observes that as this building is apparently constructed with untreated timber, the Guarantee may be limited. The contractor licensed by the cladding system to install the system supplied a producer statement dated 28th March 2003.

Sequence of events:

- 2.5 The TA issued a building consent on 8th October 2002. Although the consent was issued following certification of the proposed plans and specifications by a private building certifier on 18 September 2002, the building company constructing the house wrote to the TA on 21 October 2002 requesting the TA to make all inspections and, subsequently, to issue the code compliance certificate. The TA did carry out a series of inspections as the building work progressed. The last of these was apparently a "Weathertightness Issues" inspection for "Completed Monolithic Dwellings Without a Cavity," carried out on the subject house on 15th December 2003. The Authority notes that amongst the notes at the foot of the inspection record the inspector wrote "15/12/03 Final recheck for ground levels – OK (no cladding issues)" and at the conclusion of a note apparently added to the form on 20 February 2004 "Suggest O K for CCC."
- 2.6 Early in 2004 the owner requested a code compliance certificate (CCC) from the TA.
- 2.7 In a letter to the owner dated 4 March 2004, the territorial authority declined to issue a CCC and said, inter alia:

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 specific 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 we are unable to verify that it fully complies with the Building Code requirements, manufacturer's details application (sic) at the time and that it will remain durable for the required period, therefore Council is not prepared to issue a Code Compliance Certificate at this time.

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 and is therefore unable to issue a code compliance certificate.

- 2.8 The TA did not issue a Notice to Rectify under section 43(6) of the Building Act 1991.
- 2.9 The owner applied for this determination on 8 April 2004.

3 THE SUBMISSIONS

3.1 The owners provided the following relevant documents with their application:

- The plans and specifications for the house;
- The plaster system supplier's warranties;
- The plaster system installer's producer statement; and
- The TA's letter, dated 4th March 2004, declining to issue a CCC.

3.2 The TA provided the following relevant documents with its submission:

- A copy of its letter, dated to 4th March 2004, to the owner; and
- A copy of all relevant building consent documents and correspondence.

3.3 Neither party commented on the submission of the other.

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 clauses B2.3.1 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 view of the unexplained discrepancy between the TA's favourable inspection report dated 15 December 2003 and its letter dated 4 March 2004 the Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert stated there was no visual cracking on the surface of the cladding and the finish was of a high standard to all elevations. 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. The expert noted that the only penetrations through the cladding to cause concern were those for the fixings for the down-pipes that used unsealed screws into the cladding rather than the fixing blocks specified by the cladding system manufacturer. In order to check sill and head flashing details the expert removed sections of cladding at two wall window locations. That established that, while the flashings were present, they had not been installed in accordance with the manufacturer's recommendation or the relevant appraisal certificate issued by an independent appraisal organisation. Although the expert reached the conclusion that "the cladding system has

been well installed”, he noted “ the following areas are considered as representing the highest risk for potential from potential moisture ingress”:

- Windows flashings – not in accordance with manufacturer’s installation requirements or in accordance with the relevant Appraisal Certificate. In particular some head and sill flashings do not extend 20mm past the jambs and some jamb and head flashings are not linked.
- Lead flashings to lower pitched roof abutments on all elevations – vulnerable to moisture ingress. Some loose tiles were found under one of the flashings.

- 5.2 The expert used a non-invasive moisture meter to take moisture readings at various internal locations. No moisture was detected in any area. Invasive moisture meter readings were taken at various locations on the exterior of the building. Readings ranged between 7.3 and 80.3 %. Apart from the 80.3% reading the highest reading was 12.2%. It is generally considered that moisture meter readings over 18% are indicative of moisture entry. The expert removed a section of cladding at the site of the 80.3% reading to reveal the plywood bracing sheet behind the cladding. The plywood was saturated with a moisture reading of 99.9% being obtained. The expert attributed the presence of moisture to faulty flashing at the abutment of the roof over the bay window with the wall of the house.
- 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 400mm eaves overhangs (including gutter width) to the perimeters of the house roof and to the garage roof;
- Has a relatively simple overall envelope shape;
- Is in a low wind zone although quite exposed;
- Is constructed to two levels;
- Has several wall/roof intersections;

- Has face-fixed cladding with no drainage cavity; and
- Has external walls that are constructed from kiln-dried untreated timber which provides no initial protection from decay.

Weathertightness performance

- 6.8 The Authority finds that the cladding in general appears to have been installed according to good trade practice and can therefore be considered to be effective in preventing the ingress of water.
- 6.9 The Authority accepts the expert's conclusion that control joints are not required in any of the wall panels on this house.
- 6.10 The Authority notes the expert's advice that the flashing system around the windows, although not installed in accordance with the manufacturer's recommendations, is currently working effectively. It also notes the expert's view that the ongoing effectiveness of the flashing system is dependent on consistent maintenance of the wall cladding system. The Authority notes that the inspections of the cladding by the TA did not result in any concerns from the TA about the manner in which it was installed. The Authority would have expected the inspector to have noted the incorrect window flashing details, and, in particular, the fact that head and sill flashings did not extend past the jamb flashings.
- 6.11 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. There are no defects in the cladding finish. However, the Authority believes there is evidence that moisture is entering the building through the cladding at the junctions of the bay window roof and the adjacent wall.
- 6.12 The wall/roof junctions may provide some ventilation to the upper level wall frames.

7 CONCLUSION

- 7.1 The Authority finds 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 continues 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 because the faults in this cladding occur in discrete areas, it is able to conclude that rectification of the identified faults is likely to bring the cladding into compliance with the code. Once the cladding faults listed below have been

satisfactorily rectified this house should be able to remain weathertight and thus comply with both clause E2 and B2. Those faults are:

- The poor construction of the roof to wall junctions, at least one of which was apparently leaking at the time of the expert's inspection. The tiles at all such junctions need to be properly fixed and a suitable flashing system, resistant to wind uplift, needs to be installed.
- The flashing system around the windows, while currently effective, is overly reliant on the ongoing maintenance of the cladding system, and will not be effective if the plaster cracks around the windows.
- The fixings of the down-pipes to the cladding are not sealed against moisture ingress or fixed to the blocks recommended by the manufacturer.

- 7.4 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.
- 7.5 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.
- 7.6 The Authority declines to incorporate any waiver or modification of the building code in its determination.

8 THE AUTHORITY'S DECISION

- 8.1 In accordance with section 20 of the Building Act, the Authority determines that there is evidence of external moisture entering the building and, therefore, the cladding on this particular building does not comply with clause E2. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 8.2 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.
- 8.3 The Authority, therefore, finds that once the items of non-compliance that are listed in paragraph 7.3 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.

- 8.4 The Authority notes that the territorial authority has not issued a Notice to Rectify. However, if the territorial authority chooses to do so, the owner is obliged to bring the house up to compliance with the building code. It is not for the Authority to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose, possibly after taking advice from an independent building professional, 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.
- 8.5 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.

A handwritten signature in black ink, appearing to read 'J. Ryan', with a large, sweeping underline stroke.

John Ryan
Chief Executive