

Determination 2005/14

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 12

1 THE DISPUTE TO BE DETERMINED

1.1 This is a determination of a dispute referred to the Chief Executive of the Department of Building and Housing (“the Chief Executive”) under section 17 of the Building Act 1991 as amended by section 424 of the Building Act 2004 (“the Act”). The applicants are the 2 joint owners (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 4-year-old house, unless changes are made to its monolithic cladding system.

1.2 My task in this determination is to consider whether I am satisfied on reasonable grounds that the external monolithic wall cladding as installed on all the timber framed external walls of the house (“the cladding”), complies with the building code (see sections 18 and 20 of the Act). By “external monolithic wall cladding as installed”, I 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 This determination is made under the Building Act 1991 subject to section 424 of the Building Act 2004. That section came into force (“commenced”) on 30 November 2004, and its relevant provisions are:

“ . . . on and after the commencement of this section,—

“(a) a reference to the Authority in the Building Act 1991 must be read as a reference to the chief executive; and

“(b) the Building Act 1991 must be read with all necessary modifications to enable the chief executive to perform the functions and duties, and exercise the powers, of the Authority . . . ”

It should be noted that the new legislation does not amend the determination process set out under the 1991 Act, other than to transfer the power to make a determination from the Building Industry Authority (“the Authority”) to the Chief Executive.

1.4 This determination refers to the former Authority.

- (a) When quoting from documents received in the course of the determination, and
- (b) When referring to determinations made by the Authority before section 424 came into force.

- 1.5 In making my decision, I have not considered any other aspects of the Building Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.4, and paragraph 8 sets out my decision.

2 PROCEDURE

The building

- 2.1 The building is a two-storey detached house situated on an excavated sloping site in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction on concrete block foundation walls, and all the external walls are sheathed with monolithic cladding. The house is of a fairly complex shape, with the asphalt shingle tiled roofs at two main levels having hip and valley junctions, with roof/wall junctions at the lower level roofs. A tiled lean-to roof extending 1200mm from the wall face is constructed over the garage at one elevation. A short walkway extends from the laundry area and this consists of a timber-boarded deck, and a tiled roof supported on beams and monolithic clad columns. There is a projecting extension at the ground floor bathroom, and a bay window extension to the first floor dining area is set into the lower roof. A shaped extension to the stairwell extends onto the main upper-level deck. Apart from the bay window projection where the fascia is fixed directly to the cladding, the eaves have 600 mm wide projections. A chimney, which is not shown on the consent drawings, extends through the high level roof.
- 2.2 A large open balcony to one elevation is constructed over living spaces and a smaller enclosed balcony adjoining the master bedroom at the first floor level is constructed over the lower deck. The smaller balcony is supported on timber beams and columns that are encased in monolithic cladding, with the columns extending up to the upper roof level. The tiled decks of the balconies are timber framed, and have a paint-on waterproofing membrane applied to a 18mm thick plywood substrate. An integral gutter is formed at the perimeters in the membrane, which is also carried over the edge upstands. Both balconies have glazed aluminium balustrades. A tiled deck at the ground floor level is constructed with 100 mm thick concrete slabs supported on concrete block retaining walls.
- 2.3 No evidence has been provided as to what treatment, if any, was applied to the exterior wall framing.
- 2.4 The building is clad with what is described as monolithic cladding. The cladding is a particular proprietary product, installed in accordance with the manufacturer’s instructions, which include flashings to heads, jambs, sills, trims and corners. As detailed in that manufacturer's instructions (“the

instructions”), it incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through building wrap directly to framing timbers and finished with a proprietary fibreglass mesh reinforced polymer-modified cement plaster system supplied by the manufacturer of the backing sheet system. The system has been subject to an appraisal certificate from an independent testing organisation.

- 2.5 The plastering company issued a warranty dated 9 March 2004 that covered the backing system for 15 years and the coating system for 10 years. The applicator of the coating system issued a producer statement dated 1 March 2004, which also noted that the applicator was satisfied that the substrate was suitably prepared and that the required flashings were properly installed.

