

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 47

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 building owners (referred throughout this Determination as 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 3-year old 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”), which is applied to some columns and the walls of 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 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 part single-storey and part two-storey detached house, situated on a sloping and partly excavated site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction, built on a concrete block foundation wall. The external walls, with the exception of the garage masonry wall, are sheathed with monolithic cladding. The house is of a relatively complex shape, with the pitched roofs set at two levels with some hip junctions, valley gutters and wall to roof junctions. There is a metal clad internal gutter adjacent to the masonry garage wall, which also has a metal barge capping over it. The house has an upper level timber-framed gap-boarded deck to one elevation and a return, which is partly constructed over a living space. The section over the living space is clad in butyl rubber

with metal cap flashings to the external edges of the deck. The deck is supported on timber beams and poles and has a metal-framed glazed balustrade to the perimeter. The entrance porch roof is supported on two monolithic clad side walls, which is a departure from the two support columns shown on the consent plans. Except for the two main gable ends, which have no projections, and the maximum 1100mm gable roof extension over part of the deck area, the remaining gables and the eaves have 315mm wide projections. The eaves also have 130mm wide attached gutters.

- 2.2 The expert appointed by the Authority was able to observe a large sample of framing used in the house and established that the timber used in the construction of the external walls is not treated. The owner also verified this use of untreated timber.
- 2.3 The cladding system is what is described as monolithic cladding. As specified in its manufacturer's data sheets ("the manufacturer's instructions") and a subsequent independent appraisal ("the appraisal"), it incorporates 40mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the framing timbers and finished with textured sponge float plaster and a final paint system. The manufacturer's instructions include details for flashings at various junctions and require pvc flashings to the jambs and sills of exterior joinery units. The sponge finished coating system used in this instance is one of those systems referred to in the independent appraisal. The Authority notes that the cladding is one of the two alternative cladding systems indicated on the plans.
- 2.4 The coating systems supplier issued a "Materials Components Guarantee", dated 2 June 2004, which contained the qualification that the proprietor will not accept responsibility for damage resulting from the use of untreated timber.

Sequence of events

- 2.5 The territorial authority issued a building consent on 30 November 1999. None of the "Building Consent Requirements" attached to the consent referred to the cladding apart from noting the notice time for carrying out inspections.
- 2.6 The territorial authority made various inspections during the course of construction, and on 30 October 2000 approved the "Preline Building Inspection", apart from some bracing concerns and a reference to future ground clearances. The territorial authority issued four "Building Officers Field Memoranda" following inspections on 30 October 2000, 2 November 2000, and 13 May 2004, which listed items that were in contravention of the building code. None of these items related to the cladding.
- 2.7 The territorial authority wrote to the owner stating that existing properties using any type of monolithic cladding will be reviewed on a case-by-case basis before determining whether a code compliance certificate could be issued.
- 2.8 On 1 July 2004, the territorial authority wrote to the owner pointing out that the territorial authority had to ensure that all building work had to meet the building code requirements. The letter 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 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. Visual inspection has also revealed

- 1) High risk design in high wind zone
- 2) No timber treatment of external wall frames
- 3) Producer Statement and warranty still to be provided
- 4) Deck above living space
- 5) Visible cracks
- 6) Non-complying ground levels- to be 100mm below cladding

Visible inspection recently carried out by council has also revealed the following defects, which need remedying, however we advise that even when these defects are remedied to council's satisfaction, we consider consent would still need to go to the Building Industry Authority for determination

Defects to be Remedied and further inspection to be called for

1. Ground clearances to be made complying, ie to be lowered to a minimum of 100mm below cladding at front
2. Cracks to be repaired
3. Producer Statement PS3 and Warranty required from cladding installer

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

2.9 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.

2.10 The owner applied for a determination on 19 July 2004.

3 THE SUBMISSIONS

- 3.1 In a covering letter to the documentation forwarded by the owner, dated 19 July 2004, the owner noted that at the time of construction, cladding inspections were not required, nor was it a requirement to have a ventilated cavity system of cladding.
- 3.2 The owner also provided copies of:
- The drawings and specifications;
 - The building consent documentation;
 - The correspondence with the territorial authority; and
 - The cladding manufacturer's guarantee.
- 3.3 The territorial authority did not make a submission, but did supply copies of the following:
- The consent documentation;
 - Inspection documentation;
 - The correspondence with the owner;
 - The cladding manufacturer's guarantee; and
 - A set of photographs of the building, apparently supplied by the cladding manufacturer.
- 3.4 The copies of the submissions and other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submissions of the other party.

