

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 52

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 two building owners, who are acting through the builder as agent (referred to 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 10-month 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 the walls and columns 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 two-storey detached house, situated on a slightly sloping and partly excavated site, which is in a very high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction, built on a proprietary concrete ground floor slab, which is supported on piled foundations. The external walls and columns are sheathed with monolithic cladding. The house is of a relatively simple shape, with the pitched roofs set at two main levels with numerous hip junctions, valley gutters and wall to roof junctions. The house has a small upper level timber-framed balcony built over a living space, with a membrane lining over plywood sarking, over which tiles have been laid. The balcony is open, with two support columns that support the main roof at each corner and there is a small projecting flat roof over. The balcony has a metal balustrade to the front and both ends that is side fixed to the columns

and walls. A decorative band has been fixed to the upper-level walls between the windows and also to the tops of the columns. A similar projection also occurs at the sills of some windows. The eaves to the upper roofs have 300 mm wide projections and the eaves to the lower roofs have 450 mm wide projections.

- 2.2 The expert appointed by the Authority obtained a copy of a quotation from the owner indicating that the timber used in the construction of the external walls was H1 treated. The specification calls for the wall framing to be boracic H1 (minimum) treated.
- 2.3 The cladding system is what is described as monolithic cladding. As specified in draft manufacturer's January 2003 data sheets ("the manufacturer's instructions"), it incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the wall framing and finished with textured sponge float plaster and paint systems. The system has been subject to an independent appraisal ("the appraisal"). The manufacturer's instructions include details for flashings at various junctions and require pvc flashings to the heads, 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, while the manufacturer's instructions show 50mm x 20mm polystyrene battens forming a ventilated and drained cavity behind the cladding, the cladding has in fact been fixed directly to the framing. The territorial authority commented on the lack of battens in a letter to the owner in April 2004.
- 2.4 The coating systems supplier issued a "Producer Statement", dated 9 December 2003, certifying the cladding system, a "Materials Components Guarantee", dated 23 December 2003 covering the material components of the system, and a "Workmanship Guarantee", of the same date, covering the plasterwork. Both guarantees contain qualifications 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 6 March 2003. The "Building Consent Requirements" attached to the consent referred to the installation of the cladding and the requirement that producer statements and certification or warranties be provided.
- 2.6 The territorial authority made various inspections during the course of construction, and on 30 June 2003 approved the "Preline Building Inspection". The territorial authority issued four "Development Building Officers Field Memoranda" following inspections on 24 June 2003, 8 July 2003, and 2 December 2003, which listed items that were in contravention of the building code. The relevant items relating to the cladding were set out on the Memoranda following the 2 December 2003 inspection, as follows:
- Seal around cable through cladding by gas meter.
 - Pebble garden at rear to be 225mm below floor level (unprotected ground).
 - Flash/block/seal junctions (2 off) where fascia abuts wall cladding (each side of Dining).
 - Council has no record of any wall cladding inspections. The approved plans indicate a cavity system should have been used.
 - Please provide PS3 for fixing and coating of wall cladding and manufacturers for all cladding materials.

The Authority notes that, according to the “Field Inspection Sheets”, the territorial authority has carried out both pre and post-lining inspections on the house. It queries, therefore, the statement that there is “no record of any wall cladding inspections”. The Authority also notes the reference by the territorial authority to “approved plans” [which in terms of the Act include specifications], and points out that the cavity system was in fact indicated on the manufacturer's instructions. As both the territorial authority and the owner have submitted these instructions and those from the territorial authority are stamped as “Council Copy”, the Authority accepts that they formed part of the consent documentation forwarded to the territorial authority.

- 2.7 On 8 April 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) House has not been built according to approved plans ([Named product] without cavity system approved
- 2) No inspections called for when they had been requested
- 3) Timber treatment unknown
- 4) Plumbing and Drainage items outstanding

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.

- 2.8 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.
- 2.9 The owner applied for a determination on 3 June 2004.

3 THE SUBMISSIONS

- 3.1 In the “Matter of Doubt or Dispute” section of the application for a determination, the owner stated that the territorial authority couldn’t grant a code compliance certificate for the cladding without a cavity system.
- 3.2 The owner also provided copies of:
- Some of the drawings;
 - The letter of 8 April 2004 from the territorial authority to the owner;
 - The manufacturer's instructions for the cladding;
 - A guide for plaster preservation and maintenance; and
 - The two cladding guarantees.
- 3.3 The territorial authority did not make a submission, but supplied copies of:
- The plans and specifications;
 - The consent documentation;
 - The territorial authority’s inspection documentation;
 - Its letter of 8 April 2004 to the owner;
 - The cladding producer statement and guarantees;
 - The manufacturer's instructions; and
 - A set of photographs showing aspects of the building.
- 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; and
 - 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 plaster finish appears to be consistent and is applied evenly. The exterior finish, including the plaster coating and painting is generally of a good standard, with the exception of three localised areas. The expert noted that, in accordance the manufacturer's instructions, 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.