Sequence of events

- 2.6 A building consent was issued for the building to a previous owner some time in 1999, based on a certificate issued by a building certifier. Building work commenced in late 1999 or early 2000.
- 2.7 The owner purchased the partially completed house and arranged for new plans to be drawn up to revise the design. The building certifier approved these plans on 26 February 2001. I have not received any information as to whether the building consent has been amended to accommodate the revised design.
- 2.8 Building recommenced in February 2001, and the building certifier carried out and passed various inspections while the house was being constructed. The building pre-line inspection was passed on 20 August 2001. The original outside plastering and painting were completed by 3 September 2001.
- 2.9 The owner was dissatisfied with the standard of workmanship and following arbitration, the cladding applicator was ordered to refund the cladding contract price. According to the owner, there was a delay in the refunding these moneys, and consequently, the removal and replacement of the plaster did not take place until 20 October 2003.
- 2.10 On 28 April 2004, the building certifier wrote to the owner stating that its scope of certification had been restricted to the Approved Solutions as set out in E2/AS1. The building certifier noted that it could only issue a building certificate to cover the building works excluding the exterior cladding. All documentation would then be presented to the territorial authority that might then issue a code compliance certificate. The building certifier strongly advised the owner to obtain a producer statement from the installer/applicator of the exterior cladding system. The building certifier noted that this might aid the issue of a code compliance certificate but this could not be guaranteed.
- 2.11 Following a final inspection on 10 June 2004, the building certifier issued a building certificate on the same date and noted:
- This is a final building certificate issued in respect of the building work under the above building consent but excluding exterior cladding, gas and electrical installations.
- 2.12 On 23 July 2004, the territorial authority wrote to the owner, noting that the building certifier was unable to issue a code compliance certificate as the

cladding on the house was not an Acceptable Solution. The territorial authority stated:

In this case the building is clad in monolithic style and Council is not satisfied on reasonable grounds that it complies with the Functional Requirement of Building Code Clause E2 External Moisture.

The territorial authority went on to state that there were three methods available to achieve code compliance, and the issue of a code compliance certificate. In summary these were:

- Destructive testing /checking where the cladding or internal lining is removed to check the condition of the framing; or
- Removal of the cladding and replacement either with an alternative non-monolithic cladding, or a monolithic cladding with a suitable moisture management scheme; or
- Applying to the Authority for a Determination.

2.13 On 6 October 2004, the territorial authority wrote to the owner, attaching a code compliance certificate for a pergola at the gallery door.

2.14 The owner applied for a determination on 15 August 2004.

3 THE SUBMISSIONS

3.1 The owner set out the history of the building project including the dealings with the building certifier and the territorial authority in a letter to the Authority dated 14 August 2004.

3.2 The territorial authority in a letter to the Authority dated 6 September 2004 stated that the territorial authority declined to issue a Notice to Rectify under section 43(5) of the Act. The cladding in question fell outside the Acceptable Solutions; therefore the building certifier could not certify the cladding as being compliant. The territorial authority had not carried out any inspections, and although there was no evidence to suggest that the cladding is not compliant in terms of clause E2, the territorial authority equally had no evidence that it is.

3.3 The territorial authority wrote to the Authority on 16 November 2004, pointing out that the building certifier had not been requested to undertake inspections, and neither the building certifier nor the territorial authority had inspected the cladding. It would be difficult therefore for the territorial authority to form an opinion as to the weathertightness of the building. The territorial authority also emphasised that a monolithic cladding with a suitable moisture management system would be acceptable, and a drainage cavity is one possible method of achieving this objective.

3.4 In response to the territorial authority's letter of 16 November 2004, the owner wrote to the Authority on 24 November 2004, noting that the building certifier had been contacted and kept informed at all times. The owner claimed that the

building certifier had carried out an inspection when all the flashings were in place and some plastering had been carried out. Subsequent to the partial removal of the existing plaster, the building certifier had confirmed that both the replacement cladding and its applicator were “good”. The owner also claimed that on inquiring whether the building certifier wished to carry out further inspections, the building certifier response was in the negative. The owner was advised to get producer statements from the supplier and the applicator. This was done and these were forwarded to the building certifier who acknowledged that these were what were required and that everything was “OK”.

3.5 The owner provided copies of:

- The building plans and some consent information;
- The building certifier’s and territorial authority’s inspection notes;
- The correspondence with the building certifier and the territorial authority;
- The code compliance certificate for the pergola;
- The independent cladding appraisal;
- The coating system applicator’s producer statement and warranties from the cladding manufacturer, the membrane manufacturer, and the roofing tile supplier; and
- A set of photographs.

3.6 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. The relevant 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. I am, therefore of the opinion that the cladding system as installed must now be considered to be an alternative solution.

4.3 In several previous determinations, the Authority has made the following general observations, which in my view remain valid in this case, 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 dated 17 December 2004. It stated that the cladding is in excellent condition at present. The quality of the finishing is good and the texture/paintwork to the cladding appears sound and evenly applied with no evidence of cracking, flaking or staining. The expert noted that there were no drip edges to the cladding above the external windows and doors. However, apart from the sloping window heads, there was adequate soffit overhang at

these locations that could offset this omission. The expert removed a small section of the plaster to examine a sill/jamb intersection of one window, and found that both jamb and sill flashings had been installed in accordance with the manufacturer's recommendations. I accept that these exposed details are likely to be representative of the remaining window and door flashings. The expert's report made the following specific comments on the cladding:

- There is no evidence of vertical or horizontal control joints as required by the manufacturer's instructions. However, the expert did not identify any cracking that could be attributed to the absence of control joints;
- The 5 mm gap required between the window and door sill flashings and the cladding is, in some locations, blocked by paint and plaster;
- There are no drip moulds on the cladding where there is no soffit protection above the raking window heads along the north elevation;
- At some locations there is insufficient ground clearance to the base of the cladding above the first-floor level balcony decks;
- The timber fascia above the bay windows is installed directly against the cladding and is buried into the plaster; and
- The downpipes discharging onto the decks need to be extended down to deck level and the shoe turned away from the cladding.