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 sub floor 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. It noted that the “final coat of the plaster is a ‘sponge’ finish done to a high standard”, and the cladding was to “reasonably good practice”. The expert noted that, in accordance with the appraisal carried out on the cladding system, no vertical or horizontal control joints were required for the walls of the dimensions found in the house. The expert cut away the cladding to expose a jamb/sill intersection of one window and this investigation showed that the exterior joinery unit was fully flashed in accordance with the manufacturer's instructions. A second cut-out exposed an area where a high moisture reading was recorded adjacent to the garage wall barge capping, and it was found that there was a limited spread of water at this location and no signs of fungal decay. The expert also noted some concerns regarding the cladding:

- There is a crack in the external corner of the cladding, adjacent to the master bedroom window and the sealant between the two lengths of sill flashing at this location is not well adhered and there is only one layer of mesh present;
- The intersection between the end of the internal gutter adjacent to the garage masonry wall and the barge capping is inadequately finished and is allowing water ingress;
- The deck beam penetrates the cladding and there are numerous fixing screw and nail penetrations through the deck end flashings and possibly through the membrane under it;
- The bottoms of the timber side jambs to the garage wall are touching the drive concrete;
- Both ends of timber fascia to the low-level roof have been fitted prior to the application of the plaster and paint finishes;
- The entrance steps have been poured directly against the cladding;
- Some ground clearances to the base of the cladding are inadequate, and the expert noted that the drive concrete had been cut away to give a more adequate ground clearance adjacent to the garage; and
- The electricity meter perimeter junction with the cladding is inadequately sealed.

5.2 The expert also took non-invasive moisture readings through the inner walls of the house, and apart from two locations where slightly elevated readings were recorded, all readings were to an acceptable level. The expert took a further 36 invasive readings at various locations and recorded 4 moisture readings over 18%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. The high readings were located as follows:

- 20% under the south east corner window of the master bedroom;
- 22% under the penetrating deck beam;
- 24% at the bottom plate on the left-hand side of the garage door; and
- 40% at the southwest corner adjacent to the blockwork garage wall.

5.3 Copies of the expert's report were provided to each of the parties. The territorial authority did not comment on the expert's report. In a letter to the Authority, dated 11 October 2004, the owners stated that they were happy with 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 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 Important matters for consideration are:
- 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:

- Apart from the main gables, which have no projections and, therefore, offer no protection to the cladding, has 445mm wide eaves projections that provide some protection to the cladding under them;
- Is in a high wind zone;
- Is two stories high;
- Has fully flashed exterior joinery units;
- Has an overall envelope that is relatively complex on plan, with roofs at two levels that have some roof and wall/roof intersections;
- Has a deck at the upper level, partially built over a living space; and
- Has external walls constructed with untreated timber, which would not be effective in preventing the onset of decay.

Weathertightness performance

6.8 Generally the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions. However, this does not apply to a limited number of localised areas, where the cladding has been ineffective in preventing penetration of water into the wall structure, as set out in paragraph 5.1.

6.9 The Authority accepts the expert's opinion that vertical and horizontal joints are not required in the cladding. The Authority notes that the appraisal does not require joints in walls of the dimensions that are present in this house and considers that this EIFS cladding panel size will achieve the performance required by clause E2.

6.10 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 in this particular case. These are:

- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
- The exterior joinery units are fully flashed; and

- The moisture evident at this time is related to four identified areas only.
- 6.11 The Authority considers that these other provisions adequately compensate for the lack of a drained and ventilated cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.
- 6.12 The Authority notes that when assessed against the risk matrix incorporated in the Acceptable Solution E2/AS1, this house presents a risk of weathertightness failure that is moderate on two elevations and high on the other two elevations. The matrix is an assessment tool that is intended to be used at the time of application for consent, but must be supplemented at the time of issuing a code compliance certificate by careful inspection of the building as actually built.

7 CONCLUSION

- 7.1 The Authority finds the expert's report establishes that 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 in paragraph 5.1 have been satisfactorily rectified this house should be able to remain weathertight and thus comply with both clause E2 and B2.
- 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. The Authority recognises that a territorial authority does not have any statutory responsibility for the ongoing maintenance of a building. However, the maintenance programme adopted by the owner could be undertaken after consultation with the territorial authority, bearing in mind that any comments or advice provided by the territorial authority to the owner are likely to be accompanied by appropriate disclaimers.
- 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 once the items of non-compliance that are listed in paragraph 5.1 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.
- 8.3 The Authority notes that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then 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 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.
- 8.4 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 2 November 2004.



John Ryan
Chief Executive