The expert also made the following comments regarding the cladding:

- There are no jamb or sill reveal flashings installed to the exterior windows;
- There is no head flashing over the garage door opening, although the head of the door is protected by the eaves above it;
- The ends of the apron flashings lack “kickouts”;
- The top edge of the decorative band over the dining room window is not plastered, sealed, or painted;
- There is a chip on the bottom edge of the cladding over the garage on the eastern side of the building, and there is cracking to the sill of the south side window outside the bathroom;
- The ground clearance in the area at the front entry is insufficient, but this area is well sheltered and drained;
- The plaster has “blown” on the front face of the balcony where the joists project and no drip edge has been provided on the front edge the balcony;
- The “birds beak” on the flashing on the top edge of the balcony has been turned in towards the cladding and does not deflect moisture away. The flashing is also covered with plaster droppings, which should be cleaned off to prevent retention of moisture;
- The spoutings have been fixed prior to the application of the plaster and paint coatings, and the spouting abutting the wall beside the garage and dining rooms is buried in the cladding;
- The downpipe bracket fixing screws are not sealed;
- Some pipework and cable penetrations, and the balcony balustrade fixings are not properly flanged and sealed; and
- There are no flashings around the gas and electricity meter boxes.

The expert also noted that there was a loose tile to the hip over the master bedroom and a downpipe from the upper roof is discharging over the laps of the tiles of the lower roof.

- 5.2 The expert also took non-invasive moisture readings of the external wall cavities through the inner walls of the house, and apart from one reading in bedroom 5 of 18.1% and one reading in the living room beside the laundry of 30%, all readings were below 18 %. The expert took further invasive readings and obtained a reading of 15.3% in bedroom 5 and a reading of 30% in the living room. The owner advised the expert that there had been a leak in this location, which the owner believed had been fixed. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. The expert also noted that there was a swelling in the Gibraltar board in the living room and there was a white powder-like stain on the carpet. The expert pointed out that as the wall in question was load bearing and contained a bracing element, it was

essential that it be checked. As this wall is an internal wall, the Authority is of the opinion that the leak likely related to the internal plumbing system, rather than to the cladding.

- 5.3 Copies of the expert's report were provided to each of the parties. The owner did not comment on the report but the territorial authority made a submission by e-mail on 29 October 2004. The territorial authority raised two issues. The first of these noted that a further invasive inspection at the previously investigated joinery unit had revealed both a jamb flashing and a sill flashing had been installed as well as a corner soaker. The second issue concerned the garage door head, which the territorial authority considered was adequately protected.

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 Research data and experience, both internationally and locally, 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:

- Has 300 mm and 450 mm wide eaves projections that provide some protection to the cladding under them;
- Is in a very high wind zone;
- Is two stories high;
- Has head flashings to the exterior doors and windows, but there are no jamb or sill reveal flashings to the windows;
- Has an overall envelope that is relatively simple on plan, with roofs at two main levels that have some roof and wall/roof intersections;
- Has lower roof/wall framing junctions that provide additional ventilation to the upper-floor walls;
- Has one balcony at the upper level, built over a living space; and
- Has external walls constructed with what the Authority assumes to be H1 LOSP treated timber, which would not be effective in preventing the onset of decay.

Weather-tightness performance

6.8 Some aspects of the cladding appear not to have been installed according to good trade practice and to the manufacturer's instructions. As the Authority has accepted that the high moisture reading in the laundry/living room internal wall is attributable to a

plumbing leak, the Authority considers that the cladding has been effective to date in preventing the penetration of water. There are, however, a number of discrete defects as set out in paragraph 5.1, which if not remedied, will eventually allow the ingress of further moisture behind the cladding.

- 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 manufacturer's instructions do 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. The Authority considers that the lack of a head flashing over the garage door is acceptable as the door is well protected by the eaves immediately above it. The Authority also considers that the low ground clearance to the cladding at the front entry does not require rectification because the porch is well protected and there is good drainage away from the entry area. The Authority also accepts that, as identified by the territorial authority by a subsequent intrusive investigation, that there are sill and jamb flashings installed to the exterior joinery units.
- 6.10 The Authority notes that the manufacturer's instructions supplied with the consent documentation forwarded to the territorial authority include the requirement for a cavity for this house. It also notes that the inspections and invasive testing carried out by the expert indicated that the cavity had not been installed. The Authority is concerned that:
- The critical building work deviated so clearly from the approved construction details; and
 - The obvious differences between the consented and the as-built details inspections of the cladding were not identified through the construction inspection process.
- 6.11 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and 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:
- With the exception of the matters mentioned in paragraph 5.1, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
 - The presence of verge projections that afford some protection to the external joinery units;
 - The ventilation spaces in the lower roof/wall junction locations; and
 - At this time, the only moisture evident is the result of internal rather than external moisture ingress.
- 6.12 The Authority considers that these other provisions adequately compensate for the lack of a ventilation cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.
- 6.13 The Authority notes that all elevations of the building demonstrate a medium weathertightness risk rating, as calculated using the E2/AS1 risk matrix. 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 no evidence of external moisture entering the building. Accordingly the Authority finds that the cladding on this particular building at this time does comply with clause E2.
- 7.2 However, 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. The Authority also finds that the loose roof tile and the downpipe discharging over the roof tile laps should be attended to so as to ensure the watertight integrity of the house. Once the cladding faults listed in paragraph 5.1 (excluding the jamb and sill flashings to the exterior joinery units, the garage door head flashing and the porch cladding ground clearance) and the loose tile and downpipe discharge 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 also notes the expert's concerns regarding the continued structural stability and bracing capabilities of the living room wall adjacent to where moisture had penetrated the cladding. The Authority urges that this particular wall be fully investigated and any necessary remedial work be carried out to ensure that its functions have not been impaired.
- 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 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. 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.
- 7.6 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 THE AUTHORITY'S DECISION

- 8.1 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.
- 8.2 The Authority, therefore, finds that once the items of non-compliance that are listed in paragraph 5.1 (excluding the jamb and sill flashings to the exterior joinery units, the garage door head flashing and the porch cladding ground clearance) plus the loose tile and downpipe discharge, 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 12 November 2004.



John Ryan
Chief Executive