5.2 The expert carried out a series of moisture tests to the interior of the house at high-risk areas, using a non-invasive meter. No internal elevated readings were obtained from these tests. The expert then took a further 2 invasive readings into the timber framing and obtained readings of 10.8% and 11.6%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.3 Copies of the expert's report were provided to each of the parties.

6 DISCUSSION

General

6.1 I have considered the submissions of the parties, the expert's report and the other evidence in this matter. The 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 research 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 In my opinion, the important matters for consideration are:
- Data show 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, it is believed 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 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. It is believed 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, I believe 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, I find that the house:

- Has, with one exception, 600mm wide eaves projections and roof overhangs that provide excellent cladding protection;
- Is built in a high wind zone;
- Is two storeys high;
- Is generally complex in plan, with roofs having hip, valley, and wall/roof junctions;
- Has exterior windows and doors that are fully flashed;
- Has two high-level balconies, and a deck at ground floor level; and
- Has external walls, which that I accept are constructed with untreated timber that is likely to decay if it absorbs and retains moisture.

Weather-tightness performance

6.8 Generally the cladding appears to have been installed according to good trade practice, and I consider it has been effective to date in preventing the penetration of water. There are, however, some defective areas of the house, which if not remedied, will eventually allow the ingress of moisture behind the cladding. These are set out below:

- The lack of vertical or horizontal control joints as required by the manufacturer's instructions;
- The lack of a 5 mm gap required between the window and door sill flashings and the cladding;
- The lack of drip moulds on the cladding above the raking window heads along the north elevation;
- The insufficient ground clearance at some locations to the base of the cladding above the first-floor level balcony decks;
- The timber fascia above the bay windows being installed directly against the cladding and buried into the plaster; and
- The downpipes discharging onto the decks in a way that channels water onto the cladding.

6.9 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and ventilation behind the cladding sheets, I find that there are compensating factors 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;
- The exterior windows and doors have effective flashings; and

- There is no moisture evident at this time in the external wall cavities.
- 6.10 I consider that these factors adequately compensate for the lack of a full drainage and ventilation cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.
- 6.11 I note that due to the cover offered by overhanging soffits, the expert does not consider that drip projection need to be installed over the window and door heads. I am prepared to accept the opinion of the expert in this matter.
- 6.12 The expert could find no evidence that vertical and horizontal control joints had been installed in the cladding and noted that there was no evidence of cracking at this time. I am of the opinion that this issue should be carefully investigated to establish the presence or otherwise of these joints. In my view, if they are not present they should be installed.
- 6.13 I note that two elevations of the house demonstrate a low weathertightness risk rating and two elevations demonstrate a medium weathertightness risk rating 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 I consider that the expert's report establishes there is no evidence of external moisture entering the house, and accordingly, that the monolithic cladding does comply with clause E2 at this time.
- 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 house to remain weathertight. Because the cladding faults in the house are likely to allow the ingress of moisture in the future, the house does not comply with the durability requirements of clause B2.
- 7.3 I also consider that because the faults in the house cladding occur in discrete areas, I am 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 6.8 have been satisfactorily rectified, this house should be able to remain weathertight and thus comply with both clauses E2 and B2.
- 7.4 I note that effective maintenance of monolithic claddings is important to ensure ongoing compliance with clause B2 of the building code. That maintenance is the responsibility of the building owner. The code assumes that the normal maintenance necessary to ensure the durability of the cladding is carried out. For that reason clause B2.3.1 of the building code requires that the cladding be subject to "normal maintenance". That term is not defined and I take the view that it must be given its ordinary and natural meaning in context. In other words, normal maintenance of the cladding means inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.

- 7.5 I emphasise 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 I decline to incorporate any waiver or modification of the building code in this determination.

8 THE DECISION

- 8.1 In accordance with section 20 of the Act, I determine 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, I find that the house does not comply with clause B2. Accordingly, I confirm the territorial authority's decision to refuse to issue the code compliance certificate.
- 8.2 I find that once the items of non-compliance that are listed in paragraph 6.8 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 I note 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 me 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 Chief Executive for another determination.
- 8.4 Finally, I consider that the cladding will require on-going maintenance to ensure its continuing code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 11 February 2005.

John Gardiner
Determinations Manager